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INTRODUCTION

This Prodeedings comprises papers from the **International conference on Information technology and development of education** that is held in the ”Vojvodina” Hotel in Zrenjanin on July 1st 2011.

The International conference on Information technology and development of education has had a goal to contribute to the development of education in Serbia and in the region, as well as, to gather experts in natural and technical sciences' teaching fields.

The expected scientific-skilled analysis of the accomplishment in the field of the contemporary information and communication technologies, as well as analysis of state, needs and tendencies in education all around the world and in our country have been realized.

The authors and the participans of the Conference have dealt with the following thematic areas:

- Theoretical and methodological questions of contemporary pedagogy
- Curriculum of contemporary teaching
- Methodical questions about the realization of natural and technical sciences teaching
- Lifelong learning and professional upgrading of teacher
- E-learnin
- Management in education
- Information technology development and its influence on education

All submitted papers have been reviewed at least two independent members of the Science Committee.

The papers presented on the Conference and published in this Proceedings can be useful for teacher while learning and teaching in the fields of informatics, technics and other teaching subjects and activities. Contribution to science and teaching development in this region and wider has been achieved in this way.

The Organizing Committee of the Conference

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CONTENTS

TWO MAJOR ASPECTS OF HIGHER EDUCATION – AUTONOMY AND RESPONSIBILITY

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Abstract - Objectives of this paper are: overview of current higher educational system in India, presenting concepts of autonomous policy at university higher education and major responsibilities of higher education universities.

I. INTRODUCTION

The universities in India play a very important role not only in the sustenance of a just and vibrant society but also in the continuation of its rich democratic tradition. In fact a few universities in India are playing an excellent job of producing enlightened citizens for the nation. But with the growth of the economy, the Indian Universities and other institutes of higher education have faced with a new challenge.

As India is already very large in terms of population, the need of the hour is transform the unproductive human resources to productive human capital. This again calls for making quality and relevant higher education accessible to a large section of the population and huge investment in the education sector.

Human Resource Development (HRD) of the country depends on certain decision policies. Among these, one of the prime factors is the “Education”. The policy decision for the Higher Education is the most important factor of the HRD, as this helps in personal development of the citizen of the country. It also helps to guide / built the carrier of individual.

Modification, upgrading and updating in the field of higher education, should be implemented regularly. To move in this direction, most of the Universities/ colleges have been given the status of “Autonomous” by the HRD of India.

II. HIGHER EDUCATION SYSTEM IN INDIA

A. *History of University Development*

India is a highly populated country in the world (the second largest populated country (next to China). It has one of the largest “Higher Education system” in the world. This can be viewed from the Table I.

Receiving higher education, once the nearly exclusive domain of the wealthy and privileged, since independence has become the aspiration of almost every student completing high school. In the academic year 1950-51, there were some 360,000 students enrolled in colleges and universities; by the academic year 1990-91, the number had risen to nearly 4 million, a more than tenfold increase in four decades.

At that time, there were 177 universities and university-level institutions (more than six times the number at independence), some 500 teacher-training colleges, and several thousand other colleges. Out of these 177 universities in the country, only ten are funded by the central government. The majority of universities are managed by the states, which establish them and provide funding.

TABLE I. HIGHER EDUCATION IN INDIA - HISTORICAL AND STATISTICAL OVERVIEW

Year	Number of Universities	Number of Colleges	Number of Students	Number of Teachers	Teacher –Student Ratio
1950- 51	30	750	2,63,000	24,000	10.96
1998-99	238	11,089	74,17,000	3,42,000	21.69
2009-10	More than 400	25,951	N.A.	N.A.	N. A.

B. Universities

In India, there are four categories of universities.

- The first type: The largest numbers are teaching universities that maintain and run a large number of colleges. That means colleges are affiliated with the respective universities.
- The second type: Unitary institutions, such as Allahabad University and Lucknow University.
- The third type: The 26 agricultural universities, each managed by the state in which it is located, generally called State level universities.
- The forth type: Technical universities (such as the IIT, the world class prestigious university)

In the late 1980s, more technical universities, such as the Jawaharlal Nehru Technological University in the state of Hyderabad, were founded. There were also proposals to found medical universities in some states. By 1990 Andhra Pradesh and Tamil Nadu already had established such universities.

State governments play a powerful role in the running of all but the national universities. The state governor is usually the university chancellor, and the vice chancellor, who actually runs the institution, is usually a political appointee.

C. Institutes

Realizing the urgent need of revamping the Indian higher education system the Ministry of Human Resources Development has proposed to establish 8 new Indian Institutes of Technology, 7 Indian Institutes of Management and thirty 30 Central Universities under the 11th five-year plan. Out of these 30 Central Universities, 14 would be World class Universities.

Some of the institutes that are associated with Universities of India are:

- University Grants Commission (UGC) of India is a body of the central government that provides support to the government-recognized universities and colleges with funds. The University Grants Commission of India or UGC provides recognition to the universities in India. UGC also conducts the NET exams. This examination is for the recruitment of teachers in colleges and universities.
- All India Council for Technical Education (AICTE) is a body that is involved in the systematic planning and organized development of the technical education system in the country. Presently, there is a total of 1,346 engineering colleges all over India, that have been approved by the All India Council of Technical Education. The headquarters of AICTE is in New Delhi.
- Association of Indian Universities (AIU) is an organization that is located in Delhi. The organization is involved in the evaluation of courses, standard and syllabus and acts as liaison between the universities of India and the government. They include:
    - Central Universities in India
    - Open Universities in India
    - Deemed Universities in India
    - Deemed Universities Status Aspiring Institutes in India
    - Agricultural Universities in India.

D. Colleges

There are three kinds of colleges in India:

- The first kind: Government colleges. They are generally found only in those states where private enterprise is weak or which were at one time controlled by princes.
- The second kind: These are colleges managed by religious organizations and the private sector. Many of the latter institutions were founded after 1947 by wealthy business owners and politicians wishing to gain local fame and importance.
- The third kind: Professional colleges consist mostly of medical, teacher training, engineering, law, and agricultural colleges. More than 50% of them are sponsored and managed by the government. However, about 5% of these colleges are privately run without government grant support, called as "Self-finance" colleges. They charge fees of ten to twelve times the amount of the government-run colleges.

Course type-wise number of colleges in India in 2001-2002 statistics (January 1,2002) is presented as follows:

- Arts, Science, Commerce & Oriental Learning Colleges: 11128. These colleges are not necessarily be exclusive for Art/Science/Commerce courses. Some of the colleges are also offering professional courses like Teacher's training, Journalism, LflV etc. in addition to the Arts/ Science/ Commerce courses.
- Teachers Training: 784
- Engineering/Technology/Architecture: 1077
- Medical: 1253. Break-up of Medical Colleges:
    - Allopathy: 262
    - Ayurveda: 189
    - Homeopathy: 141
    - Unani/Tibbia: 29
    - Dental: 142
    - Nursing: 122
    - Pharmacy: 241

  - Physiotherapy: 120
  - Naturotherapy: 5
  - Public Health: 2
- Agriculture: 106
- Veterinary Science / Animal Science: 50
- Law: 368
- Others (Includes colleges exclusive for Library Science, Physical Education/Yoga, Music / Fine Arts, Social Work, Journalism / Mass Communication etc. & Colleges for which type not availAble): 671
- Total Colleges: 15437
- Total Recognized Universities: 196
- Premier Colleges: 8,111
- Polytechnics: 887
- Students Enrolled in Regular University-level courses: 4.7 million
- The University Grants Commission (UGC) 2002-03 estimates states that there are 92,27, 833 enrollments in various Universities & Colleges, out of which 36,95,964 (40.05%) are women students.

E. Human resources implications

The profusion of new engineering colleges in India in the late 1980s and early 1990s caused concern in official education circles that the overall quality and reputation of India's higher education system would be threatened by these new schools, which operated mainly on a for-profit basis. As the government tightened its support to higher education in the early 1990s, colleges and universities came under considerable financial stress.

There was a high rate of attrition among students in higher education in the 1980s. A substantial portion failed their examinations more than once, and large numbers dropped out; only about one out of four students successfully completed the full course of studies. Even those students who were successful could not count on a university degree to assure them employment.

In the early post-independence years, a bachelor's degree often provided entrance to the elite, but in contemporary India, it provides a chance to become a white-collar worker at a relatively modest salary. The government traditionally has been the principal employer of educated man-power.

III. Schemes of Autonomous Colleges Universities

A. Introduction

Highlighting the importance of autonomous colleges, the UGC document on the 10th Plan profile of higher education in India clearly states that: "*The only safe and better way to improve the quality of undergraduate education is to delink most of the colleges from the affiliating structure"*.

It has been noted that colleges with academic and operative freedom are doing better and have more credibility. The financial support to such colleges boosts the concept of autonomy.

It is proposed to increase the number of autonomous colleges to spread the culture of autonomy, and the target is to make 10 percent of eligible colleges autonomous by the end of the Plan.

B. Need for Autonomy

The affiliating system of colleges was originally designed when their number in a university was small. The university could then effectively oversee the working of the colleges, act as an examining body and award degrees on their behalf. The system has now become unwieldy and it is becoming increasingly difficult for a university to attend to the varied needs of individual colleges. (Refer Table 1)

The colleges do not have the freedom to modernize their curricula or make them locally relevant. The regulations of the university and its common system, governing all colleges alike, irrespective of their characteristic strengths, weaknesses and locations, have affected the academic development of individual colleges.

Colleges that have the potential for offering programs of a higher standard do not have the freedom to offer them.

In 1964-66, The “Education Commission” pointed out that the exercise of academic freedom by teachers is a crucial requirement for development of the intellectual climate of our country. Unless such a claim ate prevails, it is difficult to achieve excellence in our higher education system.

With students, teachers and management being co-partners in raising the quality of higher education, it is imperative that they share a major responsibility. Hence, the Education Commission (1964-66) recommended college autonomy, which, in essence, is the instrument for promoting academic excellence.

C. Objectives

The National Policy on Education (1986-92) formulated the following objectives for autonomous colleges. An autonomous college will have the freedom to:

- Determine and prescribe its own courses of study and syllabi, and restructure and redesign the courses to suit local needs; and
- Determine and prescribe its own courses of study and syllabi, and restructure and redesign the courses to suit local needs; and
- Prescribe rules for admission in consonance with the reservation policy of the state government;

- Evolve methods of assessment of students performance, the conduct of examinations and notification of results;
- Use modern tools of educational technology to achieve higher standards and greater creativity; and
- Promote healthy practices such as community service, extension activities, projects for the benefit of the society at large, neighbor-hood programs, etc.

D. Relationship with the parent university &, the state government and other educational institutions

Autonomous colleges are free to make use of the expertise of university departments and other institutions to frame their curricula, devise methods of teaching, examination and evaluation. They can recruit their teachers according to the existing procedures (for private and government colleges).

The parent university will accept the methodologies of teaching, examination, evaluation and the course curriculum of its autonomous colleges. It will also help the colleges to develop their academic programs, improve the faculty and to provide necessary guidance by participating in the deliberations of the different bodies of the colleges. The role of the parent university will be:

- To bring more autonomous colleges under its fold;
- To promote academic freedom in autonomous colleges by encouraging introduction of innovative academic programmes;
- To facilitate new courses of study, subject to the required minimum number of hours of instruction, content and standards;
- To permit them to issue their own provisional, migration and other certificates;
- To do everything possible to foster the spirit of autonomy;
- To ensure that degrees/diplomas/certificates issued indicate the name of the college;
- To depute various nominees of the university to serve in various committees of the autonomous colleges and get the feedback on their functioning; and
- To create separate wings wherever necessary to facilitate the smooth working of the autonomous colleges.

The state government will assist the autonomous colleges by:

- Avoiding, as far as possible, transfer of teachers, especially in colleges where academic innovation and reforms are in progress, except for need-based transfers;
- Conveying its concurrence for the extension of autonomy of any college to the Commission within the stipulated time of 90 days after receipt of the review committee report, failing which it will be construed that the state government has no objection to the college continuing to be autonomous; and deputing nominees on time to the governing body of government colleges and other bodies wherever their nominees are to be included.
- Conferring autonomous status - Autonomous status covers certificate, diploma, undergraduate, postgraduate and M.Phil. programs offered in colleges that are autonomous and those seeking autonomous status.
- The parent university will confer the status of autonomy upon a college that is permanently affiliated, with the concurrence of the state government and the University Grants Commission.
- The Act and Statutes of the universities ought to be amended to provide for the grant of autonomy to affiliated colleges.
- Before granting autonomy, the university will ensure that the management structure of the applicant college is adequately participatory and provides ample opportunities for academicians to make a creative contribution.

IV. MECHANISM FOR IMPLEMENTATION OF AUTONOMY

A. Preparing a College for Autonomy

There are several areas where proper preparation is necessary if college autonomy is to be implemented successfully. These are:

- Faculty preparation,
- Departmental preparation,
- Institutional preparation, and
- Preparation of students and the local community.

Such multi-pronged preparation should be completed well before autonomy is sought and conferred upon a college so that no part of the college community is found unprepared for the new responsibility which it is called upon to shoulder.

1) Faculty Preparation

It is essential to get the staff of the college involved in the thinking and planning processes from the very beginning. Seminars, workshops and consultations may be organized to make the staff familiar with the concept, objectives and rationale of autonomy. This will help them have a sense of participation in decision making and motivate them to get involved in the entire exercise. This could form part of the academic calendar of the college.

2) Departmental Preparation

An important responsibility of the department is that of designing suitable courses in the major and related subjects, introducing new courses of study, renaming obsolete courses by changing their content, updating existing courses to match the current state-of-the-art in each discipline, and preparing course materials and human resources.
These will be done in the light of the general objectives of autonomy and the specific objectives of the education institutions. Common programs to be adopted are:

- Semester pattern of study
- Continuous internal assessment
- Credit/grading system
- Student feedback
- Self-appraisal by teachers

3) Institutional Preparation

Since an autonomous college is called upon to perform many of the functions that the university has hither to performed, it must study the academic, administrative /management and financial implications of such a changeover and prepare itself to discharge its new functions efficiently.

4) Preparation of students and the local community

The students are the most important factor in each field of education. They should be aware of the benefits of autonomy in higher education. Students of today's class are the real assets of the country. They should be provided up dated knowledge / technologies used in the respective fields. These will help to face any challenges come from any fields.

V. RESPONSIBILITIES TOWARDS AUTONOMOUS INSTITUTIONS

Once the needs and objectives of autonomous institutions have been justified and implemented, corresponding responsibilities of these institutions are also increased. It is very essential for each autonomous institution to maintain the purpose and motto of autonomous in the field of higher education, The management and the administrative authority of these autonomous institutions should work within the certain frame work of working-criterion. The autonomous does not mean the management of this institution works / acts without any legal / moral control. The followings are few issues to be taken very sensible:

- The teaching staff and non-teaching staff should kept more secure for their jobs. Their job conditions should be well satisfied, so that they will fully cooperate in the functionality of autonomy.
- Academic standard should be well maintain and up graded as per the needs in their respective fields.
- The fee structures of the students should be well balanced and maintained properly to generate proper funds.
- The institutions should join their hands with various industries. The industries not only can sponsor but also recruits the students after the completion of their higher degrees.
- Latest and more feasible facilities should be provided to the students of these institutions.
- Networking and internet should be very fast during 24 x 7 period of time.
- On line teaching / interacting with students should be implemented.
- Autonomous institutions should progress better than other general institutions.

If the responsibilities of institutions / universities having autonomous status are not fulfilled, then U.G.C. of India has full authority to cancel the autonomous status with penalty! Here is the recent evidence that U.G.C., India's apex higher education regulator, has declined to confirm autonomous status to city-based BMS College of Engineering at Banglore.

While two other prestigious colleges – St. Joseph's College and Jyoti Nivas College – have got their autonomous tag extended up to 2015-2016. However, the regulator has imposed a condition that the colleges should not offer any course that is not approved under section 22 of the UGC Act. Autonomous status allows colleges to design their own curriculum, conduct exams and even announce results. The degree, however, will be awarded by the affiliating university.

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DIGITAL COMPETENCE IN THE PROFESSIONAL PROFILE OF THE TECHNOLOGY EDUCATION TEACHER

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Abstract - The article focuses on digital competence viewed as a complex notion construct. The structural configuration of digital competence has been defined through theoretical analysis, conclusions and the requirements of the European Reference Framework. The functions and the relation between the main constituent of digital competence- knowledge, skills and attitudes have been analyzed. Through the integration of three basic dimensions- the technological, cognitive and ethical, the contents frame of the key competences for technology teachers has been outlined.

I. INTRODUCTION

Digital competence is defined as one of the eight key competences within the European Reference Frame for the levels of professional qualifications. The Framework document was approved by the European Parliament and the European Council in 2006 and since then has become main orientation point for the major changes happening on all educational levels. As it is well known, the changes aim at harmonizing the main parameters of the educational systems in all European Union countries; the objective being the creation of a unified European educational space. A major part in this process is played by the key competences for lifelong learning as a tool for providing the necessary quality of modern 21st century education.

In its essence the European Reference Framework for key competences is a manifestation of a new education policy- one not defined as in the past by opposing political ideologies but an education policy based on such social and economic arguments as globalization, growth, steady development, high qualification, career development and life-long learning. It is on this basis that the eight key competences are pointed out and defined, which is doubtlessly useful both semantically (clear semantic configuration) and terminologically (unified terminological approach). In this sense digital competence, which is the subject of this paper, and the rest of the key competences (communication in the mother tongue, communication in foreign languages, mathematical competence and basic competences in science and technology, learning to learn, social and civic competences, initiative and sense of entrepreneurship, cultural awareness and expression) are seen as a structural definition and contents of certain knowledge, skills and attitudes.

II. DIGITAL COMPETENCE AS A COMPLEX NOTION CONSTRUCT

According to the definition within the Reference Framework the essence of digital competence involves ‘the confident and critical use of Information Society Technology (IST) for work, leisure and communication [1]. As the definition shows digital competence should be viewed as a complex notion construct, which is confirmed by the opinion of Lars Adreasen expressed in his article ‘Digital competence and ICT in relation to education and lifelong learning’ where he says: ‘I see digital competence as what is needed for being able to act; to learn play and work in a society, which is more depending on digital computer-mediated networks. ICT is in different ways becoming an integrated part of the working life, the education, and the everyday life, and therefore practically everybody- a nurse, a child, an unskilled worker- must know how to handle ICT in different circumstances” [2].

We have to note, however, that other authors who have their attention on digital competence focus on purely technical characteristics and tools (mainly software applications) and by doing so make them extremely important in developing digital competence and at the same time claim them a prerequisite for the modern individual to have high-quality lifestyle and successful career.

This trend is easily understood as technology developers have turned digitalization from a dreams-and-ideals-filled space into a modern tool for a more realistic perception of the processes and phenomena of our environment, a tool that makes communication more efficient and, not less importantly, helps individuals identify themselves professionally in a global society. In this sense the notion of digital competence is overloaded with semantic meanings dominated by the leading presence of information and communication technology (ICT) and its related applications which are characterized as having a multiplying effect. Thus, the following questions arise:

1. What is the 'volume' of the digital competence notion?
2. Which one of its structural components prevails- knowledge, skills or attitude?
3. How should the notion of digital competence be operated with in all the private cases of educational practice and how should it be approached?

In its nature and meaning each of the above questions outlines the field for theoretical, empirical research and more complex analyses – psychological, educational, technical and technological, sociological, methodical, etc. They are extremely important in achieving a unified understanding for the genesis and development of digital competence not only as a technical and technological construct within the educational environment but also as a psychological and pedagogical construct within the modern education of the students and the professional qualification of their teachers.

The personal observations I have made as a university professor and an author working in the field of technology education in secondary school grade and also training qualified technology education teachers have led me to the conclusion that generally the matter of the competence approach in education has been developing in a positive way. In Bulgaria the research of N. Tsankov and L. Genkova are among those which have led to precision in the understanding for the nature of the not clearly defined conceptual pair **competence – competency** [3]. New features in the nature and role of digital competence have been outlined by R. Marinov [4] whose efforts are concentrated in the field of **efficient communication**. In Serbia S. Popov and M. Danilovic have been working for long years to make technology education in secondary-school grade more modern by introducing ICT and by making digital competence a leading factor in the training of technology education teachers [5]. In practice experts have given high evaluation to the work of D.Glusac [6]. In Russia the work of S. N. Babina, E. F. Sharipova and A. S. Tihonov [7] in the field of 'technology and entrepreneurship' has also contributed to better understanding of digital competence.

III. STRUCTURAL CONFIGURATION OF DIGITAL COMPETENCE

In order to fully form and develop digital competence in the different stages of education, it is necessary to point out its main structural constituents and their subordination. There are different approaches in differentiating the constituents of each type of competence and their relations. For instance, Russian scholars accent on the activity-based and personal approaches when discussing the structure of the competences in the professional profile of the technology teacher. In Bulgaria, R. Marinov puts the stress on the relation between *communication and professional identity* [4] when discussing the structure of digital competence. When clarifying the role of the competence approach in education N. Tsankov differentiates between competence and competency, seeing it as a pair relation between concept and event (competence and performance). Distinguishing between competence and competency helps identifying competence as a personal subjective characteristic and competency as an objective, performance characteristic. This pair relation allows both terms to be used in scientifically correct and adequate manner and projected in technological variants for their formation and development through the different levels of school education [8].

The notional and terminological relation between competence and competency and its thorough identification is related to the more precise defining of the character of the relation they have with another pair of terms (notions)- that of *knowledge and skills*, which are said to have more scientifically determined features. As it can be seen from the European Reference Framework for key competences the basic structural elements of each competence include knowledge, skills and attitudes. In the Frame document knowledge within the structure of digital competence is related to being familiar with the basic computer programmes, ways of saving and distributing data and understanding of the potential risks of using electronic means of communication through the internet. The skills include collecting and processing of information to be used in critical and systematical manner; also skills for assessing information and distinguishing between real and virtual but at the same time recognizing the relations between them; skills for using tools for creating and presenting information, internet based services; skills for searching for and understanding complicated data. The relations within the structure of digital competence should be based on the interest and motivation for critical, responsible and safe use of technology in information space.

IV. Aspects of the digital competence of technology teachers

Technology teachers in Bulgaria are trained in a Bachelor's programme with four year course of study at two Bulgarian universities- The South West University 'Neofit Rilski' in Blagoevgrad and the University Of Shumen (in the town of Shumen). One of the main documents determining the required professional qualification before the approval of the European Reference Framework did not have into account key competences. This can be explained to some extend by the past theory and practice in which different models and interpretation for the application of competence approach existed. We have to also say that the European Reference Framework for key competences is still considered by some applicable only for secondary school education. In the meantime higher education lacks a unified model for determining requirements for professional qualifications and therefore it is necessary to harmonize them through the requirements of the European Reference Framework. A successful example of such harmonizing fulfilled has been given by a project completed in the Department of Education in the South –West University. The completion of the project allows within the specialty 'Technology Education' the following competences to be determined as essential for the professional profile of the technology teacher:

- Educational
- Psychological
- Special Methodological
- Mathematical and Scientific
- Digital
- Foreign Language
- Technological.

The European Reference Framework has defined the necessary knowledge, skills and attitudes for each competence. The approach of A. Calvani, A. Cartelli, A. Fini, M. Ranieri, has been used to develop a model for assessment of digital competence based on its following aspects: cognitive, technological and ethical. According to the authors, the cognitive dimension determines the ability to read, choose, interpret and assess data and information, while bearing in mind their reliability and adequacy; the technological aspects includes the ability to flexibly find and research problems in the modern technological conditions; the ethical dimension is related to the possibility for realization of relations with other people through technological means in a constructive and responsible manner [9].

The integration of these three aspects allows us to determine the contents frame for the digital competence of technology teacher and set the following requirements to the professional profile of the technology teacher. The technology teacher:

- knows the natural world well and understands the role of ICT and possibilities it provides;
- knows the basic and specific characteristics of e-based education;
- knows the work principles and understands the exploitation of automatic devises and digital technology used in the process of education.
- has skills to use visualization through ICT in the technology education of students of different ages.
- has skills to create e-based education materials for the technology education of the students;
- has skills to use and adapt educational software for the technical and constructional activities;
- has skills to use school administrative software;
- has skills to manage and direct the process of creating the student's portfolio;
- has managing skills to organize the work of students in web communication projects;
- has positive attitudes towards the ethical principles and norms of healthy and safe use of ICT.

V. Conclusion

The efforts to identify digital competence within the qualification frame of the teacher have led to the conclusion that the term is very broad and has great integrative force, which determines its leading role in the system of internal links and relations of all key competences. The notion is characterized by an extremely dynamic contents determined by the fast changing processes in ITC. The social and ethic aspects of this type of competence are also to be paid attention to because they add to key competence another aspect – that of value, which will allow the analysis and construction of digital competences and all other key competences not only within the relation competence- competency but also within the relation value- competence. In that sense, one of the expected positive results when assessing the level of professional qualifications of technology teachers will be the development of a personal attitude in the teacher towards digital competence. It is expected that trained technology teachers will 'achieve understanding of digital competence and its educational potential as well as the possibilities it gives for integration in the process of education' [10].

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ICT TOOLS FOR GOOD MANAGEMENT OF THE SCHOOL

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Abstract - School is to some extent a joint action of parents, pupils and teachers. To achieve optimum results, it is imperative that from time to time to gather information to show the success or failure of our efforts. The responses of parents and students to surveys enable us to improve the quality of our teaching-learning and collaboration.

I. INTRODUCTION

Popularization and application of Internet technologies have caused another big jump in full use of current technology to the information. Through the Internet, people are able to purchase any digital information and to communicate with anyone, anywhere and at any time.

A. *Collection of data for knowledge of reality in school*

The access to education is a complex concept and that's why it has to be looked at from different perspectives when we analyze the real situation in a school.

The following should be taken into consideration: physical access, how welcoming the school is, to what extend the school is part of the community, to what extend the school offers to the parents the possibility of having access, the availability and accessibility of the corresponding educational aids, the level of cooperation of the school staff (principal, teachers, administrative and auxiliary staff) in order to ensure the access to education.

B. *Strategy for evaluating the quality of teaching*

Strategy for evaluating the quality of teaching can be done at school level by submitting a complex questionnaire, regarding the number of approached items and dimensions, filled in by all the pupils.

Analyzing the answers can allow taking two types of data:

- **Global evaluation**– by establishing the pupils expectations regarding the quality of teaching, delimiting the educational coordinates that the students expect from the teachers;
- **Individual evaluation** of the teachers (direct feed-back) by the pupils through characterizations.

C. *Parents – partener in the educational process*

Parents' participation to the decisions and the quality of the educational act is made by:

- Parents meetings which are periodically held by the form teachers
- Parents' representative board
- Questionnaires periodically submitted on different themes (especially regarding the educational process).

D. *Collecting data using InfoPath and Outlook forms*

The characteristic of collecting data, in the Office Access 2007/2010, helps us collect data using Outlook and, optional, InfoPath. An InfoPath or HTML form can be produced and it can be included in the content of an email. Then the form can be send to all the selected addressees from the Outlook contacts or to the addressees' names storaged in a field from the Access data base.

Ms Access 2007/2010 makes it easy to collect the data from persons located anywhere on the globe.

In order to use this tool, you must have **Outlook 2007/2010** installed, to help you generate and send an email containing a form for introducing data. When the addressees fill in the forms and send them back, the answers are processed depending on the specifications.

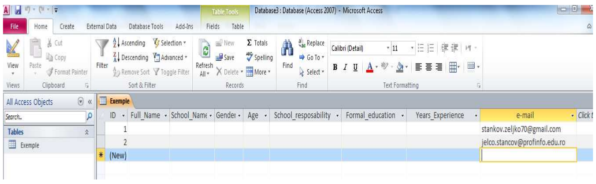
For example, if you choose the answers to be processed automatically, the content of the form is added to the data base when the answer reaches the

Inbox. This characteristic can help you save hours that you would have spent introducing data for the users.

Example

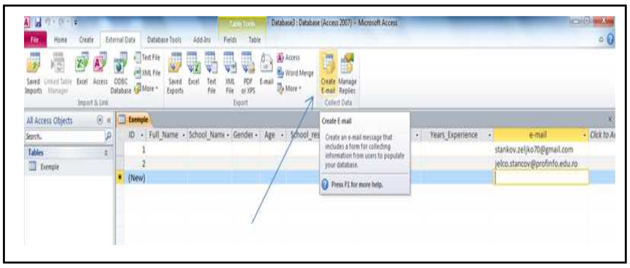
We will send an email through which, all pupils/parents will fill in certain data regarding the given questionnaire.

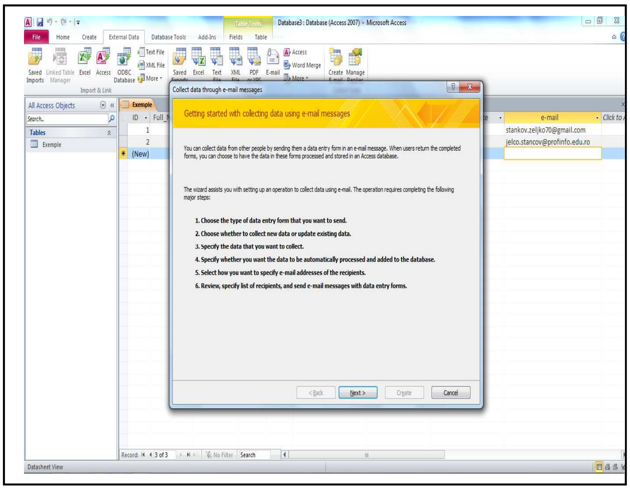
In order to be able to send an email to each pupil/parent, we must insert a column which contains their email addresses.



After a right click on the table which will collect the information, from the contextual menu we will choose the option **Collect and Update Data via E-mail.**

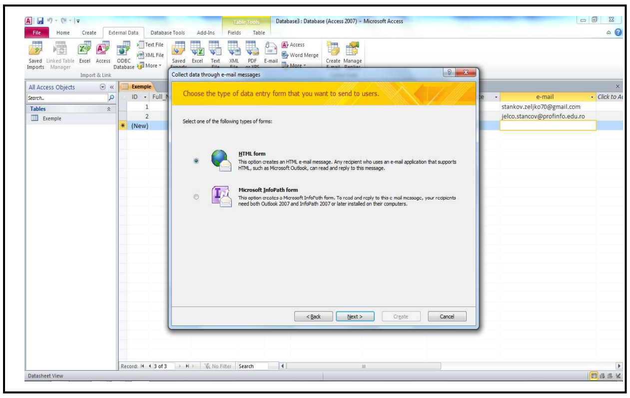
Firstly, the wizard displays the steps we are about to follow.





The wizard will display two ways of collecting the data:

- HTML or InfoPath forms; for our example we will work with **HTML** forms

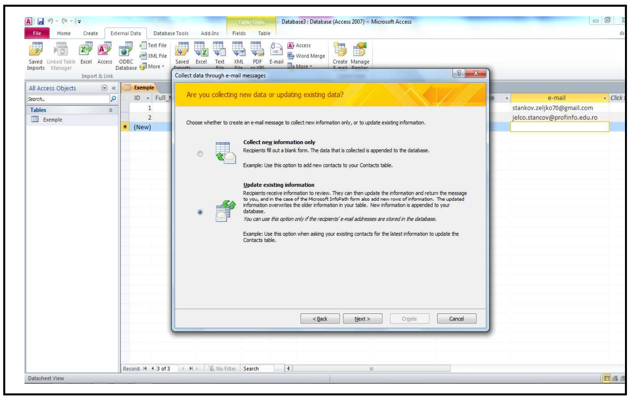


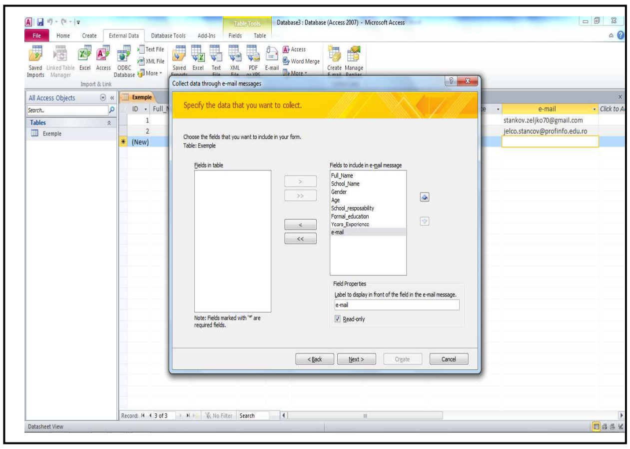
We are asked if we collect new data or upgrade the already existing data in the data base.

Now we establish which fields to be displayed within the form for collecting the data.

In addition, we can decide which fields to be upgraded.

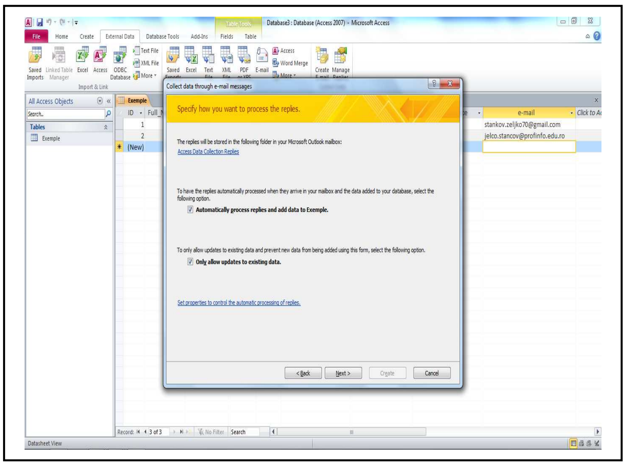
In order to avoid damaging the existing data, we'll make **Read-Only** email fields.





Within this step we will specify the way in which the answers will be processed.

We want these answers to be automatically processed and in addition, we will establish to be accepted only the data that allow upgrading the data base not the new data.



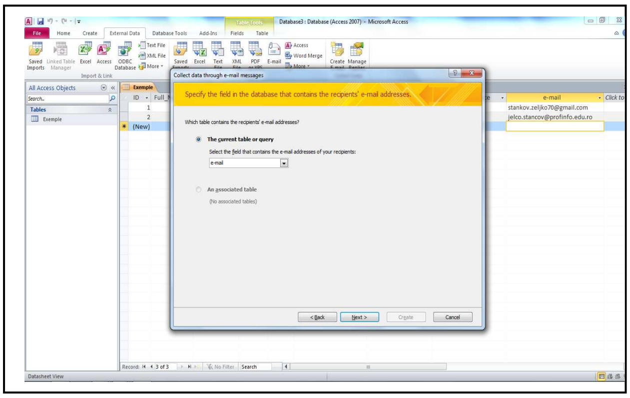
At this moment we have to specify which the data base field is that contains the email addresses.

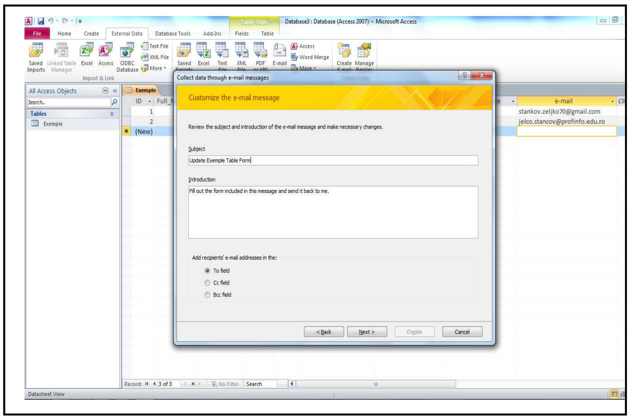
Access detected which that field was and displayed it.

This step allows us to customize the message that's going to be sent. We can add a subject and an introduction.

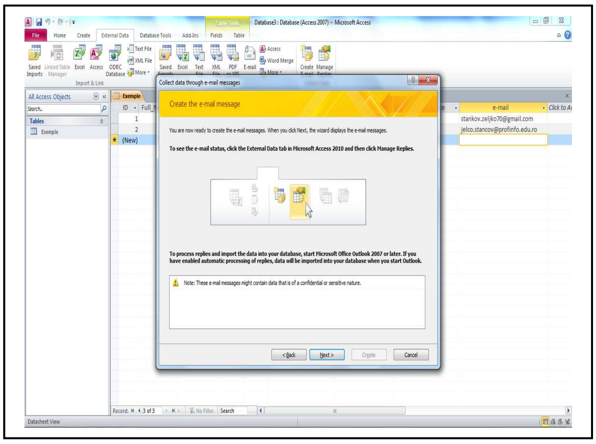
In addition, we can decide where the email addresses to be introduced:

- in To field;
- in Cc field;
- in Bcc field.



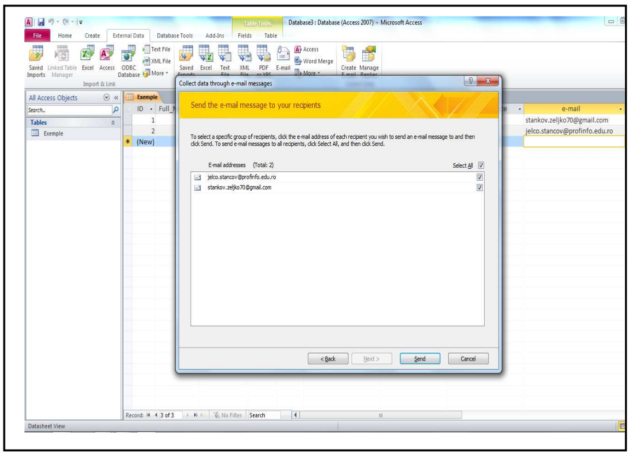


Now the wizard lets us know that the message is created and we can see the state of the sent message, by accessing **External Data** tab from the ribbon of the Access programme.

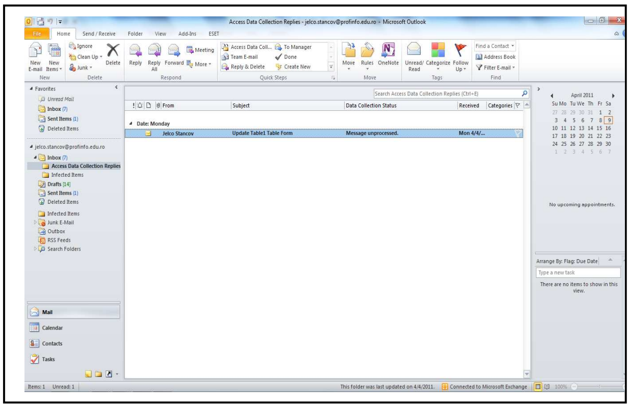


Within the last step the email addresses to which this email will be sent are displayed to us.

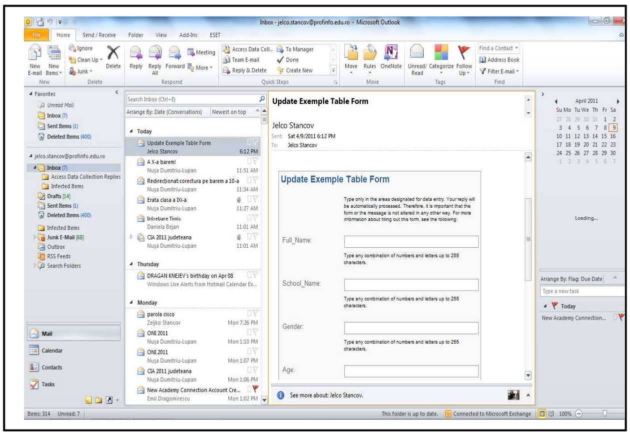
In order to prevent the errors linked to processing the answers, we'll close the data base.



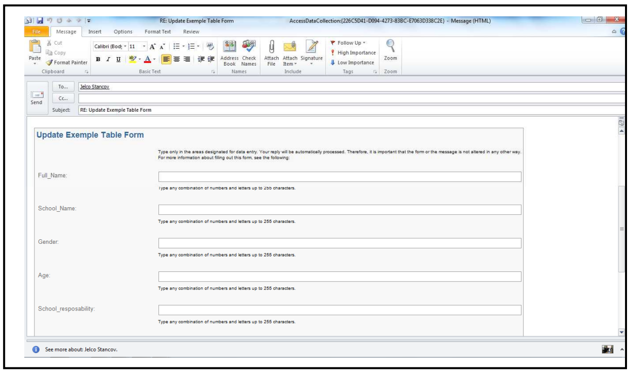
At this moment, in Outlook there has been attached a new folder within the **Inbox** folder. In this folder there will be the messages that are going to be processed to upgrade the data from the data base.



In the first phase we can notice the subject field and the content of the message. These are those specified by us in the previous steps. Below, there is a form for introducing the data.



This is the form for introducing the data asked by the data base administrator. In order to be able to fill in the form, we will have to answer this message. Each message contains a code in the content of the subject. This code is called **GUID (globally unique identifier)** and it is a unique code generated by Access to be able to manage the received answers.



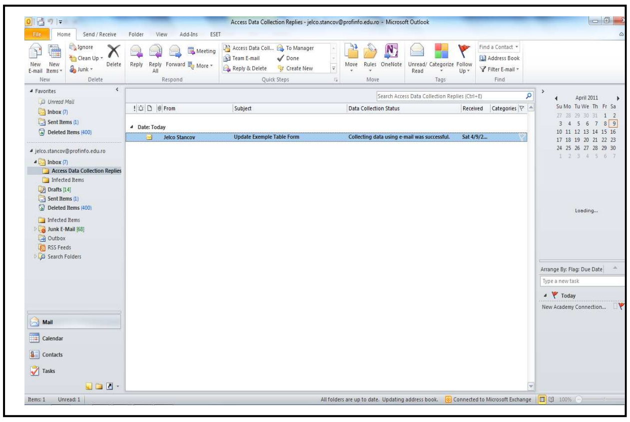
possibility to introduce data, we have the text: **Read-Only**, and at the other fields there in a text telling us what data are accepted.

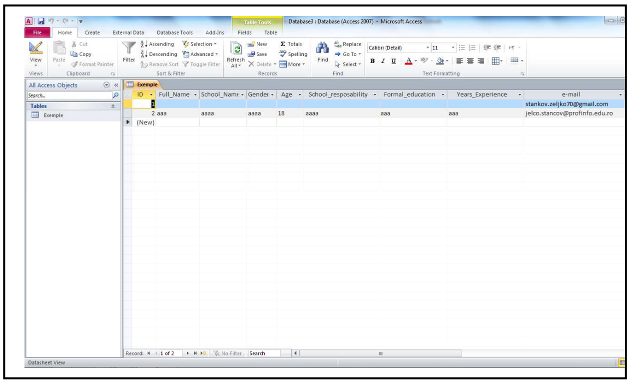
After filling in all the required data, we will send the message.

Now your message will be received in the folder created by Access in the email client.

As soon as it arrived, the massage was processed and the data were included in the data base.

As you can see, the data filled in by the pupils/parents have been added to the data base.





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IMPROVING THE TEACHING OF INFORMATICS IN B&H THROUGH LEARNING IN THE NETWORK ENVIRONMENT

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Abstract - This paper contains the base of modern information society dealing with basic principles of studying, information literacy, and competences for lifelong education, and information and communication technologies (ICT) as bases of information society. The problem of this is elaborated in detail. The emphasis is put onto students, as well as on the analysis of their use of network environment from the point of view of education.

I.. INTRODUCTION

Modern formal education requires continuous monitoring and use of ICT achievements in the education practice in order to create hypotheses for information literacy and training for achieving competition advantage. The achieved level of development and teaching Informatics in B&H lack systematic and methodological forming of strategy for institutional implementation of interactive learning of Informatics, which is the basis for the information literacy of the entire country.

The goal of the research is the primary-school students' research and analysis of the relevant elements of the education system in B&H from the point of view of ICT. A special emphasis will be put on studying of: Informatics, interactive studying of contents of Informatics in the network environment, tools for studying through the network, studying through the Internet (using Internet services, search services and agents).

II. RESEARCH GOAL

Scientifically established and systematically implemented strategy of the interactive studying of Informatics in the network environment – is the relevant factor for faster and more efficient managing of ICT.

The goal of the research is the analysis of the existing condition in the frame of Information literacy in higher grades of primary school, as well as the role of computer networks in interactive studying of Informatics – as the available ground in all cantons. [1]

III. SCIENTIFIC METHODS, RESEARCH ACTIONS AND INSTRUMENTS

In order to conduct this research, we studied all available scientific and professional literature [2], [3], internet sources and schedule documents related to education and opinion poll was conducted among students and teachers of Informatics in primary school.

Interrogation method was used in the empirical part, i.e. students and teachers were polled in order to collect as many as possible relevant data. The descriptive statistic method was used in the part of interpretation of the research results.

A. Recent cognitions

Analysis of the recent condition in the research area included elaboration of the on-line education, E-learning and Internet in the function of studying [4]. Strategies for improving teaching Informatics, presence of multimedia teaching devices for achieving efficiency in teaching Informatics, function of the teacher in improving efficiency of teaching Informatics, modern trends for evaluating students' knowledge, implementation of the mechanisms for self-evaluation of the quality and efficiency of teaching Informatics and new concepts in the education environment of the open distant surroundings were questioned and implemented as well.

IV. RESEARCH DESCRIPTION

Elements included in the research related to teaching staff, i.e. to teachers of Informatics in primary school, participation of the students of higher grades of primary school attending Informatics classes, material and space conditions, as well as equipment of primary school for teaching Informatics and opinion of teachers of Informatics.

Research was conducted in the entire B&H, i.e. it included territories populated mainly by the Bosnians, the Croats, and the Serbs. 55 primary schools from 43 different places participated in the research.

Research included 4253 students from 180 different grades of primary school (ranking from 5th to 9h grade). If we consider the information that maximal 15 students form a group for laboratory work, it seems that this survey was conducted in 284 students' groups.

The measure instrument used in the research of students' opinion was non-standard opinion poll questionnaire which included questions related to general, elementary data about the school (questions in the title of the questionnaire), open-type questions (with the given answers YES/NO), as well as double and multiple-choice questions.

On the basis of the sample including 4253 students, i.e. 4253 fulfilled questionnaire for the students, a representative sample including 426 students was formed and it included every 10th student. In forming of that representative sample we paid attention to include all cantons (with Serbian Republic and District of Brčko), schools in the country/city, as well as that there should be equal amount of male and female students, and an equal amount of students of all grades.

Therefore, taking into consideration possibility that examinees (students) are included in the opinion poll questionnaire, it has the following characteristics:

- Intentionally (cantons and cities in B&H were chosen deliberately, as well as the primary schools attended by students from the 5th to 9th grade, and the teachers of Informatics employed in those schools);
- Systematically (primary-school students were chosen systematically – every 10th student);
- Stratifically (as regards to the research problem stratums were defined – urban, suburban and rural area; students of the 5th, 6th, 7th, 8th and 9th grade of primary school).

V. RESEARCH RESULTS

Only a part of the opinion poll questionnaire results will be presented, according to [1], which was conducted with the students, although teachers also participated. The following answers to the questions are the indicators of a functional use of computers.

Question 1. Does a student own a computer?

Answer: In 78 per cent of cases students own a computer at home, which is satisfying information.

Question 2. Does a student own a PC computer of a laptop at home?

Answer: There is a dominant use of PC computers at almost all students being polled (98 per cent), and only 2 per cent of students own a laptop. It is important to mention that Pentium IV computers are dominant, but there is also the use of less effective configurations.

Question 3. Does a student use MS Office or some other software?

Answer: 28 per cent of polled students (in the sample) use MS Office package at home, while more than a half of polled students, i.e. 72 per cent use some other software (among which programmes for using Internet services, recording CDs, listening to the music and learning foreign languages are dominant). There should be mentioned that although all students use MS Office, it is obvious that they are not enough acquainted with the IT terminology, and although they work in MS Word or MS Excel programmes, they do not recognise the fact that those programmes are located in the MS Office.

Question 4: Does a student use the Internet?

Answer: Students' opinions are almost equally divided as regards to this question, i.e. less than a half of the polled population use Internet (49 per cent), and more than a half (51 per cent) do not use it, Figure 1. [5].

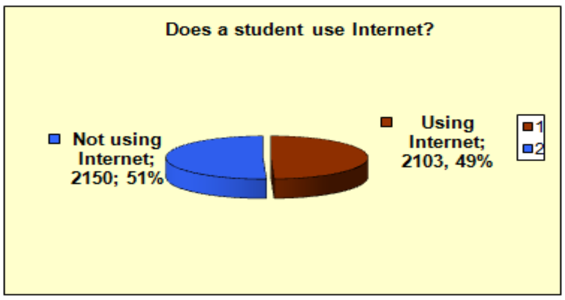

Figure1. Illustrations of the number of students who use/do not use the Internet among the entire population.

Question 5: Does a student use the Internet service: an email?

Answer: Figure 2. Shows the number of polled students (among the entire population) who use, i.e. do not use e-mail. According to that, we can conclude that only a third of the polled students, i.e. 32 per cent use, and more than a half, i.e. 68 per cent do not use an email.

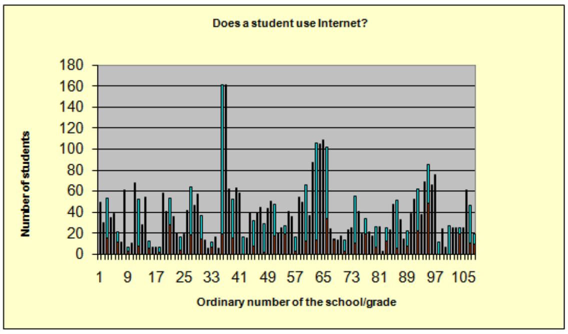

Figure 2. Illustrations of the number of all polled students who use/do not use an email according to schools/grades.

Question 6: Does a student visit the websites?

Answer: 3. Figure **3** shows that 41 per cent (i.e. 1724 students) out of the total number of the polled students visit Websites, while more than a half (59 per cent, i.e. 2529 students) does not visit the Websites.

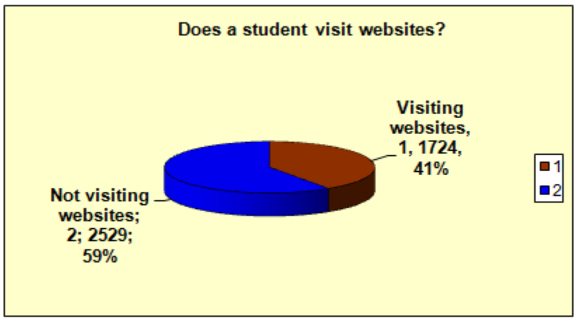

Figure 3. Illustrations of all polled students who visit/do not visit the websites in the sample.

Question 7: What do you do on your home PC computer for your school needs?

Answer: Almost the same number of students use, i.e. do not use computer for fulfilling school obligations. Correctly, 46 per cent of students (from the sample) use the computer at home for revising (22 per cent)/ practising (24 per cent), Figure 5, of what they did in school. In that, 9 per cent of students use the Internet (e.g. for school reading assignments, finding additional contents, etc.). However, 45 per cent of students do not use the computer for fulfilling school obligations, Figure 4.

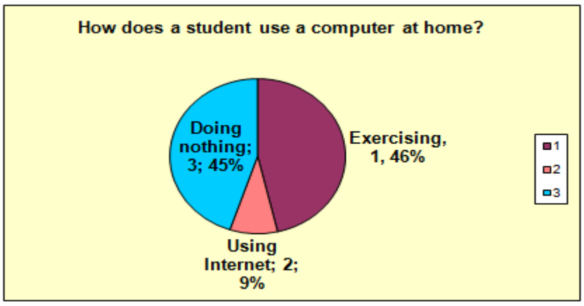

Figure 4. Illustration of the number of students in per cents in regards with the way of using the computer for school needs.

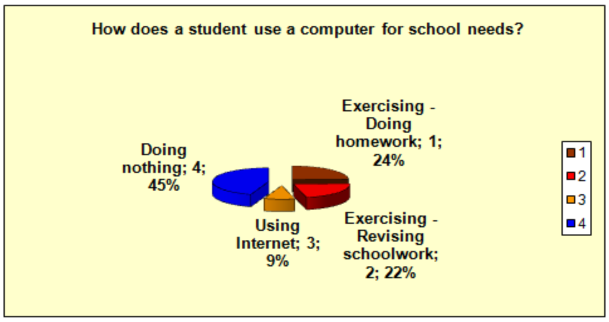

Figure 5. Illustration of the number of students in regards with the way of using the computer for school needs in regards with what they practice.

Question 8: Does a student have any software for studying?

Answer: Figure 6. shows that 12 per cent of students own software for Informatics, 4 per cent of students own software for Technics, 9 per cent own software for other school subjects, while three fourth of the students, i.e. 75 per cent do not own educational software. This information is indicative and relates to the main problem of lacking new educational materials in the so called E-form. Therefore, students are not offered appropriate educational contents for computer education. Therefore, it is not surprising that the existing computer resources are used mainly for play and fun.

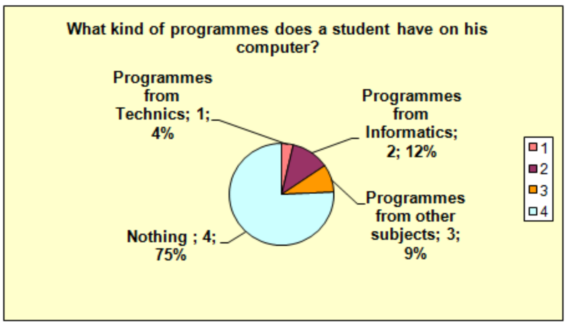

Figure 6. Illustration of the number of students in regards with owning software for school needs.

At the end of processing of the opinion poll questionnaire for the students, Table 1. Was created in order to present the numerical insight according to all questions, for every grade of primary school, from 5th to 9th grade including the sample [6].

TABLE 1. NUMERICAL INSIGHT ACCORDING TO QUESTIONS AND GRADES

Grade	1.Own a computer	1. Do not own a computer	1.PC	1.Laptop	2.Use Internet	2.Do not use Internet	3.Use e-mail	3.Do not use e-mail	4.Visit websites	4Do not visit websites
V	608	201	589	19	318	491	168	641	285	524
VI	952	246	936	16	506	692	308	890	423	775
VII	668	177	652	16	467	378	323	522	385	460
VIII	896	238	879	17	657	477	456	678	498	636
IX	213	54	213	0	155	112	116	151	133	134
SAMPLE	342	84	337	68	230	196	145	281	209	217

VI. CONCLUSION

Education through the use of the interactive computer networks, mostly the Internet, is extremely important not only for improving teaching of Informatics, but for improving teaching in all other school subjects. The internet is more and more emphasized as the unlimited resource for studying with great opportunities, not only for an individual, but for a group interaction as well, and it improves the studying process in a large amount.

For many years we have been the witnesses of great efforts of the entire society of B&H, as well as of other transition countries, in accepting the changes of the national education system according to education systems of developed European and world countries. In the last 15 years there have been many attempts to change the concept of the national education system in B&H adjusted to modern schools systems, which show that it is a long-term work in regards to science, profession, etc. The most complex part of the reform of every school system is forming of the National curriculum which should provide appropriate levels of literacy in regards to: Mathematics, Linguistics, Informatics, working and technology, health, ecology, multiculturalism, ethics, etc.

Regardless of the problems related to curriculum, all countries emphasize managing the skills for the use of information-communication technologies in teaching students. The majority of the European countries have defined curricula use of ICT in the education based on two basic approaches. The first is based on introduction of independent school subject, and the second is based on the use of ICT as the tool used in other subjects.

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TEACHERS INFLUENCE ON STUDENTS MOTIVATION TO USE INFORMATION TECHNOLOGY

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Abstract - The use of information and communication technology (ICT) permeates almost all aspects in our complex society. For that reason it is expected that the education system will teach the students how to use different kinds of ICT. Surely this means that the teachers have the key role in preparation of the youth for information-educated society. However, studies show that both students and teachers have insecurities when it comes to using these new technologies. The proper education of the educators is the foundation in the chain of knowledge. This study shows how learning process can be influenced by media literature and ways of communication; importance of proper technology education of teachers and the way it can motivate the students.

I. INTRODUCTION

Studies show that both, teachers and students have insecurities when it comes to using information and communication technology for the purpose of improving the quality of studying [19]. Education of teachers should be the most important, because it's a basic for teaching generations to come how to use newest technologies. Times are changing fast, and for that reason the imperative is to keep track with the trends in technology development. Further also explains how little do we know about the ways of teachers preparation and how, for that same reason, scientists today started to explore those issues.

However, there is a lack of information about importance of technologically informed teacher and how it later on effects the ways they teach. Series of factors are needed if you want to incorporate new technology in classes. Among them, emphasis is on the equipment and adequate conditions, as well as the knowledge in how to use it.

It is important to have teachers feel fulfilled during their carrier taking into consideration segment of pleasure, which includes technology that is helping them to work. Studies that were made among students in Trondheim, Norway, show that if you take under consideration differences in financial circumstances, equipment and teachers skills, didactics takes most important place in the process of teaching. Technology, by itself, it's not a guarantee that it's going to be efficiently used in process of teaching. It is most likely, that it is going to be used in a trivial way. The use of computer in class that hasn't been didactically thought of is leading towards glorification of the media, not improving the class [17].

Technologically rich surroundings are by all means making an easier approach towards solving a problem. Teacher who is inspired and motivated will try to find any possible way how to use different tips of technologies, then the one who is not the follower of this method. Authors themselves are saying that for high quality education performance, it is necessary to implement technology in almost all segments of the teaching process. In this case, the domination of this application should be ruled out. At this time teachers / educators/ pedagogues influence is unavoidable and crucial [9].

II. LEARNING FROM THE HISTORY

It is possible to compare the use of current contemporary technology tools with the old implementation of transmitter which was at the time a very significant media. A media in this sense can be translated into a communication tool since it can be a book, theatre, movie, television, radio, press and computer [3]. When the time came for the public masses to use it was interesting for its size; louder and richer in its content similar to every contemporary new product which is more expensive, better and prettier as it is smaller and more practical.

Technology in education enables development of different models of education processes, but history and experience with media in teaching shows that the occurrence of every new media is followed by hope in its big and strong efficiency in relation to traditional teaching and earlier media. In these last decades the perfect example is a computer and even more and more a mobile phone [17]. By introducing a calculator a majority was able to use its basic operations, however, a complete value was gained by those who mastered not only elementary but also some higher degrees of mathematics. The question was whether they who mastered the mathematics and the operations on the calculator knew how to transfer the knowledge. That depended not only on a degree of the knowledge of the mathematics but also on the degree of the specific knowledge of the technology and its kinds.

Today, after the first broadcasting of the music at the Radio Zagreb since the distant year 1926, the first television program in Croatia broadcasted on 15th of May in 1956, and later with the transmitters, mobile phones, computers and other media, we achieved an unimaginable level of information technology. But, regardless of the kind of media and time, it is necessary to raise the awareness of the constant value, the one that considers a teacher, a person who needs to be qualified and know how to select proper contents with the clear goal.

The teacher who follows the development of his profession, but also the development of new technologies, analyzing them since their beginnings until present time, understands that teaching is a life long process and is aware of the important factors, such as tools that are used for a very professional, expert and above all motivating presentations to the students and adequately raising the knowledge and increasing the awareness of the relevance of the new technologies for the general benefit.

III. EDUCATION TECHNOLOGY AND TEACHER

Education technology is continuously changing. Certainly the change in the role of a teacher in the education process is changing for the same reasons. Teaching profession of a teacher defines a list of factors which includes a technology of education that every year from the start affects the education of the teacher and in a certain sense it defines him/her again. It is absolutely impossible to neglect the advantages of the technology present in the knowledge transfer in order to keep the necessary level of the education process particularly when comparing it with other developed countries of the world [9]. A potential development of the education technology is of great relevance because „the teacher in the teaching process is preparing for successful application of the existent technology for accepting the technology innovations that are reached by other teachers and researchers (innovators) and for individual work on upgrading of technology education [2].

In the process of education, the teacher is therefore preparing for application of existent technology, but equally for accepting the prospective innovations. But, we shouldn't exclude the possibility that a teacher could participate in potential enhancement of the technology. The author implies that new technologies make education process more efficient while participating in rationalizations of the education, and enabling the realization of quality programs and fast education of the youth. Therefore it contributes to transforming of the empire of necessity into the empire of freedom, or the achieving of the ideal for a human to become a homo creator even in his free time [15]. Some authors include didactics and methodic into education technology while others connect it specifically to application of particular products of technologies, in other words to the machines in the education process.

School education has its historical that can be identified through more development stages, from whom each one is marked by suitable education technology. In each of the next stages teacher's role is different [2]:

- First technological phase is characterized by «live word» that exists since appearance of public press. Education was based on «oral history» where the teacher was principally carrier of sublimated generalized experience from his on conscience to the conscience of the student. The most important was the transmission of formulated thoughtful content.
- Second technological phase is book as the written word which mass production ....in the process of education itself so that teacher wasn't anymore the only one, and therefore wasn't the best sourcing of information, so his role was significantly changed. He became the organizer of the education process.
- Third technological phase is based upon observing immediate reality and it's substitute (education tools) in class. Change of teachers' role is seen in the presentation of knowledge. Teacher isn't presenting conventional knowledge, but encourages students so they can generalize from specific information.

- Fourth technological phase is based upon the period of manipulative and operational techniques, where on the critiques of the "old school" in which the student was the object, «new school» is founded and it's based on the student's activity. That school is also called «working school" because the student is learning in the working process. Teacher is no longer a subject that is models certain content.
- Fifth technological phase is period of audio visual techniques and mass media, and is also called teledidactics. It can be highly applied so that audio and the visual component can be well synchronizes. Teachers' role is in that sense very complex. He is becoming moderator between capacity of students receiving and big amount of information.
- Sixth technological phase is a period of education computerization which led towards radical changes. Teacher became important factor who is regulating automate of multi directional flows of information.
- Seventh technological phase is a period of multimedia techniques. Teachers' role in this stage is the most complex because of the range, complexity and social importance of the teacher and his responsibility on work.

Regarding incredibly fast development of technology it seems that soon will be able to define eight phases that will all previous and demand that teacher get some new role. We can divide educational media into two categories having in mind the source of information [4]:

1. PERSONAL MEDIA

If that person, more precisely the source of information is the teacher, we are talking about the personal media.

2. NON PERSONAL MEDIA

Students in their process of learning can't get all the information in the original reality, so for that reason they're using sources as technique, tools, and all kinds of equipment.

Non personal media are mostly divided into three categories [4]:

- Audio media are engaging students hearing. In hearing sources of knowledge we're incorporating audio cassettes, CD's, and the radio. Studies show that we're getting 11 % of outside awareness by hearing.
- Visual media are Power Point presentations, slides, silent movies and all kinds of projector presentations.
- Audiovisual media are combining the use of students vision and hearing, or sound and picture (TV show, videotapes and DVD's, documentary film, audiovisual internet features etc.).

IV. TEACHER LEADERSHIP - QUALITY FACTOR

Interesting information is that children in Croatia spend about 1.000 teaching hours in school. One lesson lasts 45 minutes. In one year there are 8.760 sunshine hours. This means that student spend in school one ninth of total time of one year. In addition, teaching activities are organized 180 days in one year. This means that students more than half of the year do not go to the school. School is usually closed to any additional children's activities [12]. This fact is very significant, as the study of French author Madelina who, discussing about teachers, often said that throughout his career, a bad teacher can ˝ruin˝ 5000 students [15]. According to above mentioned, we can conclude that teacher is the most important subject in the learning process.

The way in which technology is integrated into everyday educational program is crucial factor for motivation each individual student and class communities. Excellence of individual teacher's performances is getting different perspectives on certain things. Sometimes for students it's difficult to understand some in formations verbally presented by teacher, but having possibility to exploit those information by using modern technology is very motivating and inspiring. According to the author ˝no one can teach student, student can learn by himself. Among that, student the best knows his interests and needs, and to that is concentrated learning process. However, this doesn't exclude help provided by adults, especially teachers (educators, professors) [13].

In above mentioned research students declared that teacher is main reason why they use modern technologies in class, especially if teacher uses them successfully and inventively. They recognize how many teachers have lots of competencies, but among that it's needed to have capability to transfer their knowledge on simple and understandable way, using new technologies because Power Point or projector belong to past [19].

Among above mentioned, some teachers are dealing with problems the old way, by bossy ordering without possibilities of any complain or so-called 'fist on the table. This example of leader with strict control urgently needs to be reformed and improved to constructive dealing with situations and communication between all parties included [8].

This or similar statements given by students are indicator how important is to use modern technology much often and active that now, with special attention on students needs and correct teacher's leadership. This is in opposition with traditional school where teacher was in center old educational process, and communication was one-way, from teacher to student, and according to that learning process was passive. In opposite of that one, new and modern school has student in its center, communication between students and teachers is base of educational process, working in group or as team is encouraged, and learning process is active process on both sides.

Every teacher should be “spiritus movens” and in some sense “spiritus rector” of students intellectual processes and activities˝, and not person who teaches concluded results and knowledge [14]. According to the author, first of all teacher has to be an educator and then leader in helping children to find subjects interesting to them and preparing environment in which they will explore problems and situations and find better understanding of world around them. In order to successfully fulfill this role, teacher has to be evaluator, organizer, motivator and companion to children [10]. Also, teacher has to have psychological approach to children, good observer in assessing and understanding situations and children if he wants to be good educator in using new information and communication technology.

Today teachers have many challenges to overcome, and have to achieve goals and expectations which are set much higher then before. Also, they've been given more obligations and responsibilities, it's required from them to educate, improve them and to be competent in dealing with every new generation of students because modern technology is affecting working process [21].

V. THE IMPORTANCE OF TEACHER'S OPINION ABOUT MODERN TECHNOLOGY FOR EDUCATION PURPOSES

It is well-known that teacher influences on the processes in the brain during the study. There are all kinds of learning and teaching methods. Some of them are quite simple while the others are more complex. Some terms are easily learned, without any help, while others need teacher's help during that process, especially when are new technologies involved.

Some theorists have opinion that persons who study are [16]:

- researchers who work alone
- passive recipients of stimulations and experiments
- active participants in reactions between them and environment

By most theorists’ students are the one making differences between first two claims and third one, as an active, and not passive, participants in the process of studying. It is known fact that the fastest and easiest way of learning for children is through playing.

To achieve the purpose of playing, an adult (teacher/educator/parent) who takes a role of a player equal to a child, should be [16]:

- the one who is an assistant in the play, and leads, suggests and explains to a child when it’s impossible to act without help of teacher, and when it is allowed to act without it
- the one who is an adviser in process of playing during which are developing different kinds of states and opportunities
- the one who is an observer during these activities

An author emphasizes needed features of teacher which enable him to encourage child's development, and stresses that communication between teacher and student is the most important condition in process of learning and education. Communication with environment in which an individual lives, and throughout with wider human community, represents communication of ideas, attitudes or mental and psychological reaction on the latest social events and problems, as the ways how to address them [11]. As contribution to a statement that communication is very important part of modern education technology stands information that ˝processes of communication are special part of studies of system theory, cybernetics and informatics [7].

Expression communication is formed from Latin word communes which means common. So, communication can also be defined as process of togetherness or unity thoughts of sender and receiver [5]. An author defines communication as

˝process of sendeing and receiving messages between two persons, or small group of people, with certain effect or some instant return information [6]. Sometimes nonverbal communication is much more imortant than verbal communication. This is supported by the fact that ˝some educaters have express tendency asking questions about obvious details of activity or outside of its context, which points out only formal interest for child and play. In order to answer the question, child needs to stop playing and return from imaginary to real world [20].

Teacher has to be active, dynamic and innovative and creative, has to encourage curiosity and to effectively motivate in order to successfully realize and achieve set goals, and should also be educated about modern technology.

The goal is to new and modern technology implement in the school programs of education. To achieve previously mentioned it is necessary to educate teachers about new technologies [3]. Often teachers automatically make gestures while teaching in class or individually. Students notice those gestures and from them collect lots of informations which are nowhere to be found in teacher's speech.

Current collected knowledge asume that listeners better take in and memorize new informations/messages if are those informations at the same time visually and verbal presentated. Gestures are concidered part of visual presentation, and educatiors include them together with verbal communication.

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The teacher communication behavior and their influence on learning results are widely research, and immediacy is main subject. Related to that, author develop original concept [22]. Immediacy is usage of communication behavior which increase vicinity and decrease physical and/or psychic distance among persons.

Immediacy consists of verbal and nonverbal components [22]. Although nonverbal immediacy behavior include spatial, tactile and eye contact component, argument reveal that not all of nonverbal behavior are of the same importance. The most prominent teacher nonverbal immediacy behavior include smiling, vocal diversity and expressiveness, eye contact, gesture, relaxed attitude, body leaning forward and nearness.

Today is almost impossible to imagine life without modern technology which became integral part of everyday life. As much as we consider media important still in schools for young children/students is dominant (and will be for longer period of time) direct communication between teachers and students or among students. There are two types of immediate (direct) communication: verbal and nonverbal, and having that in mind, it is possible to achieve higher quality of educational communication.

Media-mediated educational communication will never achieve such quality as personal and direct human communication between teacher and student [13]. Guerrero and Miller have proved that if students perceive their teacher to be kind and involved in his work, he will also be considered more competent, and his lecture more valuable and interesting [1]. In category "elaborate children's play" are included all verbal and nonverbal reactions of an educator by which he indirectly suggests new play or role in it, and by doing that he creates new contexts and more possibilities for learning [20].

This is how learning process about new and modern technology and proper way of using them should be leaded, always thinking how to motivate children to discover their own potentials and preferences. Teachers individual approach and spontaneity while playing is the best learning method.

Teacher's role should be initiating student's curiosity to actively researches world around them [16]. In many scientific articles which are discussing how to stimulate children throughout playing, it's often emphasized the perfect environment in which child could form own idea of the word around them. This kind of development it's possible only if teacher takes special care and interest in child, recognize his needs, and if there isn't any kind of disturbances in his environment so that child is free to find himself in new situations while playing and make own opinion and learning's of the world around him, according to his abilities.

Therefore adults should enable children to experience social and physical aspect of world we live in trough learning processes which includes playing as standard. Also, teachers need to take in consideration different possibilities of social interaction. Changes which are happening during children’s development require teacher's sensitivity in choosing the correct working methods with them.

There are two types of learning methods [16]:

- Teacher can allow student to take an initiative and choose his own way of playing and learning about himself on his own terms, assuming child has necessary ability and capacity for previously mentioned
- Teacher can support, motivate if there isn't enough interest, take an initiative for learning and exploring, and can give an example with own experience

It is necessary to interior learning program in school with play. The question that emerge is does the existing school program educate young people throughout play for business with new modern technologies and digital era? If we take quick research test for teachers who are working in educating children for 10 - 15 years and ask them if they changed their working methods in that period of time, final results would probably be devastating. And for sure, there wouldn't be mentioned word like playing.

Teacher's role is to observe the ways how his influence motivates students to use modern information technology trough out playing, how his opinion toward modern technology is effecting students attention and activities, an effects on educational results and especially correlation between playing and development of children’s abilities. School which has child in center can not be without playing, 'cause it's one of the children's primary needs. Having that in mind, every teacher should accept play as integral part of their educational school program.

VI. Student support

The author is mentioning some of the following steps which he'd took when he started monitoring support in learning process of his students [25]:

- talking to students which didn't realize good results
- giving them possibilities for better perspective in their work
- making diplomas
- the best works putting on Web site of his school

The author feels that if we want to be good support to our students, we should elaborate and plan following actions through different media, but having in mind there are two kind of support, the first is happening in schools and the other is happening outside of school.

Support is one of the best ways to motivate students. Teachers in schools have many possibilities how to influence on students. Some teachers with use theirs verbal skills will to present new technology and its advantages, while the others will motivate by estimating or even motivating by research work.

Outside of school, the best support for children are their friends, cousins, neighbors, grandparents, and their parents. All together they have strong influence in motivating children to use modern information technology: immediately, as directly.

If the parents are supporters of new technologies, child shall be motivated for same content. We have to remember of the child’s in families of lower standard in which discussion of new technology advantages are uncommon. It's useful to advice parents how to ˝interfere˝ with in child knowledge improving in modern technologies, how to monitor and evaluate.

There is big influence of contextual conditions in which learning is performed, culture, technology and teaching practice. Technology and teaching practice have to be on student level, cognitive capabilities and their learning and opinion strategies. Conditions in class may have great influence on learning process. Positive emotions motivate and contribute in success learning. Low level of stress may improve student focus on particular task. In contrary of positive emotions, intensive negative emotions such as anxiety, panic, anger, uncertainty and related thinking (carrying regarding competence, thinking about failure, fear of punishment, decrease motivation, interfere with learning capabilities and contribute to bad success. Teachers should pay attention to strategies that motivate students to study diligently and persistently for the purpose of achieving the set high standards and a general understanding. It is of course possible only if the students estimate that were placed or arranged tasks personally relevant and interesting.

VII. Epilogue

Teacher's role as person who frequently motivates in educational process, guides and transfers knowledge, is also one of the key person who motivates students in using information technology which is more integrated in everyday life, and so in school system. To perform any educational process, it is necessary to use informational technology.

Today when man has reached the degree unimagined possibilities of using information technology, what appears to be crucial at this moment, is a man, or, the unavoidable influence of the teacher as a teacher, educator. It seems that the best motivating factors in human and moral qualities that are assumed for every man, especially for teachers because it should be an example, of course, the inevitable thorough professional training for a job that is, knowledge and mastery of pedagogical knowledge and skills of communication, including adequate training in the use of ICT and their capabilities, but also knowledge of their limitations, as a direct personal communication will never be able to completely replace the so-called media communications.

All this involves a clear awareness that education and lifelong learning require self-education that will train and equip teachers for the educational process, the appropriate leadership gradually, for the proper selection of media and didactic strategy that is clearly aware of all the criteria and who, what, how, when, where and why, in what proportions and doses transmit knowledge and to what extent to include information technology. This, qualified teacher, certainly taking into account the particular experiential, practical cooperation and contribution to the students themselves, will have a beneficial impact on their motivation to use information technology.

Famous Greek philosopher Plato, who was Socrates student and Aristotle's teacher, said one of the biggest truth, current even today: ˝If Athens has bad shoemakers, citizens will walk around barefooted, but if Athens has bad teachers, it will fall to ruins!˝

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PROJECT “ GRADUATION?! HOW? EASY!”

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Abstract - Project *“GRADUATION?! HOW? EASY!”* was formed following an agreement on cooperation between the heads of the School Board from Zrenjanin city, “ HD Film”, and a business incubator. It took a few minutes of constructive conversation that the potentials of these three subjects to unite and settle the idea of the project that has made very remarkable results, it turned out, not only in the Banat, which was originally intended, but much wider.

I. INTRODUCTION

A Holders of the Project

School Board in Zrenjanin city, (the developer), a separate department of the Ministry of Education and Science, and it includes the area of Banat and Senta, Ada, and Kanjiža (Three districts, 19 municipalities, 192 schools and 229 preschools. The main role of the school administration is monitoring and improving the quality of teaching in educational institutions, and that is why this project is fully in line with its mission.

HD Movie - Monolith style LLC, a partner in the project.

The main activity:

- Production of TV programs
- Production of feature films
- Production of documentary films
- Production of music videos
- Production of TV commercials
- TV network correspondent
- Direct Internet video transfers

Business Incubator (BIZ), a partner in the project

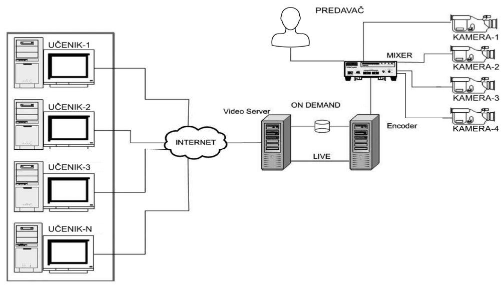
Business Incubator Zrenjanin - BIZ was founded with the intent to support the entrepreneurial process of companies involved in information technologies and promote their innovations to the level of success of such companies increased. BIZ offers tenants a formal organizational environment with management, organized system of planning, monitoring and development of tenants, a system of performance measurement, provides training and education, including assistance in preparing a business plan, marketing, market research, assistance in developing technical and other documentation, obtaining adequate certificates and more.

The project was created based on the idea about using streaming video in distance learning (e-learning).

B WHAT IS VIDEO STREAMING?

Streaming refers to a broadcast of a separately prepared (encoded) digital video recording or live programs over the Internet to the client or user.

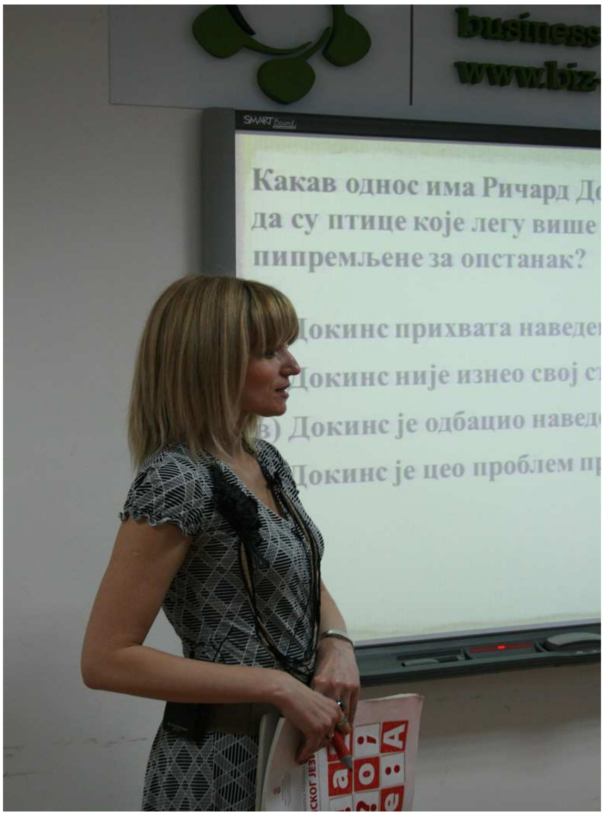
Materials prepared for the streaming will start automatically and remain on the user's computer. The recording is not necessary to download before



broadcast because the download is done in real time during recording. The quality depends on the quality of streaming video production and the quality of the connection to the Internet users. The early 21st century begins and the great expansion of the Internet, and thus a significant reduction of costs in connection with an Internet connection. This allows expansion of streaming. Streaming as such is still in development. Expectations are that the stream takes a leading position in the broadcasting media, as broadcasting over the Internet has no spatial or temporal boundaries.

Signal from the streaming technology can be broadcasted in two ways: Live and On-Demand.

1. Live streaming is a live broadcast over the internet (another name webcast). Live video



   streaming is a direct transfer of video signals over the internet and works by BIZ sending encoded audio-video signal through the server to users via our web site to access the signal and watch (listen to) live broadcast.
2. On-Demand is to broadcast pre-prepared video.

The system On-Demand streaming works by the encoded audio-video archive on the server and is transmitted on demand by client/user.

What are the advantages of video streaming over conventional video clips on the Internet?

- Considering the load in real time, recording can last "indefinitely" and therefore the only way to live broadcast or live coverage of events to a wide number of users on the internet around the world.
- it is possible to broadcast long shots, such as lectures, seminars, media conferences, trade fairs, talks, films, and more.
- No pre-loaded images, which significantly contributes to the facilitation of the use by the client/ user.

II. BASIC FEATURES OF THE PROJECT "GRADUATION? HOW? EASY!"

The project included the teachers who were selected from elementary schools, to solve the tasks in front of video cameras, from the Collection of tasks for the final exam. Thus the recorded lectures were broadcast over the Internet on Tuesdays and Thursdays, scheduled to be completed 30 days before final exams, so students can once again repeat to identify material that it deems it necessary. It is important to note that all lectures are archived and students can download them from the web site of the school Administration, or Business Incubators, which was proved to be much more common case of direct monitoring of the original broadcast. All tasks in mathematics were addressed in the Serbian language, and questions designed to test the mother tongue were analyzed in Serbian, Hungarian, Romanian and Slovakian. The selected languages are mentioned, as such are the languages in education in School Administration of Zrenjanin city, and also because the tests on the final exam also taken in these languages. In preparation for teaching the languages of minority communities have helped us very much the Hungarian, Romanian and Slovak National Councils. It is important to note that solutions of the task of Collection are not just circled during broadcast, but the teachers always gave further explanations needed reminding students to the content of the material from which the questions are based. Teachers of mathematics often pointed students to various forms of solving some problems, because the goal of these lectures was not merely giving answers and solutions to questions from the Collection, but also to develop creative thinking and observations, as far as possible, given the large number of tasks for a limited period of time. Indeed to conclude that this project encompassed a much larger part of the school curriculum than is imagined in the beginning, because students who have followed the lectures could be reminded of a substantial portion of material that are taught in schools.

Depending on the agreement with the teachers, all lectures are arranged by subject, and what is more important are those students are able, via the Internet or e-mail to ask questions, in the same way as their teachers responded to the students. At first discussed the possibility of broadcasting special programs, "specials" during which the teachers answered the most frequent questions, but it was dropped because of such lectures students have not shown a special need.

The room where the lecture took place has been prepared as a typical classroom because the idea was that its typical appearance and create the impression of uniqueness and singularity, as it is to this project, unique in Serbia, as it was. However, each lecture was accompanied immediately from students from nearby schools, because we felt it would be much easier for teachers to address the present students. It turned out that we were right, because our teachers confirmed that their presence has increased student motivation and facilitate the work. In addition, we tried to take advantage of yet another modern teaching tool, so called ‘‘Smart’’ whiteboard. Use of this whiteboard provides greater visibility and is particularly well-acted personnel changes in the moments when the teacher wrote on it, so that the content and method of the solution then was in the forefront.

WHY?

There are several reasons why we decided to launch this project:

1. desire to influence meaningful and useful use of computers among children and teachers,
2. modernization and to overcome traditional forms of teaching, via the Internet,
3. help eighth grade students for the best possible preparation for the final exam,
4. help teachers in schools to prepare students for the final exam (they were able to compare the way they work with the way teachers who handle tasks during the project),
5. significant savings of funds for parents who have children before implementation of this project paid for private lessons for preparing for the final exam,
6. To provide parents follow-up, prepare students for the final exam at home, with computers, with their children,
7. replacement of lost time and teaching hours during several months of strikes in schools during 2010/11 school year,
8. testing of IT equipment and the flow of information via the Internet in the Banat (for future projects)
9. analysis of seemingly simple forms of "distance learning" with the prospect of expanding facilities and programs,
10. inclusion of minority ethnic communities in a common project.

Each participant in the project gave the maximum in their area:

School Board has done the following:

- called the teachers of mathematics and mother tongue in elementary schools and prepare them for the project,
- made a plan of tasks from published Collections of tasks,
- informed the principals (139 principles of elementary schools)
- held meetings with representatives of local authorities, who immediately supported the project,
- informed the Ministry of Education and Science on the content of the Project

- forwarded links to all heads of school districts so that everyone in Serbia is able to monitor via the Internet transfer preparation for the final exam.

HD ''Film'':

- provide adequate equipment for recording hours of preparation, four cameras, video mixer, lighting, wireless sound equipment, digital video recorders, encoders and decoders, pictures,
- provide skilled technical team: cameramen, producers, video mixer, audio technicians, video editors, graphic artists,
- conducted a test recording and prepare for the broadcast transmission,
- prepared and designed graphics and web site announcement, provided the archive on the Web server in a video format 80 hours of lectures via the Internet,
- the information on using material during transfer, as well as the use of archived,
- transmitted via the Internet, two press conferences during which all potential users (students and teachers in schools) project was presented,
- provide additional funding for the project.

Business Incubator:

- provide adequate space for the direction and space for recording
- provided the conditions for the press conference
- provide a studio for recording lectures,
- provided the equipment necessary to administer the system used during streaming (server, internet area network bandwidth)
- organized a video-audio recording
- organized web site and storage space on the Internet,
- opened a separate video channel on the Internet for the project,
- provide IT logistics for conferences.

Timing of the project: from April 06th to June 19th 2011

Ministry of Education and Science has started the implementation of the strategy of the final exam, “Graduation", which in its final analysis involves solving tests with a completely unfamiliar tasks, in accordance with the introduced, the long-awaited standards. This strategy is being implemented gradually, so that the tests in mathematics and mother tongue, which were taken in 2011 contained 25% totally unknown tasks, 25% changed from the collections of tasks that were released earlier this year, and 50% of tasks that were identical to those from the Collection of tasks. So, our "Internet” lectures have greatly helped the students to adequately prepare for taking the test in the final examination in both subjects, in 2011.

III. EVALUATION

Each evaluation includes the criteria by which they are committed. We, the School Board, and especially the holders of this project is very important to you and how much it contributed to the increase in performance results of students in eighth grade final exam.

There are several aggravating circumstances that it was not possible to compare the level of achievement this year's results with results from past years:

1. tests for the first time in the history of Serbian education, formed the basis of three levels, in line with the introduced mandatory educational standards for the completion of primary education, which means that there are a number of tasks from the basic level, significantly lighter than the real tasks of average difficulty in tests from past years,
2. last test was not done in accordance with the standards, and contained 25% of tasks from the Collection that had altered figures, and all other tasks are known, from the Collection.
3. This year the final exams were required for all students to complete them, since the release were receiving a certificate for an elementary school. So, this year had a higher attendance, but the larger the number of those who will be totally unprepared,

appear on the test, because there was no low admission in order to pass. Simply, it is sufficient to eighth grade students to appear on the exam and obtained the condition for the completion of compulsory basic education.

These three reasons make it clear that student achievement from last year and this year were far to compare.

For these reasons, the evaluation can only be done through a questionnaire which we will not try to compare the achievements of students, but we will examine how the project helped students and teachers to better prepare for this year's Final Exam (the extent to which students are familiar with the project, if they have used its capabilities and to what extent they are satisfied or not with what was offered, and the like).

IV. RESUME

We shall ask students and teachers to send us suggestions on how and in what way we could help them via the internet to achieve better results in education, because we would like to continue with the implementation.

By participating in this project together we came to new ideas on how to use the benefits offered by properly applied information systems used in the best possible way. Here are some:

- Distance Learning
- treatment of some complicated areas, particularly in mathematics and other sciences;
- work with gifted children, preparation for competition;
- cross-border cooperation, preservation of the original mother tongue of minority representatives,
- savings for the School Board, ” meetings" via the internet, et cetera.

Finally, the fact that speaks for itself: with over 8000 different internet addresses were followed by direct broadcast, and more than 48.000 lectures were downloaded.

AUTONOMOUS HEXAPOD WALKER ROBOT "SZABAD(KA) II" – SOFTWARE MODELING AND TOOLS

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Abstract—**"Szabad(ka) II" is an Autonomous hexapod walker robot, developed for testing and developing algorithms connected to motion, robot vision, decision making and robot networking. This hexapod robot was given the name "Szabad(ka)" because it incorporates the name of the city where it was designed as well as hinting at its main feature, namely that it can be openly ('szabad') developing platform for user specific needs.**

I. Introduction

The robot is a complex system both considering its mechanical structure as well as its electronic developments and processor structure.

In the robot's microcontrollers, there are various algorithms for sensor processing and basic motion control. Higher level software can be and is written on personal computers, (in C++ or in MATLAB). Its software platform (with the already written algorithms) is designed in a modular way, which makes possible for the developers and researchers to develop codes in their own fields of interest without having to be familiar with other software parts of the robot.

First, we started developing software for a DSP (TMS320C6455 DSP - 1GHz frequency – can be seen on the picture), then (because the fast evolving of the standard PC processors) we replaced the DSP with a PC. This computer can be an on-board net-book, a desktop computer or even a separate server farm. The robot's computers and the MSP microcontrollers are connected into network through RS485, USB and Ethernet interfaces. The robot has 8 PCB-s (1 MSP controllers on each). The robot has 1 laser, 2 gyroscopes, 2 accelerometers, 1 radar, and several IR proximity detectors. Also every leg has an accelerometer and a force sensor in its foot. For video streaming a USB camera is mounted on the robot, but we are already working on stereo vision which needs 2 cameras.

The robot's body is made from more than 150 aluminum and steel parts. All of them were designed in AutoCAD. The parts were manufactured with CNC milling machines.

A. *Mechanics*

The robot weighs about 5 kg and it is 300 mm high if it stands ("Fig. 1"). The parts of the legs and the body are made mostly from duralumin - an aluminum alloy. This material is strong and light enough for our needs.

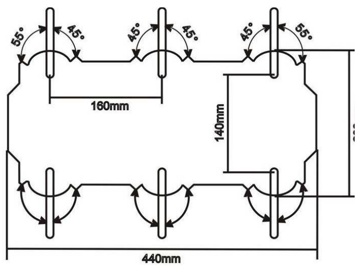

Figure 1. Mechanical dimensions

The leg attachments all lie in the same plane, with all the axes parallel. Besides holding the legs, the function of the chassis is to hold the electronics and the accumulator, too. The legs are all identical and have three revolute joints each. The first two are orthogonal to each other and the third is parallel with the second. All the joints use similar 10W DC motors running through 1:256 planetary reduction gearboxes. For angle measurements on the servos, optical quadrature encoders were used. Calibration of their offset can be done with software by moving the joints until they hit the bumpers, which generates known reference angles for each joint. In every jointed foot there is a force measuring stamp and a 3D accelerometer providing additional data.

B. *Electronics*

From the 8 MSP boards, there are:

1 **Radar** board, 1 Communications – **Motion Algorithm** board, and 6 **Inverse Kinematics** boards.

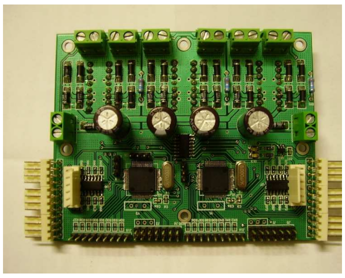

Figure 2. Old IK board

The Communications – Motion Algorithm (**MA**) board, contains 1 MSP processor. It can be connected to the computer thru USB or Ethernet. Its main tasks are to transceive the commands between the PC and the other MSP-s, and to generate the walking coordinates in dependence of time. It also process the body gyroscopes, the body accelerometers, and some infra red collision signals.

The task of the 6 Inverse Kinematics (**IK**) boards ("Fig. 2") is to receive the coordinates from the Communications – Motion Algorithm board and to generate the desired angles of 3 joints for a leg. Logically, every IK board has one MSP (one uC for each leg). This board's other task is to process the data received from the force sensors and the accelerometers placed in the feet.

The **Radar** board is also a homemade device, used for 2D obstacle detection. It moves an ultra sound transmitter-receiver pair with an RC servo motor. It also moves 2 RC servos, for the camera moving.

C. *Software*

First, the robot's software was physically divided into 3 parts. These were: the software running on the PC, the DSP software, and the MSP software.

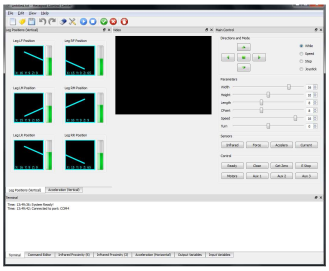

Figure 3. RobotClient

As mentioned before, after the transition from the DSP platform to a PC platform, the DSP's software was integrated to the programs running on the PC. Currently for the PC, there is a controlling software written in C++ (using Qt framework) ("Fig. 3"), and a MATLAB platform. Both of them are capable for moving the robot in various directions, with various speeds, and with other options.

The tasks of the software on the 5 MSP boards were already described under the electronics section, thus 6 MSP-s are for Inverse Kinematics, 1 MSP is for controlling, and processing, and another is for the radar.

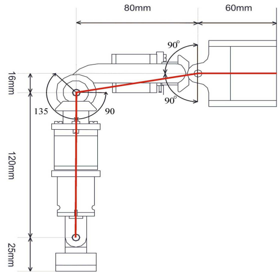

Figure 4. Leg dimensions

D. *Inverse kinematics – ANFIS*

The role of inverse kinematics - just like in any other system – is that it creates the necessary angles of joints (in our case the alpha, theta1 and theta2) if the end point (base of the foot) coordinates are given – x, y and z ("Fig. 4"). Inverse kinematics calculations are normally complex and need high processor resources. We implemented specially optimized algorithms, to run the IK calculations, in simple microcontrollers. Also, we are working on replacing the classic IK codes, with ANFIS (ANFIS method is a hybrid neuro-fuzzy technique that brings learning capabilities of neural networks to fuzzy inference systems), what will give us the ability for more adaptive codes. We already wrote the algorithms on PC (MATLAB), and now we are working on implementing the algorithms on the DSP, and the MSP-s. [1] [2]

II. Szabad(ka) II Robot's History

Coming to the Szabad(ka) II robot was a complex process's result. Before it, we made 2 previous robots.

A. *Hexapod 1*

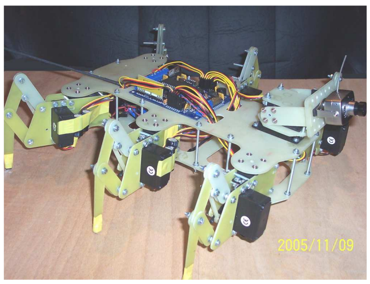

Figure 5. Hexapod 1

The first robot (Hexapod 1) was born in 2005 ("Fig. 5"). This robot was made from vitro-plast. For the simplicity, it's parts were connected with standard M3 screws, without any bearing. The robot was moved by 12 RC servos (the legs had 2 DOF-s). It's electronics consisted of one PCB board which had one Microchip PIC16F877 microcontroller. It's task was to move and control the robot by the commands received wireless from the computer. The microcontroller's code was written in Assembly, and the PC code was written in Java.

B. *Szabad(ka)*

The second robot (Hexapod 2) was finished in 2008, and received the name Szabad(ka) (“Fig. 6”). This robot was a mayor improvement compared to it's predecessor. It's body was made from aluminum, it had 18 DC servo motors, every leg had it's own driver electronics, what was completed wits some other BCB-s also containing microcontrollers, and a board computer containing a DSP processor. The microcontrollers tasks were the inverse kinematics, the spline generation, the motion algorithm, and the sensor processing. We implemented a webserver to the DSP, with which we were able to control the robot from a web browser. [1]

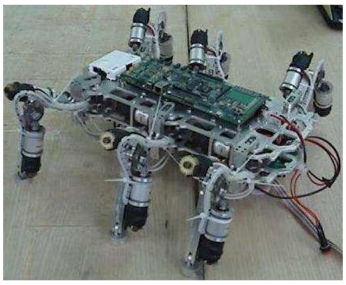

Figure 6. Szabad(ka)

C. *Szabad(ka) II*

After these, we completed our current robot (Hexapod 3), and we gave it the name Szabad(ka) II (“Fig. 7”). On its face, Szabad(ka) II looks similar to it's predecessor, however almost everything is was improved on it.

Figure 7. Szabad(ka) II

Major mech. differences:

- instead of simple aluminum, duralumin (perunal) was used,
- qualitative, lighter servo motors with higher efficiency were installed,
- whit these, the robot's weight decreased from ~10 kg to ~5 kg,
- special, lighter gears were mounted,
- the bearing was changed,
- we optimized the robot's cutouts.
- Major electrical differences:
- the motor driver boards were optimized,
- the motor driver IC-s were replaced,
- microcont. speed changed from 8 to 16 MHz,
- we added with USB and Ethernet,
- we were able to get a Laser Scanner.
- Major software differences:
- we continued the developing the PC interface,
- the IK, MA algorithms were rewritten, the microcontroller's software was extended with a task manager, DMA, and controlled duplex communications.
- We started the implementation of the followings:
    - Computer Vision (using OpenCV),
    - Mapping, Routing (using MRPT),
    - Fuzzy controlling (reactive and goal oriented),

III. PLANS FOR SOFTWARE DEVELOPMENT

As mentioned before, beside the embedded codes, currently we have a controlling software written in C++ (using Qt framework), and a MATLAB platform. The controlling software is capable of moving the robot in various directions, with various options, and displaying all the data received from the robot. It is not capable for autonomous control.

To move forward, we started the development of a software which can autonomously control the robot (from now we will call it RobotServer), and the modification of the current software to be able to connect to the server, and control the robot thru it (we will call it RobotClient).

The RobotServer's main features are environment mapping, path planning, image processing, and driving the robot to it's goals (“Fig. 8”).

The RobotClient's main features are moving the the robot, when it is not in autonomous mode, and controlling it's behavior, setting it's goals when it is in autonomous mode. Also, it displays all processed and raw sensor data and camera streams. [3]

A. *Environment mapping and path planning*

If a walking robot has to be autonomous, first of all, it needs to know it's environment. This means, that it needs a map about its surroundings.

Sensors, which could be used for mapping, are infra-red proximity sensors, sonar radars, and laser scanners. Infra-red sensors are not really precise and they are giving bad readings if their target surface is not perpendicular to their light beams. Also they act poorly with not optimal target materials. We are using them for obstacle avoidance in a lower software level. Sonar sensors are having similar problems. Their readings are also fuzzy, and they are generating false results because their sound beam is too wide.

But in contrary, laser scanners can be used with a much better outcome. They are fast, they have high resolution, and they are rarely giving bad results. This is why, for mapping and localization, almost exclusively, laser scanners are used.

Hokuyo URG-04LX is a very popular laser scanner. It is widely used and supported in several robotics projects, and we decided to use one.

The **Mobile Robot Programming Toolkit** (**MRPT**) is an open source C++ library. It can be used for implementing algorithms in the fields of Simultaneous Localization and Mapping, computer vision, and motion planning (obstacle avoidance). This is just what we needed, and we started to use it in our robotics research, to work out the mentioned tasks.

B. Image processing

Image processing is important, if we want our robot to interact with the objects or the people around it. Our first plans are to make the robot able to recognize objects and people. Some goals for the working robot would be to follow or find these targets.

For a sensor, only a better quality camera is needed, or a stereo camera if we want stereo vision.

OpenCV is an open source, cross platform, computer vision library originally developed by Intel. It focuses mainly on real-time image processing. Facial recognition system, Object Identification, and Motion tracking is between its basic applications, so it satisfies our needs.

Earlier, we started developing a small sonar scanner (radar). Because the objects recognized by a sonar scanner have fuzzy edges, we were working on combining pictures processed by an edge detecting algorithm with the readings made by the radar, thus clearing the radar's readings.

The radar is also useful if we want to help depth detection (image processing).

We will carry on with the radar, but only for image processing. For mapping the Laser scanner will be used.

If we will succeed with the radar readings correction, maybe we will use the radar in cheaper robots.

C. Driving the robot

After, we are able to map the environment, we can receive destination coordinates from the user or from the image processing algorithm, and we can generate the path which can lead the robot to its destination, but we also need a controller that drives the robot.

For this controller, we use a **fuzzy logic controller**.

Till now, we made a Matlab simulation to prove the fuzzy controller's efficiency. In this simulation, the controller has to move a little robot in a window. The task is to go forward till an obstacle appears, which the robot has to avoid.

This simulation realized reactive behavior (the robot reacts to the obstacles). In the real system reactive and goal-oriented behavior will be implemented. The goal will be the reaching of the destination coordinates received from the path generating algorithm.

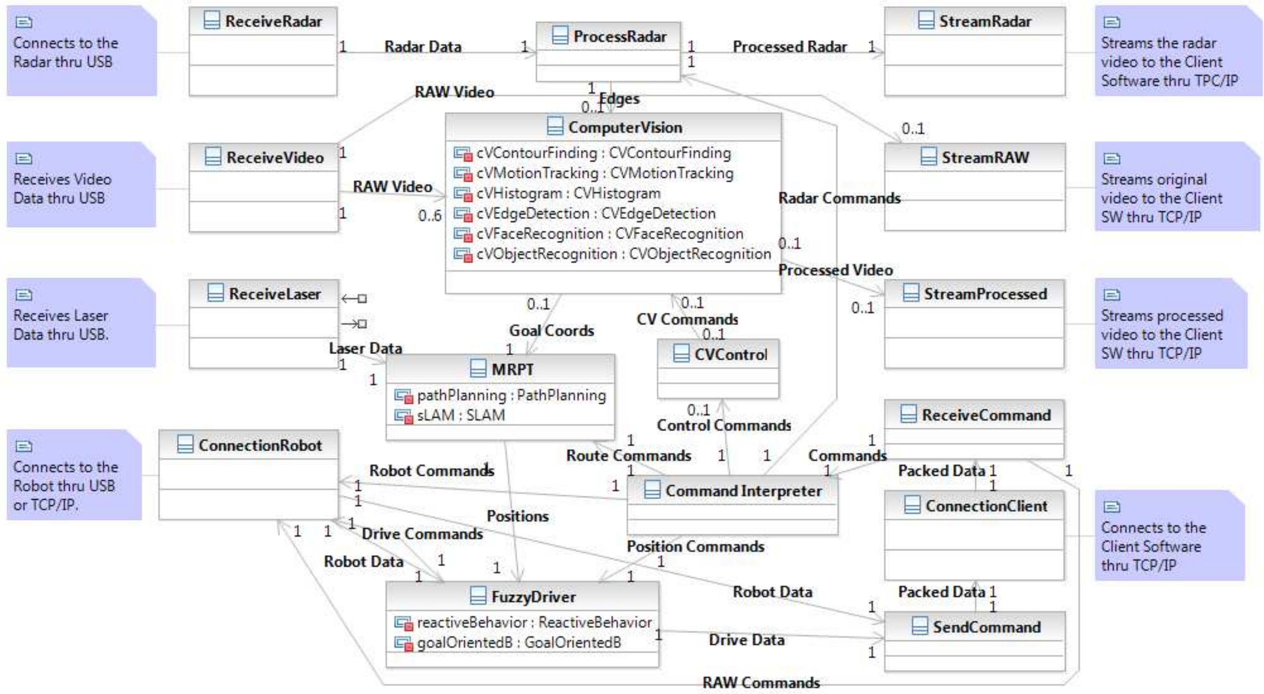

Figure 8: Class diagram of RobotServer

IV. SOFTWARE TOOLS

A. *MRPT*

The Mobile Robot Programming Toolkit (MRPT) is an extensive, cross-platform, and open source C++ library aimed to help robotics researchers to design and implement algorithms (mainly) in the fields of Simultaneous Localization and Mapping (SLAM), computer vision, and motion planning (obstacle avoidance). The priorities are efficiency and reusability of code. The libraries include classes for easily managing 3D(6D) geometry, probability density functions (pdfs) over many predefined variables (points and poses, landmarks, maps), Bayesian inference (Kalman filters, particle filters), image processing, path planning and obstacle avoidance, 3D visualization of all kind of maps (points, occupancy grids, landmarks,...), etc.

Gathering, manipulating and inspecting very large robotic datasets (Rawlogs) efficiently is another goal of MRPT, supported by several classes and applications.

A proper and up-to-date documentation is another of the major goals of MRPT developers. Currently there are dozens of examples and several single-topic tutorials. A currently on-going project is devoted to write a "MRPT book" tutorial.

The MRPT is free software and it is released under the GPL.

The MRPT project is organized as a set of individual libraries. The main one is libmrpt-core, dealing from low level OS-related issues to SLAM and Bayesian algorithms, and upon this one other libraries focus on more specific problems. There are also several libraries libmrpt-core relies on, some of them being integrated (built-in) and others are required to be preinstalled by the user. [4]

B. *OpenCV*

OpenCV is a computer vision library originally developed by Intel. It is free for use under the open source BSD license. The library is cross-platform. It focuses mainly on real-time image processing. If the library finds Intel's Integrated Performance Primitives on the system, it will use these commercial optimized routines to accelerate itself.

Officially launched in 1999, the OpenCV project was initially an Intel Research initiative to advance CPU-intensive applications, part of a series of projects including real-time ray tracing and 3D display walls. The main contributors to the project included Intel’s Performance Library Team, as well as a number of optimization experts in Intel Russia.

The first alpha version of OpenCV was released to the public at the IEEE Conference on Computer Vision and Pattern Recognition in 2000, and five betas were released between 2001 and 2005. The first 1.0 version was released in 2006. In mid-2008, OpenCV obtained corporate support from Willow Garage, and is now again under active development. A version 1.1 "pre-release" was released in October 2008, and a book by two authors of OpenCV published by O'Reilly Media went on the market that same month (see Learning OpenCV: Computer Vision with the OpenCV Library).

The second major release of the OpenCV was on October 2009. OpenCV 2 includes major changes to the C++ interface, aiming at easier, more type-safe patterns, new functions, and better implementations for existing ones in terms of performance (especially on multi-core systems).

The library is mainly written in C, which makes it portable to some specific platforms such as Digital signal processor. But wrappers for languages such as C# and Python have been developed to encourage adoption by a wider audience. [5]

C. Fuzzy control

The operation of an autonomous mobile robot in a real world unstructured environment requires consideration of multiple issues.

First, the controller must be able to operate under conditions of imprecision and uncertanity. Second, the controller must be able to reach explicit goals such as the objectives specified by user or the subgoals generated by the high level deliberation processes of automated intelligent planners. Finally, the controller must be able to consider multiple concurrent requirements. For example, a mobile robot may need to reach the end of a hallway while keeping its load well balanced, and avoiding static and moving obstacles. An interesting problem in the designing of a controller is the combination of goal-specific strategies by resolution of conflicts between multiple objectives.

Behavior-based approaches to mobile robot control have gained increasing popularity being supported by considerations arising from the study of animal behavior, by architectural concerns, and by their implementation convenience.

Fuzzy logic provides tools that are of potential interest to mobile robot control. Most applications of fuzzy logic in this field concern that use of fuzzy control techniques to implement individual behavior units. Fuzzy controllers are a convenient choice, when an analytical linear model of the system to be controlled cannot be easily obtained; they have shown a good degree of robustness in face of large variability and uncertainty in the parameters; and they lend themselves to efficient implementations, including hardware solutions. These characteristics fit well the needs of autonomous navigation where:

- a mathematical model of the environment is usually not available,
- sensor data is uncertain and imprecise, and
- real-time operation is essence. [6]

ACKNOWLEDGMENT

The realization of the project, which includes building the new Hexapod robot, is aided by the *FAULHABER Motors Hungaria Ltd.* for which we are very grateful. Besides this company we are thankful to the *AppL DSP Ltd.* for their kind support

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COMPUTER IN EDUCATION AND MIPRO CONFERENCE

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Abstract: In 1978, first microprocessors course was organized in Rijeka and Buje. This was the beginning of MIPRO, one of the biggest international ICT meetings in this part of the world. From the first beginning of MIPRO, education was considered, but it is only from 1997 that a separate conference Computers in Education was established. MIPRO since then has grown, and has earned international recognition.

I. Introduction

Initially, at the beginning of computer use, education and training for new technologies was performed only by companies that were selling or supplying hardware and software. There was no other education for computing professionals. IBM , Univac, ICL, just to name some of the companies that had training organized not just for their own personnel, but also had provided training for personnel from companies that purchased and used their equipment.

Computers were expensive and clumsy, needing air-conditioned and purpose built space. No one dreamt of using computers in schools then.

Only with appearance of microprocessors and with first personal computers the idea of introducing computers in schools started emerging.

This is the time where Mipro started. In 1978, first microprocessors course was organized in Rijeka and Buje for engineers who wonted to hear about microprocessors, the newest technologies at that time. From year to year Mipro was growing. In addition to courses, round tables where organized in next few years, followed by equipment exhibition and in 1982 with first conferences. Today Mipro has all this chain of events and the number of conferences has grown to eleven (www.mipro.hr).

II. Computers and Education

The occurrence of computers did not appear to be revolutionary in the beginning. Round 1960 it was common knowledge that there were machines imitating the human way of thinking which could be programmed and which could perform calculations very quickly and accurately. However, at the time the schools did not teach their students about that matter.

The usage of computers required a new kind of knowledge and skills. For the first few decades this problem was solved mostly within the companies which were manufacturing the computers.

Partly due to their needs and partly due to their reputation, more prominent companies started to keep on providing, for that time, extremely expensive and not very powerful computers and employ people who first had to be taught how to use them.

The technology was constantly developing, but recognition of the need for people to be enabled to use the computers was way behind the development. The education was indeed being conducted, but implicitly within the professional structures. In the beginning the education consisted only of courses for engineers held by other engineers. At first, the hardware, and then the software themes were discussed. The foundation of Mipro in 1978 was a result of one of such courses for engineers. Today, Mipro is a huge international convention dedicated to information and communication technology, electronics and microelectronics, but in 1978, when it started, Mipro was a set of tutorials for continuous education of engineers in the field of microcomputers.

A. Introducing Computers in Schools

Before usage of computers in schools was planned, the computers entered the school system in an unorganized manner which depended on assets the schools could afford, the school management and the enthusiasm of teachers teaching the students.

The introduction of computers in schools started in Rijeka around 1978. After the acquisition of the first microcomputer APPLE II in 1978, numerous visits to schools along the coast, on the islands, in Lika, Gorski kotar and Istria were organized in cooperation with the Education and Teacher Training Agency in Rijeka. This enabled some young people to see, for the first time in their lives, how a computer operated and how it was programmed.

After that, courses about multimedia and the Internet were organized. The first such course was held in 1994 at a Mipro 94 conference, the second one in the Centre of Technical Education in Rijeka in autumn of 1995. In 1996 the preparations for courses about computers in schools started and the first of such courses was held in 1997.

B. Teacher's Training

Teacher's training was also conducted in an unorganized manner. There is a riddle for children asking which came first, a hen or an egg. Similar to that, when could the teacher training have started? Could the teacher training have started only when there had been professionals who could have taught them – or, indeed, even before that?

III. COMPUTER AND TEACHER TRAINING CONVENTIONS

Teachers of informatics and teachers who were using the new technologies felt a great need for a permanent training. Although teachers of other subjects could benefit from the professional and scientific teacher training conventions, teachers of informatics and teachers who use computers in class felt a greater need to be trained than the others because there is no other field with such extent and intensity of changes and with the least bit of indication that this could change such as computer science. Every acquired fact is subject to change, the students often have access to information which the teacher has overlooked so the role of teachers of informatics is different from the role of teachers of most other subjects.

A. MIPRO (www.mipro.hr)

The term MIPRO is an acronym (MIcro and PROcessor or MIcroelectronics and microPROcessor). It is the name of the Croatian Society for Information and Communication Technology, Electronics and Microelectronics and the name of the big international convention organized by this society.

Mipro was established in 1978 as one of the first tutorials on the application of microcomputers in this part of Europe. Today Mipro is a meeting point of experts in economy, science, profession, education, state administration and local government which features more than ten conferences, several tutorials, workshops and an exhibition.

B. CE – Computers in Education (www.mipro.hr)

Although the MIPRO mission was an educational one from the very beginning, in 1997, it was decided to start a conference CE – Computers in Education within the MIPRO frames.

The scopes of the conference are: Education and Computer Science, Methods of Teaching Computer Science, Implementation of Computer Technologies in Schools, Distance Learning, CAL and CAE, Schools and Internet, Schools and Hypermedia, Permanent Teacher Training, Computer Science Curriculum, Research on Students and Computers, Teaching Programming, etc.

The founders of the conference in 1997 were Marina Čičin-Šain and Pavle Dragojlović.

C. The way it started

Mipro has been supporting the conference Computers in Education in a special way for the whole first ten years. Primarily its support was apparent in the registration fee amounts up to 2006 which were considerably lower than those for all other conferences.

Throughout all those years the City of Rijeka and the Primorsko-goranska County has been supporting this conference by financing the registration fees for all participants from Rijeka and the County.

Supporting this conference turned out to be a good move of Mipro, City of Rijeka and County because the conference has been increasing in size by all the indicators.

Every year the number of submitted reports is growing, the reports are improving in quality and the number of foreign participants coming from almost all the continents and countries of the world is on the increase.

Table 1. shows the yearly number of reports which were printed in the Proceedings of the conference, the number of reports in Croatian and English language, whether the reports came from primary and secondary schools or from universities and other sources.

Seven authors held presentations in the first year. In the very first year this conference revealed a peculiarity. There was such a great interest for reports that the lecture-hall was too small for all those who wanted to attend the presentations, many people found no seats and had to stand and the discussion after the last report lasted for two hours. The participants were mostly teachers of informatics from Rijeka who were used to attending Mipro already during their schooling. The magic of Mipro happened in the very first year if its establishing: this has been the place where primary school teachers, secondary school teachers and university teachers could meet and discuss the problems they have been encountering and share their experience.

Year	no of papers contributed	language used		Primary and secondary school		University and other educational institutions	Other -
		C	E	C	E		
1997	7	7	0	1		4	2
1998	17	9	8	2		11	4
1999	24	11	13	6		13	5
2000	25	16	9	4	3	16	2
2001	35	21	14	6	1	28	
2002	33	17	16	5		26	2
2003	29	12	17	5		20	4
2004	40	19	21	8		31	1
2005	46	23	23	6	3	32	5
2006	68	23	45	8	1	55	4
2007	58	13	45	6		48	4
2008	78	18	60	8	2	57	11
2009	84	25	59	10	3	59	12
2010	95	29	66	14	1	66	14
2011	95	24	71	11	2	61	21

Table 1. Computers in Education from 1997 to 2011

D: Chronology of Events

1997- The new conference within the Mipro frames was initiated and named Computers in Education. The Proceedings which are edited by M. Čičin-Šain and P. Dragojlović contain 90 pages, 65 of which are conference papers and 25 of which are plenary presentations and host lecture.

1998- A considerable increase in the number of works which now counts 17 of them. The Proceedings edited by M. Čičin-Šain and P. Dragojlović contain 80 pages and comprise conference papers. The cover of the Proceedings has both the Croatian title „Računala u školi“ and the English one – „Computers in Education“. The cover of the collection of works has been bilingual (Croatian and English title) ever since.

1999- The number of works is still on the increase (up to 24 works). Two host lectures about robotics were held, one by J. Lenarčič from the Institute Jozef Štefan in Ljubljana and the other by Borko Boranić from the Ministry of Education and Sport. The Proceedings edited by M. Čičin-Šain and P. Dragojlović contain 124 pages, 12 of which deal with plenary themes and 112 containing conference works.

2000- This conference increased in participant number and became the second largest conference on MIPRO, right after Computers in Telecommunication. The experts from two ministries, Prof.dr.sc. Robert Manger, deputy minister for informatics from the Ministry of Science and Technology, Stanko Paunović, dipl.ing, associate chief in Ministry of Education and Sport – Education Improvement Agency and mr. Ivana Turčić-Prstačić, dipl.ing. from the Ministry of Education and Sport, took part in the conference. The Proceedings edited by M. Čičin-Šain and P. Dragojlović change its size to a larger, A4 one, and the articles are printed in two columns. The Proceedings contain 101 pages of conference works.

2001- The number of papers is still on the increase (up to 35 works, 147 pages). Dr. Jadranka Šunde from Adelaide, Australia takes part in the convention and language-edits all the papers written in English. A review of every work made by two independent consulting editors is introduced – for papers in English one of the consulting editors is from abroad. There is a very lively round-table conference about Teaching Methods in Teaching Informatics. The Proceedings are edited by M. Čičin-Šain, P. Dragojlović and J. Šunde.

2002- The sixth conference Computers in Education coincides with the twenty-fifth anniversary of Mipro. The number of papers from the primary and the secondary schools decreases, but there are still 33 papers in the Proceedings containing 153 pages, which leaves no room for discontent. The Proceedings are edited by M. Čičin-Šain, P. Dragojlović, J. Šunde and I. Turčić Prstačić.

2003- The number of works decreases to 29. The number of participants of the conference was very large, between hundred and two hundred. The papers were reviewed and categorized by two independent consulting editors. During the conference there was a round-table conference about the project experience of the group of teachers from the primary school Trsat, Rijeka who introduced informatics as an optional subject which was taught in the 1st to 4th grades of the primary school in cooperation with prof. Šavle and Ministry of Education and Sport. The film featuring children of the Trsat elementary school performing tasks in the informatics classroom was shown during the discussion. The participants of Mipro are mostly contented. This year all the participants were handed a newly introduced Call for Papers for the conference which was to be held a year later. Thus, the participants were handed the Call for Papers for CE 2004, which turned out to be a well-thought and stimulating move. The Proceedings (148 pages) are edited by M. Čičin-Šain, P. Dragojlović and I. Turčić Prstačić.

2004- The number of papers increases to 40. The number of participants in sections varies from 200 on the first to 60 on the last day. All presentations are held in the congress hall and all the participants except for two used the presentation software. Many presentations were accompanied with discussions. The colleagues from Microsoft held the presentation about e-learning during the conference. The presentation level was high and all the presentations were very interesting. A higher quality level was specially noticeable at presenters coming from secondary schools, e.g., from Technical School for Rail Transport in Zagreb, Technical School in Šibenik, Secondary School Valpovo, Youth Center Rijeka. Lack of equipment is less and less often mentioned as the main problem of using computers in classes – the lack of teacher support becomes the main problem (hardware maintenance, permanent teacher training, updating of curricula). The need of introducing informatics as a compulsory subject in primary schools is pointed out again. The works of university teachers were, as usual, of high quality. A larger group from Slovakia (Koscice) (5 participants) also attended the conference. The colleagues from Carnet held excellent presentations which were well accepted by the participants. The Proceedings contain 40 papers on 206 pages and are edited by M. Čičin-Šain, P. Dragojlović and I. Turčić Prstačić.

2005- The number of papers increases to 46. Mr I. Vidaković, head manager of IBM - Croatia, held the host lecture „Future of Education“. In the end of the conference a round-table conference was held and four excellent introductory reports (by Jureković, Pale, Hutinski and Vidaković) were presented. The Proceedings (247 pages) and are edited by M. Čičin-Šain, P. Dragojlović and I. Turčić Prstačić.

2006- The number of papers increases to 68. For the first time there is a simultaneous translation to English for all the reports held in Croatian. Two round-table conferences are held: Children and Adolescents on Internet – Safety and Protection and Experiences of Implementing Bologna Process. There are three introductory reports (by Jureković, Ostojić and Lamza-Marohnić). The discussion is very lively. The supervising team loses one of its members – prof.dr. Pavle Dragojlović passes away shortly before the conference. Ms Ivanka Sluganović joins the supervising team. The Proceedings contain 68 papers on 336 pages and are edited by M. Čičin-Šain, I. Turčić Prstačić and I. Sluganović.

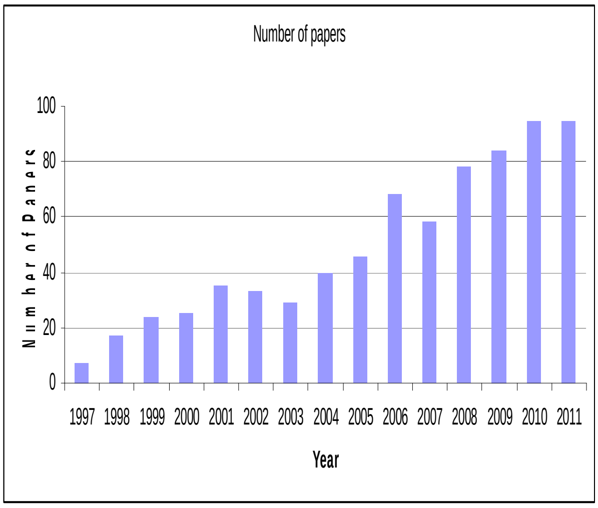
2007- There are 58 papers. Besides the papers the Proceedings contain a list of consulting editors, a list of authors, contents and preface. The works are written in Croatian (13 works) and English (45 works). Besides from Croatia the authors of works come from 11 other countries, those being Slovenia, Austria, Finland, Estonia, USA, Czech Republic, China, Serbia, Macedonia, Italy and Romania. The printed Proceedings contain 283 pages of A4 size. An electronic version of the Proceedings is edited on CD and contains all the conference papers.

2008- The Proceedings contains 78 papers. The editors of the Proceedings are M. Čičin-Šain, I. Turčić Prstačić, I. Sluganović and I. Uroda. Besides the papers the Proceedings contain a list of consulting editors, a list of authors, contents and preface written by the chief editor M. Čičin-Šain. The papers are written in Croatian (18 papers) and English (60 papers). Besides from Croatia the authors of papers come from 13 other countries, those being Slovenia, Finland, Estonia, Czech Republic, Serbia, Sweden, Iran, Russia, Bosnia and Herzegovina, Lithuania, Ukraine, Slovakia and Romania. The printed Proceedings contain 370 pages of A4 size. An electronic version of the Proceedings is edited on CD and contains all the conference papers (Picture 1.).

2009- The Proceedings contains 84 papers. The editors of the Proceedings are M. Čičin-Šain, I. Turčić Prstačić, I. Sluganović and I. Uroda. Besides the papers the Proceedings contain a list of consulting editors, a list of authors, contents and preface written by the chief editor M. Čičin-Šain. The papers are written in Croatian (25 papers) and English (59 papers). Besides from Croatia the authors of papers come from 14 other countries, those being Austria, Australije, Slovenia, Finland, Estonia, Czech Republic, Serbia, USA, Portugal, Makedonija, Bosnia and Herzegovina, Romania, Latvia and Slovakia. The printed Proceedings contain 421 pages of A4 size. An electronic version of the Proceedings is edited on CD and contains all the conference papers (Picture 1.).

2010- The Proceedings contains 95 papers. The editors of the Proceedings are M. Čičin-Šain, I. Turčić Prstačić, I. Sluganović and I. Uroda. Besides the papers the Proceedings contain a list of consulting editors, a list of authors, contents and preface written by the chief editor M. Čičin-Šain. The papers are written in Croatian (25 papers) and English (59 papers). Besides from Croatia the authors of papers come from 13 other countries, those being Austria, Slovenia, Finland, Estonia, Czech Republic, Serbia, Germany, Qatar, Macedonia, Bosnia and Herzegovina, Lithuania, Greece and Slovakia. The printed Proceedings contain 480 pages of A4 size. An electronic version of the Proceedings is edited on CD and contains all the conference papers (Picture 1.).

2011- The Proceedings contains 95 papers. The editors of the Proceedings are M. Čičin-Šain, I. Turčić Prstačić, I. Sluganović and I. Uroda. Besides the papers the Proceedings contain a list of consulting editors, a list of authors, contents and preface written by the chief editor M. Čičin-Šain. The papers are written in Croatian (24 papers) and English (71 papers). Besides from Croatia the authors of papers come from 13 other countries, those being Australia, Slovenia, Finland, Estonia, Czech Republic, Serbia, Germany, Turkey, Macedonia, Bosnia and Herzegovina, USA, Canada and Slovakia. The printed Proceedings contain **481** pages of A4 size. An electronic version of the Proceedings is edited on CD and contains all the conference papers (Picture 1.).



Picture 1.

E. Who Is the Conference „Computers in Education"Meant for?

The conference is meant for all those who see to it that new technologies are applied in education, but also for those who teach different topics and use computers in the process. All teachers of Informatics at all levels, from primary schools to universities, but also teachers of other subjects, e.g., mathematics, economy or geography who use computers in class in any way, are interested in this conference. Teachers can share their experience with others at the conference. However, there are other participants at the conference who represent the companies using computers in their work and can share their experience about a lifelong education of employees, there are kindergarten teachers sharing their experience about working with pre-school children, there are teachers working with physically challenged children, e.g., blind or deaf ones, there are students with their needs and attitudes, principals with their organization problems, people who maintain hardware and software Web of educational institutions... Every year there are participants from other countries, not only from Croatia.

F. Isn't That an Uneven Company: Kinder-garden Teachers and Web Masters? What Do They Have in Common?

It is actually not as unrelated as it seems at first sight. Small children already use computers. There was a report on Mipro 2003 about teaching children self-protection during Internet access (Teaching students web sites evaluation) which awoke great interest with teachers. Some of them admitted that they were not aware of all the dangers lurking from the Internet. In 2006 there was a round-table conference about Children and Adolescents on Internet – Safety and Protection and the keynote speakers were Ivana Vidaković and Ivica Ostojić. Nowadays everybody talks about Internet safety and we feel that we have contributed to perceptiveness of people to that problem at least in a small amount. On the other hand Web masters are also common people who have children of their own and can learn something from kindergarten teachers and primary school teachers, which became obvious during discussions after reports of several teachers who teach the little ones. Dads – computer specialists saved songs, poems and drawings for their children on their laptops. Anyhow, it seems that the conference Computers in Education is one of rare occasions at which all those people can meet and talk with each other.

F. Does it mean that not only teachers of informatics take part in the conference?

The number of teachers of informatics is by far the largest one at the conference. However, there are other teachers who take part in it, e.g., teachers of Croatian, forestry, electrical engineering, economy, mathematics, statistics, geography, catering and others. Apart from the teachers, there are other professionals at the conference such as librarians, psychologists and principals.

G. International Attendance

Year	noc	Authors from:	Round-table conference
1997.	Only Cro	Six authors - Rijeka, one from Zagreb	Spontaneous discussion after the report
1998.	3	Croatia, Slovenia and Austria	Internet in school
1999.	4	Croatia, Slovenia, Austria and Italy	Present state of informatics and robotics in school
2000.	4	Croatia, Slovenia, Hungary and Russia	Informatics teaching and skill development of using the Internet
2001.	4	Croatia, Slovenia, Italy and BiH	Teaching methods of Teaching Informatics
2002	3	Croatia, Slovenia and Italy	School in the 21st century
2003	7	Croatia, Slovenia, Serbia, Lithuania, Ukraine, Italy and Australia	How to improve application of new ICT in the education process
2004	9	Croatia, Slovenia, Serbia, Italy, Canada, Romania, Czech Republic, Slovakia and Australia	Forum Role of education within the world economy – Croatian prospects
2005	9	Croatia, Serbia and Montenegro, South Africa, BiH, Russia, India, USA, Ukraine, Ghana	Technology in function of human potentials within the education process
2006	9	Croatia, Slovenia, Serbia, Czech Republic, BiH, Slovakia, Finland, Estonia and Austria	1. Children and Adolescents on Internet – safety and protection 2. Implementing the Bologna process
2007	12	Croatia, Slovenia, Austria, Finland, Estonia, USA, Czech Republic, China, Serbia, Macedonia, Italy, Romania	Bologna process
2008	14	Croatia, Slovenia, Finland, BiH, Estonia, Czech Rep., Serbia, Sweden, Iran, Russia, Lithuania, Ukraine, Slovakia, Romania	Key speaker Michael Auer
2009	15	Croatia, Austria, Australia, Slovenia, Finland, Estonia, Czech Rep., Serbia, USA, BiH, Portugal, Macedonia, Latvia Romania, Slovakia.	Key speakers Jadranka Sunde, Frank Kappe
2010	14	Croatia, Austria, Slovenia, Finland, Estonia, Czech Rep., Serbia, Germany, Qatar, Macedonia, BiH, Lithuania, Greece, Slovakia	Key speaker Christian Guetl
2011	14	Croatia, Australia, Slovenia, Finland, Estonia, Czech Rep., Serbia, Germany, Turkey, Macedonia, BiH, USA, Canada and Slovakia.	Key speakers Jadranka Sunde, Katerina Agostino, Pamela Wilson, Armin Pavić, Zoran Bekić

Table 2.

In the first five years of its existence (1978 – 1982) Mipro was a convention that gathered participants from different parts of former Yugoslavia. Today, the participants come from Europe, America, Asia, Africa and Australia. Similar to that, the conference CE – Computers in Education had the local character only in its first year (1997). The Table 2 shows the interest for Mipro expanding across the Croatian borders. The same table shows the round-table conferences, that is, the host lectures on the CE convention.

It can be concluded from the table that the interest for the conference has been spreading in the other countries. The detailed analysis shows that the participants who came once are likely to return in the following years.

H. Conference Topics

The topics chosen by the authors during the past eleven years can be seen by analyzing the proceedings of past CE conferences. Total number of topics is larger than the number of works because some papers dealt with more than one topic. Table 3 shows the reports selected according to topics.

Some topics occur constantly and some are related to a certain period. Thus, the topics relating to teaching, application using and similar occur constantly while the topics relating to e-learning and laboratories have been occurring more frequently in the past few years. Some topics like programming were very popular at beginning and had some up and downs during the time.

topic	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Administration			1	1									3	1	
Adults											5	3	3	4	
Applications		4	7	5	10	6	5	10	11	20	5	14	4	8	
Assesment					2	1	4	4	2	1	3	3	6	5	
Blanding e-learning													2	2	
Certification													1	2	
Content manag.								2					3	1	
Disabled									1	1			1	1	
Distance learning		1		1	1	3	2	2	1	4	1	5	3	2	
Economic aspects										4	6		9	12	
e-learning							4	2	4	4	15	10	11	10	
Ergonomy					1	1									
Expert Systems					4	4							5		
Games											3	4	2	1	
Gifted studenta														1	
Internet	6	4	7	3	2	4	1	1	2				4		
Kindergarden&PS		2			3	4	1	2	3	4	2	3	1		
Laboratories							1	5	8	12	5	10	6	5	
Libraries													1	2	
Mobile devices			1					2				2		1	
Moddle													2	3	
Other								3					5		
Open source and freeware													1	5	
Programming &A	3	6	6	8	9	1	3	7	3	10	6	8	3	7	
Simulation							3		1				2		
Teaching	1	5	6	10	12	12	9	5	12	15	12	16	11	14	
Teleconferencing						1			1					1	

Table 3: Reports of CE selected according to topics:

IV. CONCLUSION

Teaching informatics differs from teaching other subjects mostly due to intensive changes which have been happening in the field of ICT technologies. The new technologies have been used in teaching other subjects and the teachers are both perplexed and fascinated. Due to all those reasons the application of new technologies in schools requires a constant providing of information and teacher training. Mipro conference CE – Computers in Education is one of such conferences which is well accepted by the teachers and has been held every year since 1997.

The teachers appreciate such conferences – the best argument is the large interest for the conference which is constantly growing.

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COMPRESSOR STATION THROUGHPUT SIMULATOR: LEARNING TOOL OUTPUT OF INDUSTRIAL COOPERATION

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Abstract – This paper presents the compressor station throughput simulator for KS1 station, which is the main overtaking station of natural gas transport from Russia to Slovakia. This station is of high economical importance. The goal of the simulations is to achieve higher efficiency by preserving transfer costs and infrastructure for the industrial company. The simulator copies the structure of the KS1 station and implements mathematical models of the included aggregates. It allows the setup of various parameters and outputs its results into Excel-compatible file format for post-processing and analysis. In this article, its structure and selected implementation details are presented, and further improvements are discussed.

I. INTRODUCTION

Industrial cooperation is very important for technical universities. These allow the application of new theoretical research results in the industry and/or modeling and simulation of real industrial systems and processes with high quality verification option [1,2,3,4,5].

In practice, turbo compressors are not working under the exact conditions they were designed for, i.e. under conditions, which are reflected in the design of the flow cross-section, blade angles etc. It is obvious that compression and efficiency will change, depending on the factors that affect the operation of the compressor. These factors are the parameters of the inlet gas, i.e. these parameters have a major impact on the overall throughput of the compressor station [1,3,4].

There are four compressor stations representing the major technological complexes in the mutual distance of about 115km in the transit pipeline in the territory of Slovakia [1]. These stations consist of technological devices called aggregates. These aggregates provide the required transport by increasing pressure level to compensate the pressure loss in pipes and to ensure the contracted amount of pressure and transport of the natural gas to the border overtaking points.

TABLE I. DISTRIBUTION AND NUMBER OF AGGREGATES IN KS1

Major technological equipment	Count of aggregates included in KS1 station
TS 6 MW	23
ES 25 MW	3
T 23 MW	1
R 28 MW	3

Compressor station KS1 is the most important point in the transit system. Its throughput determines the performance of the transit system of Slovakia. More information about the aggregates are presented in [1], Table I shows only the major structural elements of the KS1 station.

Computer simulation is an automation of analytical and constructive computations using mathematical models [6,7]. Implementation of a simulation tool is composite: it integrates tools for calculations, visualization and printing. In this paper, the calculations are in focus. Visualization and printing of the results is left to external tools such Excel.

The simulation program is helpful for students working on their diploma theses, running computer simulations of the selected aggregates during classes, but source code could be used in teaching programming as well [8,9,10,11,12].

The organization of the paper is as follows. Section 2 deals with the simulation program structure, basic algorithms and implementation in Pascal and C language. Section 3 presents program usage in simulation classes or any similar tasks. Section 4 discusses alternative usage of the simulator source code in teaching programming. Section 5 concludes and points on future tasks of the KS1 simulation framework improvement.

II. SIMULATION PROGRAM STRUCTURE

The simulation program implements the mathematical model presented in [1,3].

A. *The Algorithm*

Based on the mathematical model, the algorithm must be set up by passing input parameters such $p_1, t_1, \varepsilon, t_{env}$. After that, several computations based on polynomial equations are deriving parameters of compressors and drives. The last step of the algorithm consists of printing resulting values into an Excel-compatible file (comma separated values format). Algorithm steps are shown on Fig. 1.

B. *Implementation 1 – Pascal*

The first (older) version of the simulation program is implemented using Pascal language. Language features include the ability of labels usage allowing direct implementation of the algorithm presented on Fig. 1, where the instruction sequence is regulated by `goto` commands, although this kind of instruction is deprecated in some other programming languages. Example Pascal code follows for labels demonstration:

```
BEGIN
...
      repeat
            eps1:=moc(0.5,epsk);
            p12:=p1*eps1;
            nt1:=n/moc(0.5,(273+tt1));
55:         nt:=nt1;
...
            writeln(ik, n, eps1*eps2,'
            Pkom=', pkmax_t51+pkmax_t52, '
            Pturb=', pturb1+pturb2);
50:         n:=n-25;
      until n=nmin[ik];
45:   if (epsk<1.22) then ks_6MW;
30:   if tok>=35 then goto 35;
      if vypocet='a' then begin
            tok:=tok+5;
            goto 75;
      end;
35:   close(f2);
      close(f);
      close(f1)
END.
```

C. *Implementation 2 – C*

C language also supports labels and `goto` command statements. General programming advices also mark them as deprecated and one has to omit their usage to achieve clean code in terms of programming styles. Implementation 2 copies the code structure of the Pascal implementation, including the labels. The following code example is the C language variant of the Pascal code shown above:

```
main(argc, argv)
int argc;
char *argv[];
{
...
   do {
       eps1 = moc(0.5, epsk);
              p12 = p1 * eps1;
              nt1 = n/moc(0.5,273+tt1);
_L55:         nt = nt1;
...
              printf("%12ld%12ld%.5E   Pkom=
              %.5E  Pturb=%.5E\n",  ik,  n,
              eps1  *  eps2,  pkmax_t51  +
              pkmax_t52, pturb1 + pturb2);
_L50:         n -= 25;
       } while (n != nmin[ik]);
_L45:  if (epsk < 1.22) ks_6MW();
_L30:  if (tok >= 35) goto _L35;
       if (vypocet == 'a') {
              tok += 5;
              goto _L75;
       }
_L35:  if (f2 != NULL)
              fclose(f2);
       f2 = NULL;
       if (f != NULL)
              fclose(f);
       f = NULL;
       if (f1 != NULL)
              fclose(f1);
       f1 = NULL;
       exit(EXIT_SUCCESS);
```

}

D. Verification

Verification was based on comparing the simulation results to the results of practical measurements at KS1 station [1].

III. SIMULATION WORKFLOW

The workflow consists of using the base KS1 simulation program to acquire resulting data for given input parameter values. These data are further analyzed.

The obtained data sets related to constants n and P_k for compressors for variety of input pressures p_i, compression ratios ε and ambient temperature ta are processed on Excel into polynomial dependencies for each aggregate as follows:

$$n = a_p q^3 + b_p q^2 + c_p q + d_p \quad (1)$$

$$P_k = a_k q^3 + b_k q^2 + c_k q + d_k ; e_k = P_k / q \quad (2)$$

and for each turbine:

$$P_{t\_\max} = a_t q^3 + b_t q^2 + c_t q + d_t ; e_{tt} = P_{t\_\max} / q \quad (3)$$

After these calculations, results are ready to visualize or print, respectively.

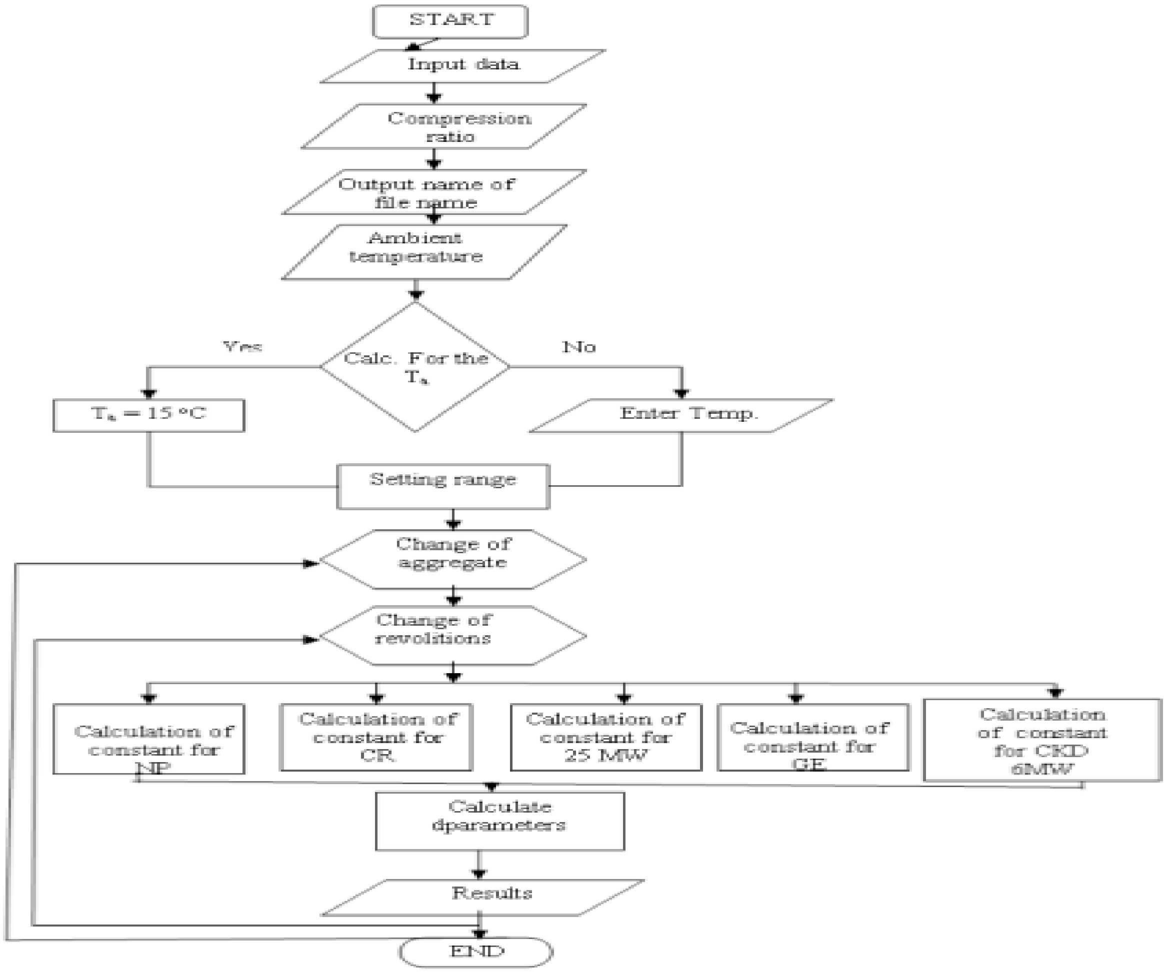

Figure 1. KS1 aggregate parameter calculation algorithm

IV. USING SIMULATOR CODE IN TEACHING PROGRAMMING

As introduced, there are several areas in teaching programming, where such a source code could be used.

A. Filling the Gap

Source codes of both implementations are suitable as examples of procedural language codes. Similarity of the codes helps to fill the gap in programming experience of students coming from different high schools, e.g. ones learned Pascal at high school, and others used C language.

B. Labels and GOTOs

Labels and `goto` statements are used as counter-examples in programming while showing programming styles. The implementation is useful for presentation of problems in source code analysis and understanding, in fault detection and localization and in debugging, caused by using program flow redirection without a condition.

C. Bad Code vs. Good Code

Refactoring classes [6,7,8,9,11] could use the C source code as subject of refactoring. There could be several goals defined based on the source code structure of this simulator:

- Label elimination by introducing statements for various types of cycles, e.g. `while, for, do`.
- Algorithm decomposition by introducing functions.
- Global variable elimination by introducing structured types and using them as return types of functions.
- Using references (pointers) in parameter passing to save stack memory, using dynamic data structures.
- Splitting the code into modules based on aggregate types to provide libraries for the compressor station simulators of the other three real stations.

In each step of refactoring, the needed regression testing will be replaced by the oracle method, i.e. using the Pascal executable to produce test data for the given inputs.

V. CONLUSION

The paper presented the compressor station throughput simulator for the real KS1 compressor station that became a learning tool for a variety of students of different fields of study.

First, for the connection to the industry, the simulator is used for aggregate parameter calculations within the prediction and analysis workflow in specialized classes and diploma theses.

Next, its source code could find place in teaching programming dealing as example source code suitable for many programming teaching activities such as introduction into procedural and structured programming or refactoring.

The future of the KS1 compressor station throughput simulator lies in the need of its complete integration into the presented simulation workflow in the form of a Matlab S-function block or an alternative type of Matlab-based application that allows usage of all benefits and advantages of the mentioned framework. This implementation is a mainly programming task with cooperation with the industrial system and the authors of the mathematical model for development instructions and system verification.

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PROPOSAL OF METHODOLOGY FOR CREATING REPOSITORY OF STUDENTS FOR SEMANTIC E-LEARNING ENVIRONMENT

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Abstract – For many years distance learning (DL) has been used as a form of teaching process in higher education. The Faculty of information technologies in Mostar (FIT) has an e-learning system for static delivery of teaching content within distance learning form of education process. Dynamic development of higher education and compulsory implementation of Bologna process have imposed the need for personalized delivery of teaching content adapted to each student, as well as the need for supervising and counselling of DL students with the aim of optimising their success. This paper will present the methodology for creating repository of students adapted to semantic e-learning environment. The methodology uses existing data about students stored in a structured data source, relational database. For the requirements of supervising and counselling of students and with the aim of optimising their success, the model includes import of new data in the structure of student model repository. The result of applying the proposed methodology is the model of repository of students that provides not only domain ontologies for the teaching content but also the preconditions for adaptive and semantic e-learning environment.

I. INTRODUCTION

Since 2003, Faculty of information technologies has been working on the reform of the teaching process with the aim to fully implement the Bologna process. For many years, the Faculty has been developing and using the e-learning system with web interface (DLWMS2) for: support to traditional teaching process, distance learning and blended learning.

It is necessary to organize the distance learning process in accordance with the requirements of Bologna process and to continuously supervise progress and success of DL students by improving the system through adding new functionalities and to adapt the system to the new phase of Web development, i.e. Semantic Web.

The process of making data repository for Semantic Web has recently been a subject of intensive scientific research. Thus, it is necessary to adapt the data layer of e-learning system to the needs of semantic Web. This paper will propose methodology for creating repository of students in e-learning system, adapted to semantic environment. Methodology will use existing data stored in relational database of e-learning system.

II. BACKGROUND

DLWMS2 stores basic data about students in a relational database supported by Microsoft SQL Server database management system. Data stored in the relational database are lacking semantic perspective necessary for semantic e-learning environment.

In order to adjust the data repository to the semantic e-learning environment it is necessary to organize the data into ontologies. Relational databases are structured data sources for learning ontologies and preparation of data repository for semantic e-learning environment. Structured data sources are defined and on basis of such data sources it is possible to largely automate the process of creating ontologies through the process of learning ontologies.

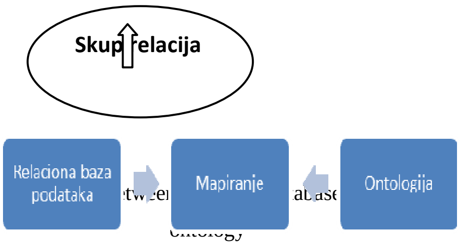
Ontology of student model enables semantic web applications to use and reuse data, reasoning based on instances of data assigned to concepts and interoperability between different systems.

There are two approaches of creating ontologies with the data source using relational database [1][2]:

- mapping relational database with existing ontologies that results in a set of relations between the database and the ontology (fig.1) and

- creating ontology on basis of the existing structure and content of the database (fig.2).

Fig 1. Creating ontologies on basis of relational database



Fig

In the process of learning ontology on basis of structured data sources, data structures from data sources are kept. In preparation of data sources for learning ontologies, it is necessary to determine ***which information about the data structure are relevant for the process of learning ontology and can offer new knowledge in the process of reasoning***.

III. Upgrading the Structure of Data Repository

The approach of transforming the database into ontology was used for preparation of data repository for semantic e-learning environment, since only the database was available and generally accepted ontologies of student model adjustable to current conditions were not available. Ontologies that were the result of transformation can be mapped with some other database of similar purpose.

Data from the existing database are not sufficient for the semantic e-learning environment. Data about characteristics and behaviour of students in the process of studying also need to be stored in data repository, in student profile. One of data sources for creating student profile is an application for identification of learning style. Other data useful for identification of student profile are: behaviour of student in the studying process, student's knowledge (reviewed teaching content, results of evaluation activities) and the role of students in the knowledge sharing community.

Application for identification of the learning style has been made as a part of scientific-research work at FIT and the results (learning style) also present a structured data source and thus, the upgrade of ontology with the data about the learning style can be automated.

Behaviour of student in the studying process is dynamic data, that can be changed each time student starts the studying process.

Stored data about the behaviour of student refer to the order of using the teaching content. The change of data about the behaviour of student can result with transferring of the instance from one ontology concept to the other or in creation of the new data instance.

Data about student's knowledge also need to be stored. In the proposed model, it is considered that student has acquired knowledge from the teaching content that he/she has reviewed and if he/she has successfully completed the evaluation activity referring to the specific teaching content.

Data about the role of student in the knowledge sharing community (http://cs.fit.ba) are important in the context of students' socialization. These data will be taken from the data warehouse storing data that were the results of analysing the social network for each course in the Curriculum. The process of analyzing the social network results with the structured data source and thus, these data can be included in process of learning ontology.

Protege 4.1.0 software tool, ontological language OWL and logical formalism of the description logics are used for the process of learning ontology of student model. Plug-in DataMaster for Protégé (Stanford Center for Biomedical Informatics Research, 2010) enables transformation of the relational database structure into four different ontologies (three OWL ontologies and one Frame ontology) [3].

Besides the possibility to create the ontology of relational database structure, DataMaster enables creating of ontology on basis of the content in relational database. Each of these four ontologies is adequate for a certain change. Ontology presenting tables of the relational database as ontology concepts is adequate for use in the process of learning ontology of student model since the content of tables, n-tuples of tables, need to be presented as instances of ontology concepts. If only the database structure (scheme) is to be presented, the ontology presenting tables of relation database as instances is used.

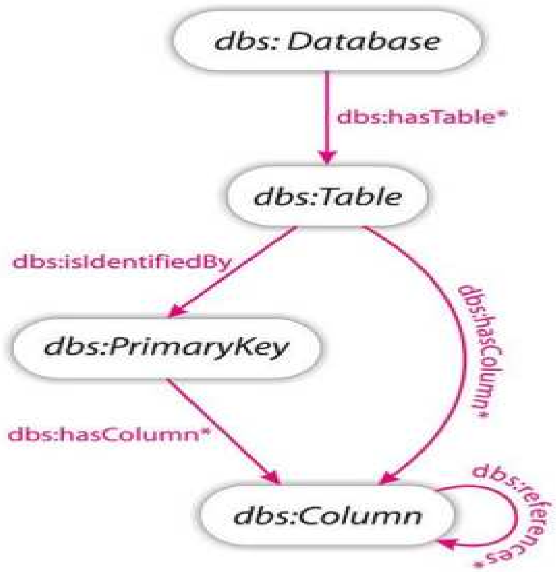


Fig 3: Ontology Relational.OWL

IV. PROPOSAL OF METHODOLOGY FOR CREATING REPOSITORY OF STUDENTS ADAPTED TO SEMANTIC E-LEARNING ENVIRONMENT

Methodology for creating the ontology of student model proposed in this paper is applicable in existing e-learning systems that on the data layer do not store metadata giving the semantic perspective to data.

Basic steps of the proposed methodology for creating ontology of student model for the existing relational databases storing data about students and data necessary for adaptive functionalities and semantic environment are (fig.5):

1. To identify data about the database structure relevant for the process of learning ontology of student model
2. To create ontology on basis of SQL-DDL code of structures selected in the first step.
   a. TABLE becomes the CONCEPT of ontology. Each table of relational database becomes OWL class. Name of class is the same as the name of table. For example table Student becomes owl class:
   <owl:Class rdf:about=“#Student“> </owl:Class>
   Classes of tables are disjunctive and thus, one individual can be the instance of one and only one class.
   b. ATTRIBUTE (column) of the relational table becomes CONCEPT ATTRIBUTE. Concept attributes have the same name as table attributes. All table attributes that are not foreign key become datatype attributes. By recommendation W3C, attribute domain is presented with XMLS. For example:

   *<owl:DatatypeProperty rdf:about=“#Surname“>
   <rdf:type rdf:resource=“&owl;FunctionalProperty“/>
   <rdfs:domain rdf:resource=“#Student“>
   <rdfs:range rdf:resource=“&xsd;string“/>
   <owl:DatatypeProperty>*

   c. ATTRIBUTE DOMAINS AND INTEGRATION RESTRICTIONS in the relational database become ontology RESTRICTIONS.
      i. Restriction of attribute domain NOT NULL becomes restriction of minimum qualified cardinality. For example:

      <owl:Restriction>

      <owl:onProperty rdf:resource=“#Surname“/>

      <owl:minQualifiedCardinality rdf:datatype=“&xsd;nonNavigative Integer“>1

      </owl:minQualifiedCardinality>

      </owl:Restriction>

i. Primary key becomes a suitable class and object attribute whose domain is a table class the primary key belongs to. Restriction of the table primary key is transformed into a suitable class and object attribute whose domain is a table class the primary key belongs to, and range is the primary key class. Primary key has a restriction of minimum qualified cardinality 1. Primary key class is in relation with datatype attributes.

```
<owl:Class rdf:about=“#StudentID“>
    <rdfs:subClassOf>
      <owl:Restriction>
      <owl:onProperty rdf:resource=“#StudentID“/>
      <owl:minQualifiedCardinality
    rdf:datatype=“&xsd;nonNavigativeInteger“>1
    </owl:minQualifiedCardinality>
    <owl:onDataRange rdf:resources=“&xsd;
    integer“/>
    </owl:Restriction>
  </rdfs:subClassOf>
</owl:Class>
```

Foreign key becomes functional object attribute whose domain is a class of table it belongs to and the range is a class of table it is indicating (reference table). For example:

```
<owl:ObjectProperty
rdf:about=“#DepartmentID“>
<rdf:type rdf:resource=“&owl;FunctionalProperty
“/>
<rdfs:range rdf:resource=“#Student“/>
<rdfs:domain rdf:resource=“#Department“/>
</owl:ObjectProperty>
```

3. Upgrade of the ontology in accordance with data in user profile:
    i. learning style,
    ii. behaviour of student in studying process,
    iii. student's knowledge (reviewed teaching content and results of evaluation activities),
    iv. role of student in knowledge sharing social network.
4. Joining of instances (n-tuples from relational database and data from student profile) with ontology concepts – ontology population.
5. Evaluation of created ontology.

First step of methodology will identify which data about the data structure from relational database are relevant for ontology learning and can offer new knowledge in the reasoning process. First step cannot be automated and participation of domain experts in the field of e-learning is required.

Second step will automatically, using tool for learning ontology, transform relational database structure selected in the first step into a suitable ontology. Besides automatic creating of ontology it is possible to use the approach that is mapping the database with existing ontologies. This approach will be suitable when other faculties of our University decide to use the same system for: improving students' success and efficiency of studying, motivating, students supervising and thus, improving the quality of the teaching process.

The new class presenting attribute domain is created for table attributes (columns) that have more restrictions. Classes are interconnected by object attributes.

Third step of methodology, upgrade of ontology can be automated and that is a significant advantage considering a large quantity of data. Automated process of creating ontologies (learning ontology) is more efficient and requires less time.

This step can be fully automated, due to structured data sources. Making this step of methodology automated is also very important, considering a large quantity of instances in student profile.

Upgrading of ontology is an improvement of DLWMS, not only because of the semantic perspective but also because of importing new data about the user (student) into repository.

Student's learning style is determined by application done by students at the beginning of studying as well as during the studying process if the success is lower than expected (fig. 4). Data about the learning style is stored in a separate data repository storing only the student identification number (index number), date and time of test completion and learning style. Learning style is a new concept in ontology and four instances have been added to it: abstract thinking, abstract experimenting, concrete experience and reflexive observing. Based on descriptions, it is simple to conclude that this part of ontology upgrading can easily be included in the process of learning ontology.

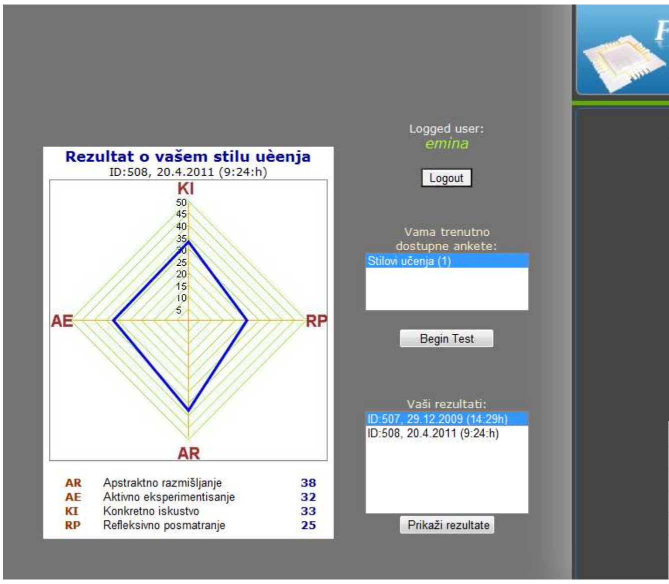


Fig 4: Result of application for determining learning style

Upgrading of ontology is a process realized also during student's interaction with teaching content and needs to include different profiles of student's behaviour during studying process (order of reviewing teaching content and number of times of accessing teaching content) into the ontology of student model. This step of learning ontology needs to be automated because of the number of students and the number of different ways of students' interaction with the teaching content. Teaching content used by student during the studying process is considered to be student's knowledge. Data about the results of student's evaluation activities are also stored.

It is possible to upgrade the ontology in accordance with activities that student performs in the knowledge sharing community (forum). By analyzing social networks, the model of data warehouse storing the roles of student and teacher in the social network has been made.

The project of automatized analysis of students' roles in social network of knowledge sharing community is ongoing and upgrade of ontology was done only on basis of the warehouse model.

By including concepts about: learning style, student's knowledge and role in social network, preconditions for adding adaptive functionalities to the system are made as well as the basis for implementation of intelligent functionalities in the semantic environment.

Fourth step, joining instances with ontology concepts is a process of transforming the relational database content into ontology instances. Datatype attributes are assigned to classes created for attributes having more restrictions and primary keys classes and relations are created between them. Other values of n-tuples are assigned to classes of a suitable table.

Fifth step of methodology, ontology evaluation process is supported with ontology evaluation tools, but it is also necessary to involve domain experts from the field of e-learning. Ontology evaluation by using the tools needs to show the consistency of ontologies and absence of conflicts. Tools used for ontology evaluation are ODEval and WonderWeb. Involving domain experts in the process of ontology evaluation is always a critical point because it is difficult to achieve consensus of opinions about the domain being evaluated.

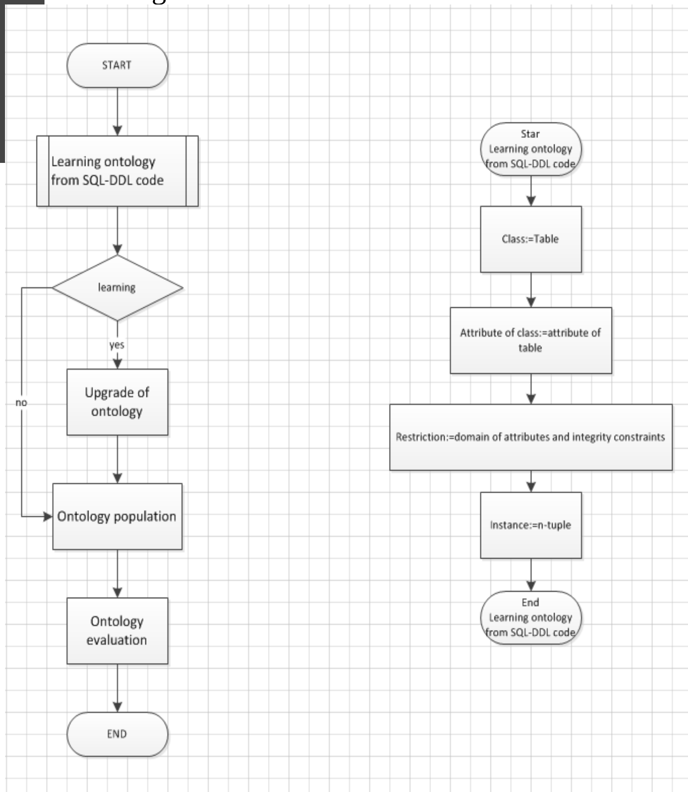


Fig 5: Methodology for developing ontology of student model

V. Conclusion

Application of the proposed methodology for developing ontology of student model (fig.5) on the data layer of e-learning system will create preconditions for storing useful metadata about student, which will contribute to creating semantic e-learning environment. Since student is interacting with teaching content during studying process, it is necessary to have sufficient metadata about teaching content on the data layer.

Ontology of student model and domain ontologies of teaching content are minimum preconditions for creating semantic e-learning environment and they also enable sharing and reuse of data as well as interoperability.

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SOME APPLIED ASPECTS OF ICT IN FOREIGN LANGUAGE TEACHING PRACTICE

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Abstract - The paper presents some theoretical aspects and practical results of a project work aiming at developing a foreign language teaching strategy based on ICT and Internet.

I. INTRODUCTION

The positive aspects and the benefits of ICT in foreign language teaching practice are well-known and a number of specialists in both ICT and linguistics fields have been studied and analyzed this problem.

II. THEORETICAL BACKGROUND OF THE PROBLEM

On the basis of the existing researches some useful conclusions with theoretical and practical value could be made:

- With the development of the educational and information technologies, the modern educational conditions and teaching approaches have been changed. The new trends are connected with more flexible and personally orientated forms and methods. The main role and functions of the students and the instructor have been put on a different level too. The communication paradigm becomes a dominating one for the modern foreign language teaching and changes the focus from the language system with all its norms and rules to the individual and the personal needs and interests of each student together with the real communicative situations and the language, not only as an object of study but as a communication tool.
- The modern ICT and the Internet allow teachers and researchers to rationalize and improve some of the existing educational concepts and strategies by offering a wide range of opportunities for a new organization and realization of the educational process which in comparison with the existing methods give better results and more varied options for presenting information on the basis of the communicative and individual approach in education. At the same time the use of ICT reduces the expenses for the organization and the development of educational resources. Due to these reasons the ICT and Internet resources adapted for language teaching are an integrated part of many modern foreign language courses and course books.
- The ICT are not a new and unknown concept for the foreign language teaching practice. Because of its specifics and the need of a new type of interaction between the language instructor and the students aiming at more effective language acquisition ICT have become one of the basic tools. As a result many foreign language teaching methods and courses have been developed on the basis of ICT. The historical background of ICT in foreign language teaching goes through some different stages depending on their development and improvement in the educational context. Generally there could be distinguished three main periods. The first period covers the 70s – 80s of the XX century. It could be presented as a computer-assisted foreign language teaching and learning. The language had been still taught as a formal system of structural units but by the computers the information could be operated and sorted easily. The 1980's saw the dawn of computer-assisted instruction, with programs designed to allow students to "interact" with the machine by responding to cues, exploring databases of information, and participating in educational "games." The first such experiments were necessarily primitive, but with the advent of CD-ROM and hypermedia technology, computer-aided

instruction has reached new heights. A number of different communication models and language structures were available for the student as multiple choice and gap filling tasks but the options were limited and the grammar and translation tasks were predominating. During the early 90s a new stage in computer-aided education had been developed. The language had been presented as a cognitive system based on communication. New interactive tasks for communicative purposes had been designed and applied. In addition, computer multimedia gave the student firsthand access to materials outside of traditional textbooks and classroom props. This real-life material in the target language which facilitates learning as well as enthusiasm and connection to the target culture can of course be found in traditional media such as magazines and newspapers, but computer technology combines these authentic materials with the interactive potential of multimedia. The new multimedia options offered better opportunities some authentic language resources to be introduced into practice using sound and image for individual and interactive teaching and learning but in a limited content framework. The late 1990's have brought a new tool to the scene - the Internet. The language has been presented as social and cognitive interaction in the real discourse based on the exchange of meaningful and useful information. The global network of computers on which email messages, files and programs are transmitted, brings new meaning to the term "interactivity." Using the Internet, students can truly communicate, not with machines or storybook characters, but with other students and native speakers around the world. The computer serves naturally to further this interactivity: students are not only able to communicate with each other during classroom time, but with other learners around the world, at any hour of the day or night. The global network and the Internet space as an environment for foreign language teaching give access to various and flexible content, communication models and situations, interactive relations. All this helps the acquisition of the structural and functional aspects of foreign language as a system of linguistic knowledge and skills and as communication code [1, 2].

- On the other side the Internet technologies and resources continuously improve their quality and develop their options presenting new systems for information exchange and communication for the different language levels. For example very useful for the beginners are the systems where the course of information is limited to a given number of options which helps the better orientation. For more advanced students the open systems with updating information and interactive links creating social and communicative networks are more attractive and efficient.

- What makes the ICT and the Internet resources most valuable for the foreign language teaching is the fact that they help the acquiring and the understanding of the abstract language system in an artificial communicative environment created for the classroom only. The advantages that they give could be summarized in the following:

1. The free online access offers a rich variety of authentic resource packs, teaching materials and self-assessment tools.
2. The existing unlimited opportunities for active communication in the language via different social networks, e-mails, chat rooms, online forums etc., are natural motivators and stimulate the individual ambition for improvement of the foreign language competence.
3. The students can quickly receive feedback about their own achievements and mistakes and some possible solutions for their correction.
4. The combination and the application of different means in presenting the information improve the development of all the basic language skills and competencies: listening and reading comprehension, spoken production and interaction, writing skills.

- The successful application of ICT in foreign language teaching practice depends on the development of an appropriate educational informational and technical infrastructure in which the moderating functions of the instructors play an important role and should not be underestimated [3, 4, 5].

III. SOME PRACTICAL SUGGESTIONS

To improve the foreign language competence of out students in the Faculty of education at South-Western University "Neofit Rilski" in Blagoevgrad, Bulgaria a research project had been conducted through the past academic year – 2009/2010. The project aimed at creating an ICT teaching environment and exploring the potential of ICT for foreign language teaching at different levels according to the students' needs. Through a standard set of tools the foreign language threshold level of 200 students studying different majors and subjects at the Faculty had been checked. The test results and the analysis of the educational environment had shown some problems that needed to be solved:

- Entering the university the students have different level of foreign language competence and this fact leads to an open dynamic system of students' needs within the group that have to be effectively and adequately answered in the educational process in order to avoid students' demotivation. Most of the standard course books have been created for groups with not such big differences of the language level that is why a single course book may not be appropriate for many of the students in the group.
- Because of the different school backgrounds of each student there is only fragmentary information about different language structures and students find it difficult to make a clear concept about the whole language system. It is usually based on their intuition rather than their knowledge.
- Another problem is the short terms for the foreign language courses and the limited number of 30-60 academic hours.
- The expectations and the needs of the students are different as well as their individual learning styles which make it impossible for the language instructor to use the same set of teaching materials and resources. At the same time there often are more than 20-30 people in a group which makes it difficult to evaluate their achievements and to correct the mistakes they have probably made.

The theoretical research in the field showed that the ICT and Internet claim to offer a good solution of the problems mentioned above. The expectations are that their flexibility and adaptability will contribute for the following:

- To improve students' motivation and activity in the process of foreign language acquisition even in the short terms determined by the curricula.
- To present more opportunities for students to practice their language and communication skills in different communicative situations closer to the real communication context.
- To develop students' communication culture.
- To provide means and ways for effective individual work with the language by offering additional information and extra curricula tasks.
- To improve students' language skills and self development.

On the other hand ICT application in foreign language teaching requires an appropriate strategy. It will be effective if:

- students are provided free unlimited access to different ICT and Internet resources for language teaching and learning;
- a rich database with suitable resources is created, organized and constantly updated according to the training purpose and difficulty level.

As a final result of the theoretical and empiric research a model of a foreign language teaching strategy using ICT could be presented. The model contains three basic stages and each of them involves specific procedures as follows:

I. Preparation stage:

1. Preliminary diagnostics of students' foreign language threshold level, their learning styles, needs and interests.
2. Selection and adaptation of suitable resources from the existing database, according to the curricula purposes and students' personal interests.
3. Development and modeling of different training variants for each of the topics.
4. Organization and formation of the students' groups and teams, according to their interests and level.
5. Giving clear instructions.

Main stage:

1. Introduction and analysis of the language structure that is going to be taught.

2. Co-operative work with the instructor on given language tasks throughout different ICT resources.

Final stage:

1. Students' individual work with some resources and presentation of the results.
2. Analysis and assessment.
3. Observation of students' work and their satisfaction of the offered resource pack and the final results.

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DEVELOPMENT AND INFLUENCE OF INFORMATION TECHNOLOGIES INTEACHING PROCESS

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Abstract – Development of information technologies and growth of knowledge have caused significant changes in teaching process, teaching technologies, learning and curriculum. Information technologies make access to education more flexible and reduce barriers of time and place. Web-based technologies can advance the effectiveness by bringing learners into contact with learning peers from around the world. The walls of the traditional classroom do not exist anymore. This article will illustrate the trends in development and use of information technologies in teaching process. The accent will be on electronic delivery of content and the web.

I. INTRODUCTION

One of the basic functions of education is preparation students for life. This function in 21st century may be participation in an information rich society. The scenario of education particularly pedagogy and instructional teaching has been changed. Learning process is more productive creating collaborative, learner centered and interactive global learning environment.

The teacher has to play new role of mentoring, coaching and helping students in their studies rather to play conventional role in the classroom. Students can learn more independently having more access to information thru the internet and web-based technologies. In general students are less dependent on teachers.

Teaching and learning with computer technologies has a history of about 35-40 years old. Since about 1960 computers have been used to support teaching and learning. There have been several methods and techniques for teaching and learning: Computer Aided Instruction, Computer Aided Learning, Computer Based Training, Interactive Video, and Intelligent Tutoring System.

Today the most widely used is the World Wide Web as a tool and platform especially in distance education. Using information technologies students can decide about their studies, learning time, place and resource in a better way. Students can work in more supportive environment. About twenty years ago serious promises began to be made that computers and computer technology would soon greatly influence teaching and learning by supplanting the source and information transfer functions of teacher; freeing them to devote more time to the personal concerns of students and providing time for diagnosing learning problems, developing appropriate learning strategies, and monitoring the effects of instruction. Students would benefit by being actively involved in the learning process, receive immediate reinforcement about performance, and be able to proceed at their own pace.

The actual impact of information technology on instruction has not been that great. Until recently the computer has been used mainly as an aid to faculty productivity and to support or enhance normal teaching activities. The promise of twenty years ago has not been realized, but progress has been made in the development of new tools to support learning.

II. LEARNING PARADIGMS

The integration of information and communication technologies into the educational process has been linked to variety of learning paradigms. A number of learning modes characterize how teaching is orchestrated and how learning takes place. In the objectivist mode, knowledge is seen as part of a reality that is out there. The goal of learning is to uncover this reality and understand it. The traditional way of instructor-led education fits this mode of learning.

The second mode is the constructivist mode, in which learners are seen as makers of their own reality. Learning knowledge is a process that is constructed by the learners through exploration and problem solving. The one of the basic functions of education is preparation students for life. This function in 21st century may be participation in an information rich society. The scenario of education in this mode emphasizes a student-centered approach to learning and the teacher is seen as a facilitator and coordinator of the learning process.

Collaborative mode is an extension of the constructivist mode in which knowledge is acquired and learned through group interaction with others. Social interaction allows learners to share their ideas and experiences with other learners, so the overall learning experience is group enriched.

Cognitive information processing mode is based on the idea that learning is a function of the cognitive characteristics of the learner. Students will learn things that match their style.

In socio-cultural mode learners tend to construct their reality based on the social setting they are in. However, constructed reality depends on the learner's cultural background.

III. ELECTRONIC DELIVERI OF CONTENT

With the above-mentioned learning paradigms and styles in mind, it is easier to think holistically about the multiple approaches that have been used in ICT-based education, and try to map them to maximize their educational value for learners. The classical approach that many instructors tend to adopt in online education, for example, is to deliver online reading material in the form of handouts or course notes for students to download.

This is an extension to what is being practiced in traditional classrooms, where faculty members and trainers make photocopies of handouts to distribute to students in class. In online mode, the process saves the instructor’s time and effort. Students will access these documents and print them for themselves or not.

Such an approach is a direct realization of the objectivist mode of learning where the instructor is still at the center of the learning process. Instructors do in electronic communication what was done in face-to-face class environment but through a different medium. Beyond the fact that the online computer acts as storage for such material, and the files can be easily exchanged and saved for future use, not much in the way of added value educational is seen in this approach over traditional campus education.

Nevertheless, this approach is valuable in distance education mode because it saves time and cost. Online communication makes material instantly available to distant learners wherever they are, and there can be cost savings. Large amounts of material, if printed, will take a huge amount of paper and the cost of shipping will be high. One negative aspect of the ease and speed of electronic delivery of documents online can be a lack of caution concerning the size (quantity) of transmitted course material. An electronic thesis or book chapter in Adobe Acrobat PDF format can have a size of 880KB (less than 1MB). However, the number of actual pages of text can be more than 300. Some instructors do not have the feel for this numb er of pages and they just keep posting additional documents for their students to read.

Reading material can be posted on the web in various format. Many instructorssimply post word processing files or portable documents (PDF or Postscript). Others may design notes in HTML to be viewed with a web browser. No matter what delivery format, instructors need to keep in mind that not all learners have the same learning style.

Adult learners, for example, tend to be more practical and they may not like to read many things at once. Young learners may be visual, so inclusion of diagrams, illustrations, and pictures can be more suitable for them. Instructors delivering electronic material in this mode also must make sure that documents are clear and readable.

There is a tendency at many universities nowadays to use a method called electronic reserves. In this mode, printed documents are scanned into a portable document format (likely Acrobat PDF), and made available online via the library. The problem is often that these documents are not scanned properly due to lack of technical knowledge or in an attempt to save disk space by making the file smaller.

Either way, the resulting documents are not always readable or the graphics in many cases are distorted. Educators who would like to use such a mode of online delivery will wish to make sure they can reproduce materials at high quality. Faculty members should be familiar with the technologies involved to be certain the documents are optimized for online delivery and are manageable to transfer and download by the students.

An extension to document delivery that is richer but more involved is multimedia content delivery. Increasingly, multimedia is being integrated into online education due to its power in illustrating many educational concepts. Images, graphics, audio, video, animation, and simulations are being used in academic online learning as well as for corporate training and e-learning systems. Examples include diagrams to illustrate certain design processes or methodologies, photos of pieces of art from museum displays, audio and video clips transferred to online music, film, and media courses, and graphical simulations that allow students to change input parameters in science and engineering experiments and observe the changes and the reaction of a system.

These are only some of the many applications of multimedia in online education. Multimedia can be mapped into the objectivist mode of learning, but can also address other modes. For example, simulations and audio/video experiences enable learners to think for themselves and can prompt participants to solve certain problems either individually or through collaboration with peers. So, simulations can be mapped into the constructivist approach. Moreover, the use of visual multimedia supported by audio and animation caters to learners less able to learn by reading.

Some students need to see, hear, and experiment in order to understand and digest complex concepts. Multimedia usage in online education may better suite all types of learners from the young to adults. It is obvious that young learners will be more attracted to learning material that is enhanced by sound, music, and animation since this makes learning more fun. For adults who have a habit of learning on their own, video documentaries, simulations, and animations can help communicate and reinforce concepts. In a work environment, seeing an illustration or watching a video clip may be more effective than learning from text-based materials.

Educators who choose to deliver content through multimedia have to keep certain issues in mind. Multimedia content is usually larger (more media-rich) than textual documents. As such, bandwidth can become a problem. They have to keep in mind that not all at home or on-the-road learners have access to the high-speed infrastructures typically found in corporations or on university campuses.

For distance education, this is particularly crucial when learners have limited access and less sophisticated equipment. In online education being delivered to developing countries, for example, the 56Kbps dial-up modem is the only available mean to access online course content and large multimedia content poses a participation problem for learners. Educators need to know how to optimize content so they can deliver their learning material and communicate concepts, but without overloading the learner and the learner's receiving devices.

IV. WORLD WIDE WEB

World Wide Web is the most popular internet service. It enables users to have simple access to data and information as well as publishing their own data and information. This internet service does not require great deal of training to be used and therefore is very simple to use.

World Wide Web is widely used in education as a presentation, communication, delivery tool and as a research tool as well. There are two main ways of World Wide Web usage in education: information gathering and information offering. The best results are achieved by combining the two.

Web 2.0 has offered improved and new generation of World Wide Web.

TABLE I. COMPARISON OF WEB 1.0 AND WEB 2.0

WEB 1.0	***WEB 2.0***
Reading	Writing
Companies	Comunities
Client-server	Peer to peer
HTML	XML
Personal wb pages	Blogs
Lectures	Conversation
Content publishing	Sharing and participating in content
Encarta	Wikipedia

The positive aspects of applying Web technologies to teaching and learning:

- better access to information and knowledge, current or updated information, abundance of reference materials, easy access to historical documents, spend more time learning, less time searching, speed
- ease of communication, student interaction, interactivity, on-line discussions, and forums
- flexibility , more choices, options, can do lots of things, expand possibilities, points of view, more diversity
- increased student role in learning , student independence, motivation for students, perceived by students to be up to the minute, pursuit of interests
- glitz, excitement, intimidating, capability for visual , sound and other media, done by professionals
- increased feasibility of distance learning, can reach out to anyone, anytime
- overcome classroom inhibitions, no peer pressure

What are the negative aspects of applying Web technologies to teaching and learning?

- less control of information, little control over what students learn, lose focus on issues being discussed
- less quality, control, increased access to "wacko" documents
- lose interaction with students, physical, personal interaction, face time, human interaction, personal relationship with students, loss of emotion and feeling
- security, security issues
- loss of social development, know about real life work ethic, meeting time constraints, loss of standards
- costs, greater hardware, software needs
- loss of anonymity
- less time for development and maintenance

V. Conclusion

Many educators continue to perceive information and communication technology as a tool or teaching aid. However, with the increased capabilities of technology, its status has been raised to that of a learning environment with multiple capabilities to support and enhance student learning. Continual advancements in information and communication technology such as virtual reality, fast speed access, networked communities, advanced computer graphics, abundant and relevant online resources will constantly change learning environments and provide for different ways humans learn. Accompanying this change will see a shift towards more qualitative methods of inquiry yielding in-depth understanding of the teaching-learning processes in a technology-based environment. In other words, research should focus on understanding what, when, why and how learning takes place in the technology enriched environment which is important because this will be the pedagogy of the future at all levels of education and training.

The technology revolution in education will continue to be about access to information but also about ways of sharing information. Instructional technology in the next decade will support both synchronous and asynchronous interaction between the learner and the sources of knowledge and information. Incorporating digital text, audio, graphics, animation, and full-motion video into lecture, laboratory, self-study, and interpersonal and inter-group communication activities will be the norm. Real-time, simultaneous two-way video, multimedia presentations, personal support systems, and "education on demand" will be delivered to students where they live, work, or study. Communications and connectivity will increase between the student and the teacher, other students, the office, the dorm room, the classroom, the library, the campus, and the world.

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SNA BASED INFERENCE

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Abstract - The use of SNA for online learning communities' analysis is common and usually performed after the ending of semester. Yet, even if such analysis is very useful, it is costly, and cannot be performed many times during the semester. In this paper, we present a model of automated SNA based inference, for a large-scale community, taking into account specific environment of developing higher education system. The model is designed to send automated reminders to all users, according to their activity in the period of two weeks. One additional analysis after the mid-term exams checks if activity matches the performance. It has crucial role in directing both students and educators towards the common goal: success at the final exams.

I. INTRODUCTION

In the past years, we were involved in analysis of a large-scale online learning community at FIT Mostar. We investigated the topology of the communication, and it turned out to be a scale-free, small world network (Bijedic and Burak, 2006). Investigating the network properties, we proved that parts of FITCS (Faculty of Information Technologies Community Server) provide knowledge sharing (Hamulic and Bijedic, 2009, Bijedic and Hamulic, 2009). In addition to this, we recently presented a semi-adaptive e-learning model suited for the limiting environment of Bosnia and Herzegovina (Radosav et al., 2010). All of these efforts are aiming to increase quality of higher education in post-war Bosnia and Herzegovina, especially concerning the new trend of online learning.

In this paper, we use the previous results to offer a model for automation of SNA results as inputs to adaptive learning management system. We base our model on FITCS, but it can be used for other large-scale learning communities.

The need for automated SNA based inference in such communities is driven by the fact that one can identify most active users, but cannot picture the communication in total.

The model deploys two types of analysis: periodical activity analysis, and mid-term success analysis.

The first aims to motivate all users to share knowledge in a proper way. The second is supposed to help all users to improve performance, and is mostly based on results of mid-term exams. Both are expressed in algorithmic form, for the sake of better understanding. We are also addressing some specific problems for B&H environment.

Concerning the students, there exists significant lack of motivation and high dropout rate, which are the results of underdeveloped labor market in the country. Such situation results in significant number of spammers in the online learning community, and we treat such students in an adequate way.

The situation with educators is quite similar, due to brain-drain. There is a significant lack of teachers, so it is very difficult to work in small groups. In practice, one educator is responsible for at least fifty students, which makes it very difficult to monitor student's progress. Since it is impossible to perform SNA many times during a semester, we here present a model in which automated inference should help all users of an online learning community to improve performance.

II. MODEL OF COMMUNICATION

FITCS

FITCS exists for more than five years now. It was originally designed for distance learning students, but in time, it became the most popular way of communication for all FIT students. FITCS consists of several units, and one of them is reserved for communication on curriculum subjects. That part was designed for knowledge and information sharing. FITCS is now numbering around 800 active students. Their communication is grouped by the semester of study, where students can exchange experience on subjects, and personal interests, such as computer networks, security, etc. In our previous research of online knowledge sharing, we explored the parts of FITCS concerned with first year subjects. The reason for choosing freshmen was simple: they need more help at the beginning, and if their knowledge sharing works out, we argued that the rest certainly will too. Additionally, in order to analyze behavior of large groups, in the end we focused on freshmen (average of around 250 active users per year), and the most difficult subjects from both winter and spring semesters. Therefore, in this paper we base our model on those experiences.

Model of Communication

For the purpose of our research, we explored various possibilities and modeled communication at FITCS as directed and undirected, weighted and non-weighted graphs, but in the end, we chose the undirected non-weighted (simple) graph, where students and educators are nodes, and communication in one topic links all of the involved users.

We argued that it is not important who is answering to whom, or who initiated the topic, but that the importance lies in the fact that all users share interest in the topic. That is the reason we chose undirected graph. In addition, since users communicate inside one topic, we argued that the topic is the smallest unit and we did not weight the links, for it was irrelevant. Nevertheless, we suggest attaching the number of posts in the sub forum to each user. In addition to this, since we aim to improve performance, we also suggest attaching students' grades at the mid-term exams.

III. ANALYSIS

In order to obtain automated inference, we suggest elements of SNA that are easy for programming, such as adjacency matrix, and node degree.

Elements of SNA

In this analysis, we suggest usage of the node degree, and number of posts for both students and educators, and students' success at the exam. We suggest calculating the node degree for each user, and ordering the degrees from highest to lowest. Furthermore, since we expect our network to be scale-free, we suggest dividing degree sequence into quartiles, and we base further inference on such division. Such node degree describes not only intensity, but also variety of communication for each user. That is, if users are communicating in more topics, it is more likely that they will have greater node degree, since they communicate with more other users. The user with node degree much greater than the rest (approximately among top five to ten, depending of number of users) we call hub.

Hubs are users that are very communicative and enthusiastic, and can be either students or educators. If educators are hubs, than their position in the forum is said to be too enthusiastic. It is known that educators should be moderators in the network. For the purpose of this research, the above means that their degree should be in second or third quartile, and that they should write not less than one and not more than two posts per day on average.

From our previous research, we identified two types of student hubs:

- users that post content relevant to the topic, and should be identified as potential demonstrators, and
- spammers.

Nodes with degree zero we call isolated users; those users posted a topic and got no answer, and they did not participate in any other topic. The difference in number of posts is related only to the previous analysis; initially it is set to zero. In order to identify behavior of students, in some parts of the analysis we include their results at exam (student's success).

Types and scheduling of analysis

There should be two types of the analysis:

- periodical activity analysis, the simplest, performed twice a month,
- success and activity analysis, performed after the mid-term exams, and

For periodical activity analysis, we suggest exploration of node degree and number of posts for each user. This analysis should provide insight into activity of both students and educators, and should provide outputs in the form of automated messages to all users.

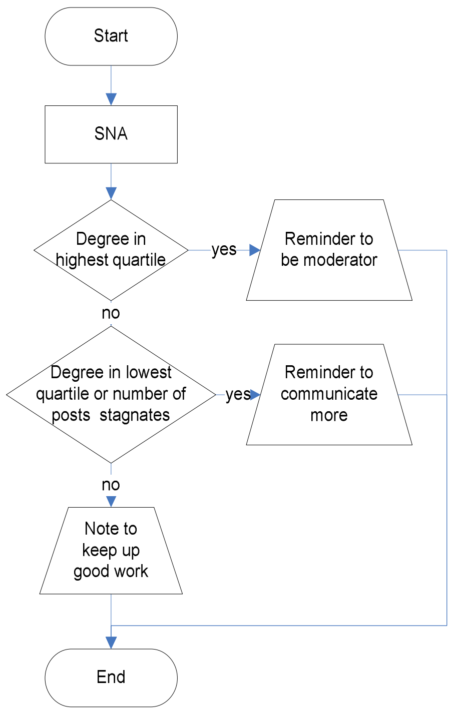

Figure 1: Educators' activity scheme, periodical analysis.

The success and activity analysis should provide insight into the success of the knowledge sharing community. Therefore, we add students' performance at mid-term exams to the elements used for periodical analysis.

We schedule it after the mid-term in order to help students improve at the final exams, if needed. The outputs are three types of messages:

- prizes for successful students, and reminders for unsuccessful ones,
- messages to educators concerning both successful and unsuccessful students, and
- messages to educators, concerning their role.

The records of all performed analyses for each user should be stored, and sent to relevant department after the end of semester:

- reports for students to their tutors, and
- reports for educators to management.

IV. INFERENCE

For the simplicity, we present inference in the form of algorithm.

Periodical activity analysis

The illustration of periodical activity analysis for educators is presented in Figure 1 and it responds to the algorithm presented in the next section. The fact that educator is a hub corresponds to the fact that their degree is in the highest quartile. We do not present here the schemes for other users and analysis, for they are similar (or identical in the case of mid-term educators' activity) to Figure 1.

Inference on educators' activity

```
IF    ((degree in the lowest quartile) OR
      (the difference in number of post is
      less than 10))
Send reminder to communicate more;
ELSE IF     (educator is hub)
Send reminder to communicate less and
      become moderator;
ELSE
Send note to keep up the good work.
```

Inference on students' activity

```
IF (degree in the lowest quartile)
      IF      (difference of number of
            posts greater than 10)
      Send reminder to keep up the good
           work (students active within a
           group that suits them);
        ELSE
      Send reminder to student to
           communicate more;
      Send reminder to educator to check
           the situation, and offer
           alternative ways of tutoring if
           needed;
ELSE
      IF ((student is hub) OR (difference
      of number of posts greater than 30))
      Send reminder to educator to check
           content of hubs' posts;
           IF (content is not spam)
           Send reminder to student to keep
               up the good work;
           Send reminder to educator to
               monitor the student's
               activity (student is
               potential demonstrator);
           ELSE
           Ban user for seven days! (this
               is a spammer).
```

Success and activity analysis

The inference on educators' activity is the same as for the periodical activity analysis.

Inference on students' activity

```
IF     (student is successful at the exam)
Send note to keep up the good work;
        IF (student is hub)
      Send note to educator to pay special
           attention to the student;
      ELSE
      Send reminder to educator that this
           student is not interested in
           such way of learning and
           knowledge sharing;
ELSE
      IF (student is hub)
      Ban from the forum till the end of
           semester (this student is
           spammer);
      ELSE IF (student's degree in lowest
      quartile or zero)
      Send reminder to educator to check on
           this student's status, and offer
           alternative help.
```

V. CONCLUSIONS

This work presents a model for automated inference based on SNA in a large-scale online learning community. We based this model on the existing and successful online community, FITCS, but the model itself can be used for other similar communities. The goal of the model is to improve performance of students at the final exams. The

SNA part is concerned with the data modeling and deployment of basic graph characteristics in order to analyze activity of online learning community users. Additionally, we include success at mid-term exams, in order to improve students' performance, if needed.

The model is designed to monitor activity of students and educators in periodical activity analysis. The outputs are in the form of reminders sent to all users according their activity. The outputs are cumulated, and at the end of semester, they grow into the report of users' role. The additional analysis, after the mid-term exams, checks if activity matches performance. It has crucial role in directing both students and educators towards the common goal: success at the final exams.

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CONCEPTUAL AND METHODOLOGICAL FRAMEWORK FOR THE FORMATION AND DEVELOPMENT OF THE INFORMATION COMPETENCE OF FUTURE TEACHERS – SCIENTIFIC AND RESEARCH GROUNDS

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Abstract: In the context of globalization and social change special significance is currently being attributed to the information competence of teachers as a prerequisite for their professional realization in the field of education. The necessity to continually improve the information competence of teachers as part of their professional profile requires that its essence be made clear and the conceptual basis of its processual formation and development be specified. The paper, therefore, focuses on the conceptual framework of teachers’ information competence as well as the conditions for its adequate structuring.

I. INTRODUCTION

Over the past decades educational systems throughout the world have been undergoing processes of restructuring, modernization, and improvement – a situation of crisis which is disconcerting not only on a European but also on a world scale. Countries with well developed economies are making attempts at handling the situation by implementing the competence-based approach in education, which is supposed to provide compatibility between the acquired educational competence and the required professional competence in the field of education. Against the background of social development and social practice, the information boom and the advance of technology set very high standards for the professional competence of specialists in all walks of life. The professional competence of teachers and, more specifically, their information competence are of vital importance to their future professional realization. There is a certain degree of controversy, however, concerning the content and the structure of teacher’s information competence which interfere with its successful formation and development during the education of future teachers. In the theory and practice of education these controversies are commonly related to: (1) misconceptions and inability to differentiate between systematic education of specialists in different spheres (primarily those in technical and engineering specialties) in the field of information technologies, the training of teachers in computer science and information technologies, and the training of teachers in other disciplines as users of such technologies; (2) the inadequate employment of the competence-based approach in the design of the aims of education and its expected results as well as the impossibility to identify the fundamental elements of any competence; (3) the lack of a clear view of the conceptual frame of teachers’ information competence and the possibilities for its successful inclusion in their professional profile; (4) the lack of a conceptual model for the design of special didactic techniques for the formation of the information competence of teachers within their training as educators.

An analysis of the issue of the formation and development of the information competence of future teachers in various disciplines such as the one offered above, reveals a series of controversies, the most far-reaching of which seem to be the diversity of theoretical approaches to the definition of the concept *information competence* and the inadequate methodological basis of their employment in the process of its formation and development in higher education.

The aim of the present research is thus to establish a foundation for the search of a scientifically grounded technique for the formation and development of the information competence of future teachers in the process of their university training so that they meet the requirements of continuous learning.

II. THE COMPETENCE APPROACH AS A METHODOLOGICAL BASIS FOR THE IDENTIFICATION OF THE STRUCTURE OF INFORMATION COMPETENCE

A variety of approaches, either in combination or each in its own right, are being implemented in educational systems worldwide in an attempt to respond to the demands of a quickly changing social practice. These include: the algorithmic approach, the problem-based heuristic approach, the activity-based personality approach, the personality development approach, etc. As a result of its innovative basis and conceptual completeness, one of the approaches which stands out among the approaches focused on the activity-based development of integral personality characteristics is the competence-based approach, which has recently received wide acclaim and implementation scope in the European Union, Russia, USA, and other countries.

The problem of the improvement of the quality of education has been acquiring greater topicality and importance, while its solution is often associated with the competence approach. Originally, it was successfully employed in the improvement and evaluation of the performance of professionals at their work places and in higher education. Over the past decades it is being used in school education as well. The educational results thus achieved and the improvement in professional performance and learning in general are usually associated with the acquisition of competencies predicating personality development and adequate social realization rather than the mastering of knowledge, skills, and habits for learning and successful performance. This requires that the technocratic paradigm of education be replaced by the humanistic personality-based constructivist paradigm, which can serve as a basis for the formation of personality and society oriented characteristics of the individual, such as self-confidence, independence, self-control and self-reflection mechanisms, personal responsibility, and other key competences.

The competence approach is considered an objective necessity related to “a gradual shift of orientation of the dominant educational paradigm from an emphasis on the transfer of knowledge and the formation of skills to the establishment of conditions for the acquisition of a system of competencies defining a potential and abilities for maintaining a stable activities in the context of the multiple factors affecting the heavy informational and communicational load in the contemporary social, political, and economic space” [1].

Other authors support similar views defining the competence approach as a tendency to orient contemporary education towards a personality-based development of the individual, his/her characteristics, competence, and competencies in the process of human activities. What justifies this conception is the fact that educational results, such as the ones described above, reveal the true potential of the individual, his/her approach to the design and organization of effective activities, as well as the degree of his/her adequacy to start school, to graduate from school or university, or to perform as a professional, specialist, or manager.

It is at this point that an essential discrepancy occurs because “the approach based on the development of competencies predominantly focuses on the practice and activities [of professional education], while the competence-based approach (which involves an emphasis on personality characteristics) is defined as a more general approach commensurate with the values of humanism in education” [2]. This discrepancy stems from the interchangeability of the concepts *competence* and *competency* characteristic of most Western scholars of the competence-based approach, which Russian researchers have been trying to avoid. The discrimination between these relatively new concepts and the assertion of the competence-based approach is a matter of continuous evolution which started more than 50 years ago but is still incomplete despite the efforts of a great number of researchers from many countries around the globe.

The competence-based approach is gradually being asserted as an inseparable part of the new educational paradigm without a clear identification of the scope and content of its fundamental concepts *competence* and *competency*. The tendency to shift the orientation of the theory and practice of education to a new educational paradigm is deeply rooted in its social and economic context and started as far back as the previous century. The traditional concepts of the *qualification* of specialists and the *educational adequacy* of school leavers, usually regarded as the acquisition of a system of knowledge, abilities, and skills, have proved inefficient against the background of technological and scientific revolution in the post-industrial society. The dynamic change in economy and social practice, the exponential increase of the amount and sources of information concerning all spheres of life have generated new conceptions and approaches to the development of the contemporary individual related to his/her *continuous* learning and *multi-faceted* education – problem-based, developing, module-based, personality-based, etc. The missing root metaphor that unites all these types of education is encoded in the conceptual pair *competence – competency*, which suggests the formation of abilities for the individual to orient in a diversity of complex and sometimes unpredictable situations, to anticipate the results of the activities s/he performs, and to take responsibility for them.

The complexity, ambiguity, and duality of the concept/event pair “competence - competency” [3] viewed in terms of educational goals and results is transferred onto the competence-based approach, which provides for the “broad social, economic, reflexive, and cultural context of the activities” performed by students. [4]

The differentiation between the concepts *competence* and *competency* makes it possible to discern and identify competence as a personality attribute and a subjective characteristic of the individual, on the one hand, and competency as an objective characteristic of the individual, on the other. Their conjoining in a concept-event pair will serve as a starting point for the correct usage of the terms in scientific discourse and for the expedient and adequate design of techniques for their formation and development.

III. THE INFORMATION COMPETENCE IN THE PROFESSIONAL PROFILE OF THE TEACHER

It is a well-known fact that objects and phenomena occur before the terms employed for their denotation come to be established. Likewise, competence as a phenomenon has been in existence long before the concept it shapes was defined. As far back as the Antiquity, and probably long before that, there were spiritually elated individuals wielding encyclopedic knowledge who were able to perform with excellence in a variety of crafts, arts, sciences, etc. Nowadays too it is possible to come across especially gifted individuals whose professional competence far outstrips the limits of the established standards of knowledge ability, experience, erudition, perspicacity, and other qualities. In addition to the accumulation of knowledge and experience, competence is also associated with the development of specific skills of the individual as well as the broadening of the horizon of his/her knowledge and the perfection of his/her spirit through education and self-education. The kind of competence required nowadays is manifested and improved as “an amalgamation of strong personal qualities, inherent or acquired […], in combination with knowledge and know-how” [5].

The theoretical review offered above and the analysis of current ideas, conceptions and good practices concerning the nature and application of the competence-based approach put forward several problematic issues. One of them is related to the concept *professional competence*, whose complex structure and dynamics is especially relevant to creative fields, such as the profession of the teacher.

The phenomenon is an object of heated dispute (the 80’s and the 90’s of the previous century) especially focused on clarifying both the structural and the functional content of the concept *professional competence* as defined by the evaluation of the results of professional education and the search for a well-regulated level of professional performance.

As a basic component of the professional profile, professional competence (along with professional competencies and roles, professional fields, and the psychomotor and psycho-sensory characteristics of the individual) “determines the sets of abilities that different types of work activities require on account of the nature and variety of the respective professional roles and competencies” [6]. It is formed on the basis of the acquisition of the necessary level of knowledge, skills, and abilities for successful professional performance; the formation of the respective professional competencies and the receiving of the required prerogatives; the evaluation and the possession of the relevant license or degree, which, in the case of teachers is a degree in education science.

The professional competence of teachers can hardly be defined outside the context of the subject it is to be employed and manifested because from a psychological point of view it is considered “a type of organization of knowledge which facilitates the making of effective decisions in a particular area” [7]. For this reason, regardless of the diversity of interpretations of the concept, it is feasible to define it as an integral characteristic and ability of the teacher based on the formation of a system of invariant professional competencies for all teachers which are realized through their variants in different subjects.

The proper contextualization of the information competence of teachers as part of the professional profile of the modern teacher is of primary importance for its identification as well as for the establishment of the principles of its formation and development.

The nature of the information society in a world of globalization and the character of education and teacher training as a legitimate sphere in the life of the information society where continuous education, transversal competencies, and key competencies are given special status of importance, postulate a necessity to change the structure of the professional profile of teachers occupied in different stages of education. The development of information and communication technologies and their ubiquity in all spheres of social life predicate the search for adequate mechanisms for the incorporation of information competence in the professional profile of the contemporary teacher.

A number of researchers view information competence as a key competence based on the fact that it virtually guarantees the success of almost every aspect of human activities and is therefore mandatory for personal realization in most walks of life [8, 9, 10, 11]. Others define it as the primary goal in the education and training of specialists and an integral component of their professional competence [12].

There are a number of definitions of the concept *information competence*, which are applicable in different contexts. O. K. Bityutskih determines it as “a system of computer knowledge and skills pertinent to a specific professional level as a condition for the receiving, processing, transfer, and storing of professionally relevant information” [13]. E. V. Panyukova claims it is “an integral personality attribute, characterizing the degree to which an individual’s potential (knowledge, skills, experience, qualities) can be realized in the field of information technologies as a guarantee of successful professional performance” [14].

O. N. Yonova asserts that information competence integrates knowledge, skills, and abilities in the sphere of information and communication technologies as well as the experience involving their effective employment” [15]. The definitions now current in scientific discourse, however, preclude a clear differentiation of the basic elements of information competence in terms of its content and function. The lack of a clear conceptual frame and methodological grounds in turn render the formation and development of such competence fragmentary and inefficient.

Since information competence functions as part of a system of competences, it has its own logic congruent with the structuring principles of this system. Some authors analyze this logic by defining the key aspects of information competence: the cognitive aspect, the motivational aspect, the technological aspect, the communicative aspect, and the reflexive aspect [16].The following parameters are commonly included as basic for this type of competence: (1) from a cognitive perspective – the ability to process information based within the cognitive process (analysis of information input, synthesis, formalization, comparison, generalization, design of scenarios to the information and predict the consequences of the decisions aimed at the solution of problems, generation of new information, organization and retaining of the information in the long-term memory); (2) from the perspective of motivation – establishment of conditions facilitating the formation of values which stimulate motivation; (3) from a technological perspective – abilities to use technical devices meant for automatic processing and storing of information and to work with data-bases and sources; (4) from a communication perspective – abilities to encode and decode information in natural and formal systems, to use communication devices; (5) from the perspective of reflection – establishment of an awareness for self-reflection, self-regulation, and self-control, enhancement of the self-consciousness and self-assertion [16].

The design of an environment which facilitates the formation of the information competence of future teachers requires profound knowledge of this system of competencies discusses above, which will make it possible to shape it in terms of knowledge, abilities, skills and intentions.

A methodological analysis of the employment of the competence-based approach in education, such as the one offered above, emphasizes the cognitive, activity-centered, creative, and axiological components of the information competence of future teachers. This offers scientific grounds for the design of specific techniques for its development.

These technological decisions can be successfully reached by using an invariant technique for the construction of technological variants pertinent to different subjects. This invariant needs to make allowance for the following determinants:

- social needs for the development of information competence;
- evaluation of the costs and educational design of its formation;
- design of a project (conceptual, processual, and content) for its structuring, formation, and development;
- design of an invariant model for the development and formation of information competence and approbation of its variants in different disciplines;

This is a comprehensive, methodologically grounded conceptual view for the efficient formation and development of the information competence of the future teachers in the course of their higher education.

IV. CONCLUSION

The importance and topicality of the aforementioned problematic zones directly related to the opportunities for the development and formation of the information competence of the teacher, their conceptualization and methodological grounding set the following perspectives to the solution of the situation:

- in social terms – search for means of mediating and settling the current controversy between the objective social requirements to education and their realization through the application of the competence-based approach in education;
- in theoretical terms – scientific grounding of the necessity for the development and development of the information competence of future teachers;
- in pragmatic terms – establishment of concrete parameters for the improvement of educational practice in the field of key competences as a whole and information competence in particular.

The methodological grounds for the proposal for a conceptual framework for the information competence and its efficient formation can be situated in the context of the constructivist educational paradigm in combination with the universally valid scientific principles and conceptions of the competence-based, the activity-based, the personality-oriented, and the system-oriented approach.

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THE VISUALIZATION ENGINE CONTROLLED BY SCRIPT IN E-LEARNING ENVIRONMENT

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Abstract - Scripting languages expand into computer graphics. In this paper, one of these scripting languages – RUBY language is presented. A practical demonstration of rotation scripted in RUBY is also presented in this paper. For model representation and visualization, a special tool for distance control of graphics simulations called SuperEngine was used.

I. INTRODUCTION

Recently, scripting languages play an important role in computer graphics and in other areas of informatics. The scripting language is also a programming language but with some differences. Main difference is that the script is not a program. It is a code, which is probably execute by other program programmed in other language such as C++, C# etc.

Script is mostly executed using its source code, but sometimes it is pre-compiled. This compiled code is called byte-code. The interpreter compiles the script into byte-code. From historical view, first scripts were developed in mid 1960s. Since that, scripts are improving and expanding to many programs and to many forms of scripting languages.

One option is to implement visualization using various scripts that could be distributed into several network places. This way of visualization flow control allows remote control of visualization by sending commands via the network, e.g. students logged in into an e-Learning system could check their computer graphics task solutions from the distance of their homes [8,9].

In the optimal case, a server is running the visualization kernel on its powerful hardware, and it is responding to the queries (scripts) of clients with less powerful hardware [1,2]. The server side of the solution should have a significant parallel property, e.g. it could be a cluster or grid.

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The most widespread script languages are for graphics. Scripting languages are many kinds for example RUBY [3], PYTHON [4], LUA [5]. This article focuses on RUBY scripting language.

II. RUBY

Ruby is script language which name is derived from ruby crystal. Ruby is programming language with focus on simplicity and productivity. It has an elegant syntax that is natural to read and easy to write. History of Ruby is dated to year 1993. In this year Yukihiro Matsumoto presented this simple scripting language. Interpreter of Ruby is written in C language. [3]

SuperEngine [6] was used as Ruby visualization program. SuperEngine is executing environment used especially for visualization scripts programmed in Ruby language. SuperEngine used objects exported from Google SketchUp [7].

Objects exported from SketchUp are exported in .obj file extension and must be converted into .bin file extensions by convertor, because SuperEngine doesn’t support .obj file extension, only .bin file extension. SuperEngine than renders these objects, also here is used a script written in Ruby.

This script provides translation of object in scene, their rotation, and moving direct camera. In script are defined procedures, functions and here is also described scene.

SuperEngine consist of two parts, one is render window (Fig. 1). In render window is rendered scene, here are objects that are moving as in movie people are walking, cars are moving on the road. Here are two ways to moving objects on the scene. First simple is moving direct camera about objects and second hard way is use script to scripting objects and their moves.

Second part of engine consists of some libraries, batch files and control center.

Figure 1. SuperEngine render window

III. ROTATION

Rotation is a movement of object in a circular motion. 2D object rotates around a center of rotation. 3D object rotates around a line called axis. Rotation matrixes for X, Y and Z-axes are (1), (2) and (3) respectively:

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & \cos\alpha & -\sin\alpha & 0 \\ 0 & \sin\alpha & \cos\alpha & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \tag{1}$$

$$\begin{bmatrix} \cos\beta & 0 & \sin\beta & 0 \\ 0 & 1 & 0 & 0 \\ -\sin\beta & 0 & \cos\beta & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \tag{2}$$

$$\begin{bmatrix} \cos\gamma & -\sin\gamma & 0 & 0 \\ \sin\gamma & \cos\gamma & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \tag{3}$$

Transformation matrix multiplied with scale matrix (4):

$$\begin{bmatrix} s_x & 0 & 0 & 0 \\ 0 & s_y & 0 & 0 \\ 0 & 0 & s_z & 0 \\ x & y & z & 1 \end{bmatrix}. \tag{4}$$

Rotation matrixes (1)-(3) and transformation matrix ((4), with s_x, s_y, s_z = 1) are multiplied together and new resulting matrix is multiplied with point and this point than had new position. Matrixes multiplication is different to classical multiplication. In matrix multiplication is important order from left to right. For completing rotate transformation is needed scaling. Scaling is process to enlarge or reduce object. Resulting matrix is therefore multiplied with scale matrix ((4), with x, y, z = 0). s_x, s_y, s_z are factors of scaling.

This rotation is sometimes called transformation of world. These matrixes can be also transformed to some formulas. In simple formula it is transformation: world = move * rotation * scale.

IV. Rotation in Ruby

In this part of paper is presented example of rotation in Ruby scripting language. Rotation is defined as 3D vector or angle for specific axis. For objects rotation around their own axes are used suffixes ox, oy and oz.

Example of the source code:

```
//definition of procedure for rotation
(speed is speed of rotation)
def Rotation(object,x,y,z,speed=1)

//save coordinates into variables
     dx = x - object.ox;
     dy = y - object.oy;
     dz = z - object.oz;

//coordinates multiplication with time
factor and speed of movement
     deltax = speed * dirx *
     $FRAMETIME;
     deltay = speed * diry *
     $FRAMETIME;
     deltaz = speed * dirz *
     $FRAMETIME;
```

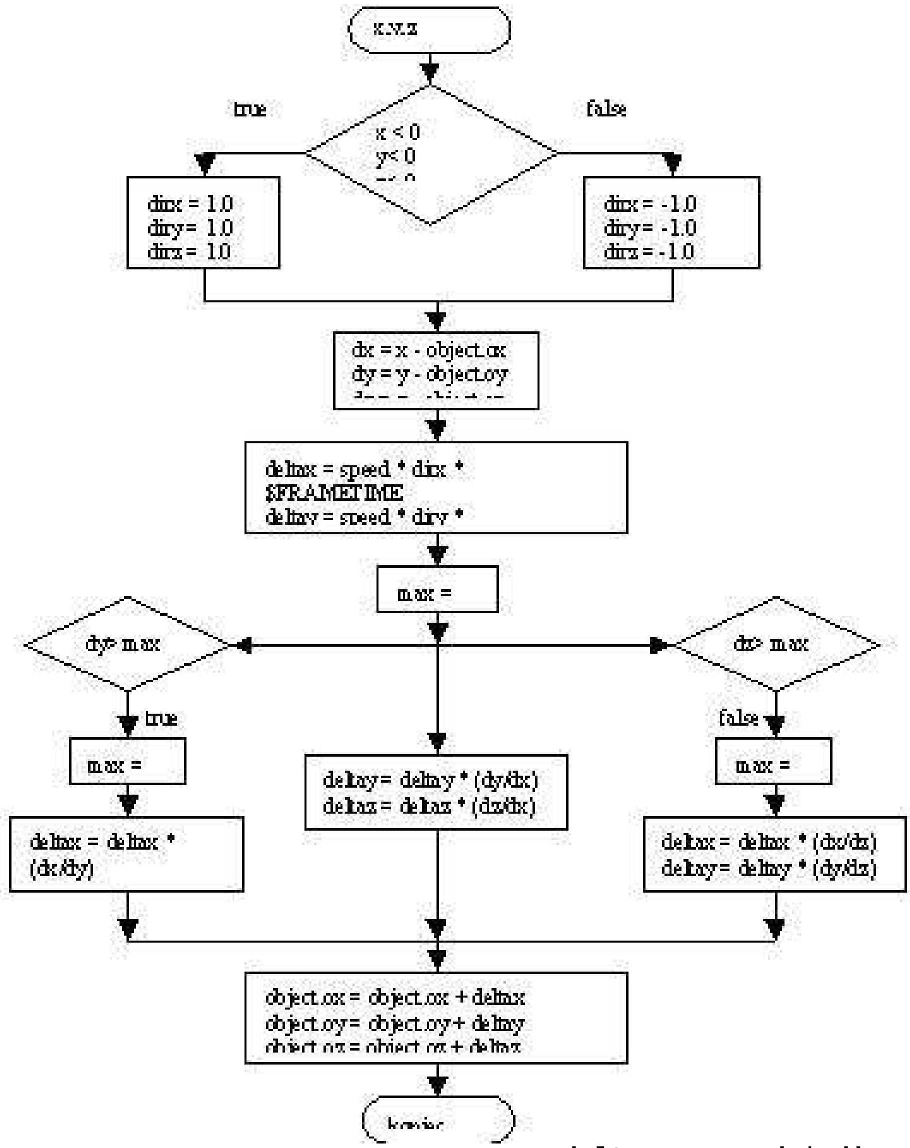

Figure 2. Rotation flowchart

```
// setting new coordinates for object
      object.ox = object.ox + deltax;
      object.oy = object.oy + deltay;
      object.oz = object.oz + deltaz;
```

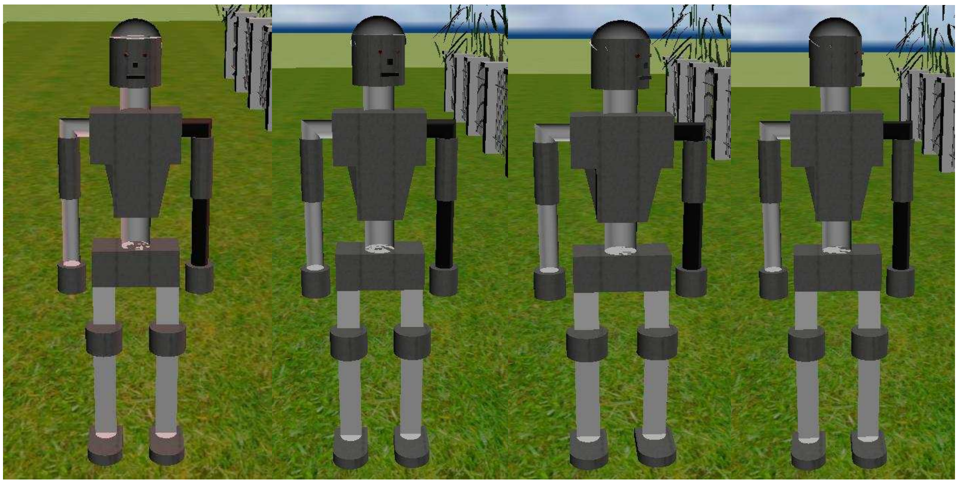

Figure 2. Animation frames from scripted head rotation

For better understanding of this procedure is shown on the flowchart on Fig. 2.

Fig. 3 shows simple head rotation scripted with RUBY and visualized with SuperEngine.

V. CONCLUSION

Scripting languages allows a wide range of programming capabilities. Originally were meant only for process automation, but their usage overcomes all expectations. Scripting languages are also used in applications programming with using graphics processors. In these applications has been noticed a substantial increase in computation speed compared to standard processors.

In this paper was presented RUBY scripting language with which was created procedure for object rotation in 3D. As visualization software was used SuperEngine and created script was tested on simple 3D model of robot. Presented procedure shows, that RUBY is suitable scripting language for computer graphics.

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LIFELONG LEARNING AS PREREQUISITE OF MODERN CURRICULUM DEVELOPMENT

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Abstract - Knowledge and evolution of globalisation processes emphasise the importance of education for both personal and social development. The need to transform the schooling system to meet the demands of modern times is recognised, especially the transformation in the area of national curricula, which should be further elaborated and applied to school and subject curricula.

Due to the fast development of scientific discoveries, technological innovations, IT technology and social changes, and the slow implementation of these changes by the education system, the knowledge is rapidly growing obsolescent. Another reason is the fact that the changes are impossible to predict; all this draws to conclusion that the solution of the education crisis is not only the intensification of the regular schooling. The lifelong learning out of the conventional schooling system as non-formal education, self-education and informal (experience) learning-by-doing is perceived as a sound foundation and solution to the education crisis.

The development of lifelong learning and self-education being not only a social and personal need, but also an economic and rational issue facing the growing trend that societies are allocating less to the conventional education, leads to another need: to raise the awareness that education can be obtained in other life settings outside of schools.

I. Importance of Lifelong Learning Objectives

These concepts were created in the UNESCO working bodies back in 1970s as the answer to «world educational crisis» that shook the globe in the 1960s (Coombs, 1968). Since the crisis is still present, we can use these successful early experiences and models.

The concept of lifelong learning and development of the "learning society" are definitely among the priorities of these education objectives. The European Commission in its recent report on future objectives of education systems and strategies to achieve these objectives emphasises three main goals:

- *development of individual (…),*
- *development of society, and*
- *development of economy,*

so that knowledge and skills are those in demand on the job market and this should be achieved by the strategy of lifelong learning that must prevail over the traditional division between different parts of formal and non-formal education (A Memorandum on Lifelong Learning, 2000).

As much as 50% of education takes place outside of schools, while values, attitudes and habits are learned during childhood and adults learn it by experience (informally) (Dohmen, 1996). The concept of lifelong learning is wider than concept of lifelong education, because it embraces the education as well as the informal – natural learning. Because of rapid technological and social changes our knowledge quickly becomes obsolescent, and this forces us to get a more systematic organisation and involvement in lifelong learning processes, besides the learning in the traditional manner.

II. Curriculum as Foundation of New Paradigm

The development of national curricula is a permanent task of every social community.

The National Curriculum should distinguish:

- general part mandatory for all students (Core Curriculum), and
- specific part, i.e. school and subject curriculum designed for a specific school.

In teaching methods it is vital to determine the ratio between teaching *theory* and *practise*, especially in vocational training programmes. The imposed ratio of theory and practise is a problem because it neglects and ignores interests, talents, abilities and propensities of students.

Design starts from subjects, areas, via methodology to contents, via duration and process to final results. This multi-pedagogical discipline is undoubtedly substantive because it is the core of modern didactics and scientific educational policy.

There is a number of different ways in which curriculum is theoretically perceived, professionally interpreted and implemented in practice. It is certainly harmful and disadvantageous to the students, whom nobody asks anything.

In order to make a productive education curriculum, it is extremely important to accept the methodology of its joint construction (Miljak, 2005), i.e. the involvement of all interested parties, and understanding of its development as a dynamic process of constant creation. As Miljak (2005) puts it, the joint construction is an ongoing process, a sort of simultaneous, partnership curriculum, and the curriculum framework provides only the principles, guidelines and starting points that should not rigidly restrain the spontaneous events.

Theoretical approaches have clearly put forward two dominant concepts of curriculum so far, while some others are to be considered their sub-categories:

1. humanistic curriculum oriented towards the development, and
2. functionalistic curriculum oriented towards the product.

The first concept is inclined to an open pedagogical approach, focused on student, and its advocates are those who critically question the education and school in its traditional role of "teacher of knowledge", the role of family as authoritarian community, and leisure time as strictly programmed out-of-school activities. The second concept is a pragmatic perception of curriculum focused on practice and the acquisition of skills, so the main components of the education process, from defining its objectives to the valuation of its impacts, are set accordingly.

III. Examples from some European countries

In some countries the term *curriculum* is recently replaced and equated with the term *syllabus* (Great Britain). This word originates from Greek and it means "table of the heads of a discourse", "concise statement", "and contents of a treatise", "survey". Curriculum is a body of knowledge-content and/or subjects. The teachers often, consciously or not, imitate and repeat the teaching they underwent as students.

Since late 1970s Great Britain adopted the understanding of curriculum as described by American authors Bobbitt and Tyler. There are some other approaches that have their advocates in Great Britain; however, these still do not have a large application. It is the understanding of curriculum as process and practice (Stenhouse, 1975) developed in the dynamics of interaction, action and reflection. Cornbleth (1990) is pro curriculum which develops the cooperative relationships in the interaction of students, teachers, parents, knowledge and environment.

According to the data provided by Flechsig, teaching plans and programmes have been made in Germany since the second half of the 18th century. The word *curriculum* was brought into the German language fro the Anglo-Saxon pedagogy in the late 1960s, at the times of students' unrests that initiated many changes in schooling. The curriculum is much wider notion than *lehrnplan* (learning plan). The curriculum includes setting of object6ives, contents, procedures, learning situations, media and evaluation, while the learning plan is the term that covers only setting of objectives and contents (Vican, Bognar, Previšić, 2007).

The main problem of the open curriculum is how to maximise the learning from experience and to minimise teaching. The solutions are to be found in the so-called Core Curriculum (Kern-Curricula) that would leave enough room for the autonomy of each school (Altrichter, 1996).

An interesting example of the *core curriculum* was drafted in 1994 in Norway. Taking into consideration the changes occurring in the Norwegian society a document called "Core Curriculum for Primary, Secondary and Adult Education in Norway" was made.

IV. Challenges and Possibilities

There are much more questions than answers, but let us assume that somebody some day will answer the following questions.

- *Education system is inert and slowly adjusting to changes*
- *The young ones expect faster changes*
- *If we do not keep up pace with the new technologies challenges, we are producing immeasurable damage*
- *How can the changes be achieved and implemented?*

These are only few observations, statements and issues that do not ask for a uniform answers, but are aimed to single out the values necessary as components of the modern curriculum.

V. Resistance to Changes in the Lifelong Learning Process

Utilisation of Information Technology in Schools

In this chapter we shall get briefly acquainted with the research results of the Institute for Social research in Zagreb and of Centre for Research and development of Education which will show the difficulties encountered and resistance to changes in the process of achieving the set goals in the application of the modern principles of national curricula by the utilisation on the *information technology (IT)* in the process of education. (Baranović, 2006)

Here are some results of the above mentioned researches; PCs are rarely or never used by approximately 60% of teachers, some 70% do use Internet, while two thirds of teachers never communicate by e-mail. The conventional sources of information, like text books and teachers' manuals, are on the top of the list, whereas Internet is at the bottom. The majority of teachers rarely use information technology as a *teaching tool in the classes*. The use of IT is related to the age of teachers.

One can conclude that the computer literacy and the *utilisation of IT* in teaching are nowadays one of the indicators of quality of work in schools. The modest utilisation of IT in preparation and implementation of teaching indicates that serious efforts should be put into the IT training of teachers, especially the older ones, through a process of lifelong learning.

Further, according to the research results, *place where the students use computers the least is school*, so 40% of students never uses computer at school, and just slightly over 30% does that rarely. *The use of Internet* in schools is even more modest, so 60% of students never uses Internet at school, and only 20% to uses it rarely. So, the fact that approximately three fourths of our students never or rarely uses PCs at school, and even 80% never or rarely uses Internet at school, are extremely alarming, especially if we bear in mind that, according to official reports, 79% of schools in Croatia has at least one computer network classroom. However, the results of the research indicate that these computers are only rarely accessible to a large number of students, and that they use computers and Internet more often at home or in some other place. For quite some time now there is a need of introducing IT education as a mandatory subject into school curricula as a direct contribution to the development of modern curriculum. This would ensure the mastering of computer skills and the use of IT in the primary schools.

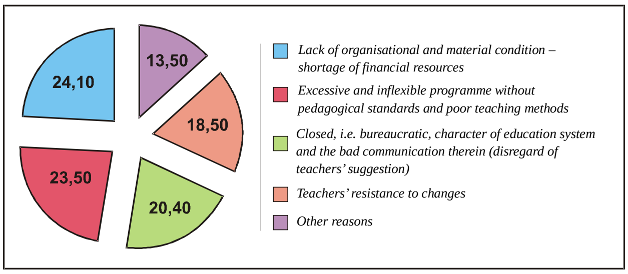

Table 1. Reasons of resistance to changes

VI. Positive Experiences of E-Learning

Anania and Burke of the Chicago University, USA, were involved in a research in which they compared three methods of learning: (i) *Conventional Learning* in which a group of 30 students had to grasp knowledge instructed and led by one teacher. The knowledge of students was verified by means of tests taken in certain time intervals and was used for the final evaluation. (ii) *Mastery Learning*) in which a group of 30 students had to grasp knowledge instructed and led by one teacher, similar to that in the conventional learning. However, the tests were used as a feedback and then followed by procedures for correcting methods and dynamics of presenting the new knowledge. (iii) *Tutoring Learning*) in which the students were instructed by a personal tutor, i.e. each student (or maximally three) had its own tutor.

This kind of teaching was followed by tests, feedback-corrective procedures and parallel tests as in mastery learning. It is important to point out that in this teaching method the need for corrective procedures was minimal. Using the standard deviation it has been determined that an average student in the tutorial group is approximately *two standard deviations* more successful than an average student in the control group (the average student in the tutorial group is 84% better than the student in the control group). The average student in "mastery learning" group is approximately *one standard deviation* better than the student in the control group (the average "mastery learning" student is 84% better than the student in the control). The tutoring learning proves that most of the students have abilities to achieve the high level of learning.

VII. Quality Management of Education as the Pre-requisite of Success

The discussions about the quality of education usually kick off from two modern anthropological theories (paradigms):

- *modernistic and*
- *Constructivist.*

The modernistic theory can be recognised by terms like: objectivity, necessity, productivity, perfectionism, expertise, social neutrality, instrumental motivation, social reductionism, quantification and measurement. The constructivist or development-humanistic paradigm is characterised by holism and subjective construction of reality. This theory is focused on student's personality; it puts responsibility on a higher level, and perceives creativity as precondition for freedom and creation. (Mušanović, M.1998, 84.).

Many theories that deal with the quality of education are actually compatible and create a positive relationship with regard to their application, implementation and completeness.

The development of quality education thus becomes an integral component of everyday activities, but also of long-term activities of both managerial staff and all employees, and in that way gets its complete form.

VIII. Conclusion

In the process of changing it is vital to design a curriculum of equal opportunities, as a humane programme of the comprehensive development of a young person.

Further, this is an opportunity to point out and take into consideration the applicability of the above mentioned curriculum *methodology* that implies a flexible, open model which embraces all those fields that are the result of students' interests, with the purpose of the implementation, relation and inter-subject linking of specific subjects into new teaching areas. The realisation of this model insists on the lifelong learning programme as an integral component of the development curriculum.

How much the society would develop towards the learning society depends on the realisation of the great idea of lifelong learning (Antikainen, 2005).

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EVALUATION OF EDUCATIONAL SOFWARE FOR THE GIFTED STUDENTS

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Abstract – In order to determine level of applicability of educational mathematics software in gifted education, the study authors compiled a list of expected characteristics of gifted students with a focus on student creative thinking. The list was used to conduct summative evaluation of selected educational software packages. The evaluation results are presented both in numeric and narrative form. The results indicate that the skill-based transmission software commonly does not provide environment that allows development of creativity. In opposite, the open-ended constructivist software is a more favorable environment, in which students have opportunity to perform more complex tasks that encourage curiosity, imagination and allow risk-taking. Also, when using the open-ended constructivist educational mathematics software, students can be genuine in their work, can express fluency and flexibility. This study results can serve as a guideline for a selection of software that could be used in gifted education.

I. INTRODUCTION

While there are several different definitions and approaches to define giftedness, the single definition cannot encompass all types of abilities and characteristics that occur among gifted children. Koren defines giftedness as a set of qualities that enable individuals to consistently achieve above average results in one or more activities that are involved in [9].

Renzulli's definition of giftedness is somewhat more extensive, he defines giftedness as a set of characteristics that enable individuals to consistently achieve above average results in the activities they are involved in and that these results significant creative contribution to the filed in which they occurred [7]. It is important to emphasize that this definition has limitations since it is not including students that are creative but at certain point do not achieve above average results.

It is crucial what definition of giftedness is accepted as an educational policy guideline that determines overall approach of the school system towards gifted and talented education. The Croatian National Educational Standard (CNES) states that a desirable educational approach is geared towards high educational standards and achievements [5]. Also, CNES states that it is important to strengthen methods of identification of gifted children and create opportunities for developing their aptitude in one or more areas. Teachers and other professional staff in primary schools should put more effort in identification of gifted and selection of educational approach which is best suited to the gifted child. CNES puts an emphasis on the two educational approaches. First approach focuses on the design and implementation of a special or enriched educational program where gifted students stays in the same class with their peers but work on highly individualized tasks. The second approach is based on acceleration where gifted students have opportunity to move faster through the program and to finish primary school earlier than their peers [5].

Besides clear definition of giftedness, it is crucial to define identification methods and methods of work with gifted, talented and creative children. When discussion identification methods, George emphasizes that measurement scales are more reliable than general checklists [7]. The measurement scales include subscales focusing on creativity, leaderships, motivation and learning characteristics, which are in a correlation with gifted students' characteristics.

This study focuses on Guilford's and George's determinants of creativity [7]. Although creativity determinants are recognizable and easily described, literature does not provide a precise definition of creativity and clear identification instruments. George writes that Guilford argues that creativity includes innate ability and sensitivity to the problems and ability to redefine and elaborate [7]. Furthermore, Guilford lists four main abilities related to creativity: fluency, flexibility, originality, and elaboration. In addition George lists additional four abilities that could be used as determinants for creative thinking: curiosity, complexity, risk taking, and imagination [7].

II. Teaching methods for work with gifted students

Cvetković-Lay and Sekulić Majurec list five main methods that have proven effective in working with gifted students: work on the project, work in small groups, individual work, extracurricular activities, and additional resources and materials [6].

- The project includes project planning during which students receive or select a specific task. The work on the project is independent while teacher should create favorable conditions for the work on the project. Furthermore, students during their work on the project use variety of skills in a greater breadth and depth.
- Work in small groups is of great importance for gifted students. In this type of activities it is possible to cooperate and socialize with other students.
- Individual work is extremely important for the gifted student development. The emphasis may be on the use of technology when there is a possibility for a provision of an individualized approach. Well designed software are created with the goal to expand knowledge and make learning easier, more interesting and better adjusted to the students' needs. Individual work should be based on the student interest, working pace and methods.
- During extracurricular activities there is a lot of flexibility and the teacher should devote time to individual activities.
- Additional sources and materials are essential in working with gifted students, since they provide opportunity for the engagement of their specific abilities (e.g., abstract and creative thinking, problem solving, accuracy, pace of work). Resources and materials that may be used are: books, complex logical and didactic games, and multimedia programs.

III. Educational technology for work with gifted students

Individualized teaching which commonly includes use of technology is very important in work with gifted students. Richey writes that focus of educational technology is on study of the theory and practice of learning which facilitates creation and use and management of technological processes [14]. Educational technology includes, but is not limited to use of software, hardware, Internet applications and various educational activities. According to The Association for Educational Communications and Technology, educational technology is the theory and practice of design, development, utilization, management, and evaluation of processes and resources for learning [16].

Along with clear definition of educational technology, when dealing with the gifted education, it is crucial to review methods and benefits of technology use. Cvetković-Lay and Sekulić Majurec list a number of advantages of computer-aided learning in gifted education. It is possible to group these advantages into three groups: step-by-step learning, opportunities for repetition and practice, and interesting content presentation [6].

- In the step-by-step learning the eligibility for reaching the next learning level is determined by the acquired knowledge and skills. Gifted students should learn on their own pace, while the pace of learning in traditional classroom is dependent on the whole class.
- The opportunities for repetition and practice of the learning content are given through the assessment of the acquired knowledge and skills. Educational software programs include numerous possibilities for student practice, monitoring of their work and feedback.
- Educational software programs may provide interesting presentation of the learning content. In addition, computer environment allows implementation of creative projects (e.g. computer programming) that are of a great importance for the gifted education.

A. *Educational software*

Niederhauser i Stoddart conducted a study in order to determine ways in which teachers use different types of educational software [12]. As a part of this study the authors offered a categorization of educational software and described two large categories of software: *the skill-based transmission software* and *the open-ended constructivist software*. The skill-based transmission software helps students learn basic facts and skills. It provides opportunities for repetition and practice, feedback and follows the student progress. The examples of the skill-based transmission software packages are *drill and practice* and *keyboarding* *software*. Furthermore, Niederhauser and Stoddart list three types of the open-ended constructivist software: *the interactive/educational games*, *the exploratory software*, and *the productivity/presentation tools* [12].

- The interactive/educational games are focusing on problem solving in a structured framework. There are often several ways to solve a problem and the way of finding the solution influences a final result.
- The exploratory software supports students in discovering and managing discovery. Participants decide how to use the software and assess what they have learned.
- The productivity/presentation tools encourage students to research, organize and present information. Educational value of these tools is dependent on the way of program use. While using this type of software students may use numerous external data sources (e.g. Internet, other software).

B. Software evaluation

Riedling emphasizes that educational software evaluation lists should reflect educational theory and should be research based, with the aim to obtain useful data [15].

There is a large number of educational software evaluation lists, while different Internet sites provide examples of educational software evaluation. For example, the Super Kids' Reviews provide evaluations of educational software that are written by parents, teachers and students, while each of them reviews different elements. The advantage of these evaluations is that they are conducted in a real environment and that they reflect variety of users views [18].

Software evaluation checklists include different sets of questions, such as: the precision of guidelines, navigation and help issues, error correction, options for student progress monitoring.

IV. RESEARCH METHODS

Squires and McDougall recognize different types of educational software assessment, such as software selection, reviewing and evaluation [17]. The authors emphasize that summative evaluation is commonly dealing with the quality and variety of experiences that the software can support.

In order to determine possibilities for educational software use in gifted education, the authors conducted a summative evaluation. Evaluation was based on the list of the expected characteristics of gifted students with a focus on student creative thinking. The main idea behind this evaluation was that educational software should provide an environment that supports development of creativity.

The list compiled by the authors includes Guilford's and George's determinants of creativity [7]. Furthermore, the list includes a short description of each ability:

- Fluency (F1) – the ability to find various solutions and options.
- Flexibility (F2) – the ability to think in number of different categories and from various points of view.
- Originality (O) – the ability to reach new, unusual, extraordinary and unique conclusions.
- Elaboration (E) – the ability to make additions and develop ideas.
- Curiosity (C1) – the ability to think about ideas.
- Complexity (C2) – the ability to generate alternative ideas.
- Risk taking (RT) – the ability to give and receive criticism.
- Imagination (I) – the ability to generate ideas that go beyond facts.

This study authors selected educational software (Table 1) and sorted it according to Niederhauser and Stoddart software categorization [12]. The selected educational software is available on the Internet and its dealing with the primary school mathematics (grades 1-4). Educational software which is focusing on mathematics is selected due to its features that are suitable for work with gifted

TABLE I. SOFTWARE CATEGORIZATION

#	Software types		
	Category	***Subcategory***	***Software***
1	Skill-based transmission software	Drill and practice	Feed Fribbit Addition
2			Feed Fribbit Subtraction
3			Number Twins
4	Open-ended constructivist software	Interactive/ educational games	Thinking Blocks
5		Exploratory software	Planet Turtle
6			Fantastic Contraption
7		Productivity/presentation tools	The Geometer's Sketchpad

students.

Lajoie emphasizes that technology use in teaching mathematics facilitates the development of mathematical ideas and deeper understanding of mathematical postulates [10].

V. Software Evaluation Results

Evaluation results are presented both in numeric and narrative form. The Table 2 includes numerical data on presence (1) or absence (0) of the listed determinants of creative thinking skills in selected software. The columns are marked with abbreviations representing one of the eight creativity determinants, while the rows are marked with numbers that represent matching software previously listed in Table 1. The narrative section consists of description of software and way in which the particular software is aligned with a certain creative thinking skill determinant.

TABLE II. EVALUATION RESULTS

#	Creativity determinant							
	F1	*F2*	*O*	*E*	*C1*	*C2*	*RT*	*I*
1	0	0	0	0	1	0	1	0
2	0	0	0	0	1	0	1	0
3	1	1	0	0	1	0	1	1
4	1	1	1	0	1	0	0	1
5	1	0	1	0	1	0	1	1
6	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1

Software packages *Feed Fribbit Addition* [2] and *Feed Fribbit Subtraction* [3] in terms of *fluency* do not allow use of different problem solving techniques and there is no possibility for students to propose their own ideas. When it comes to *flexibility*, these two software packages do not offer different types of problem solving and students cannot elaborate reasons for a selection of a certain problem solving method. In terms of *originality*, the software packages do not allow proposing new ideas. Also students cannot show unique and unusual ways of problem solving. In regards to the *elaboration*, students have no opportunity to propose ideas that could clarify the basic idea, and cannot contribute with a variety of details that lead to the idea development. These software packages do encourage *curiosity* to some extent. The correct answers lead students to new tasks and new levels. When it comes to *complexity*, the software packages do not give possibility for expressing the alternative ideas. The *risk-taking* is related to students' willingness to play a guessing game. These software packages do not encourage students' *imagination*.

Number Twins [4] software evaluation determined that this software allows different ways of problem solving and to some extent encourages *fluency*. However, students have no opportunity to propose their own ideas. This software allows use of different problem solving techniques, so that it promotes *flexibility*. In this software, there is no possibility for students to propose new ideas. Hence, students cannot express their *original* ways of thinking. Possible ways of problem solving that could be used are listed at the start of the program. The students have no opportunity to propose ideas, so that this software does not encourage *elaboration*. The software content can stimulate *curiosity*, because correct answers lead students to new tasks and levels. The software does not promote *complex tasks*, and does not provide students with opportunity to express alternative ideas. *Risk-taking* is linked to the guessing of answers to the posted questions. Nevertheless, this software allows students to select the problem solving techniques and encourages students' *imagination*.

Thinking Blocks [11] software encourages *fluency* due to options that allow different ways of problem solving. These options can be selected according to student needs and abilities. The software is easily adapted to the individual user needs, but the advancement is linked to the speed of problem solving. The tasks can be tackled in different ways and this contributes to the software *flexibility*. The tasks encourage students *original* problem solving, nevertheless the students cannot *elaborate* on their ideas. The content partially stimulates *curiosity* of students, since correct answers lead to the new and more complex tasks. The software does not allow implementation of *complex* ideas and it is not possible to link problem solving technique to the task type. If students *take a risk* and play a guessing game this could prevent them from proceeding to the higher level tasks. The software stimulates *imagination* through the variety of learning games.

Planet Turtle [1] software leaves the possibility for use of a variety of problem solving techniques. Students can select these techniques according to their needs and abilities. The software content can be adjusted to individual needs and encourages *fluency*. Although the tasks are clearly structured, the student selects the problem solving technique, pace of work and accuracy. The software does not promote *flexibility* because the limited number of problem slowing techniques is offered and students cannot elaborate on reasons for a selection of the problem solving technique. Planet Turtle software can be used by more than one student at the same time, and this option encourages *originality*. The students decide on the pace of work. Nevertheless, there is no possibility for students to *elaborate* their ideas. The software content does encourage *curiosity*, since correct answers lead to the new tasks and levels. Also, there is a possibility for students to further explore virtual world. The software does not allow implementation of *complex ideas.* The *risk-taking* is linked to guessing. It is important that this software encourages role-play which is linked to development of *imagination.* Student takes a role of turtle and learns through play.

Fantastic Contraption [13] software allows problem solving according to individual abilities. The student determines the speed of problem solving. Hence, it is possible to conclude that this type of software encourages *fluency*. This software encourages *flexibility* because students choose tasks to solve and ways of problem solving; also it is important that the tasks can be solved in different ways. Since it provides a unique and individualized problem solutions, this software encourages *original* ways of thinking. Although students are working individually on their tasks the software allows students to *elaborate* their ideas. The software contents and setup encourages student's *curiosity.* At higher levels, this software allows implementation of *complex* and alternative ideas. Furthermore, when working on their tasks students can play a guessing game and *take a risk*. The software encourages *imagination,* since students decides in what way and what time they will work on certain tasks.

The Geometer's Sketchpad [8] promotes *fluency* through different ways of problem solving activities and the options for work on mathematical calculations, charts and diagrams. This software includes tasks that are previously set, nevertheless the software encourages *flexibility* due to the fact that students decide on problem solving technique and work on their own pace. This software allows *original* problem solutions; the student has opportunity to work individually and to *elaborate* ideas. The software content stimulates *curiosity.* It includes numerous options and possibilities for problem solving. The user can draw complex geometric features. This is open constructivist software and students have a large freedom in implementation of their ideas. This option encourages *risk-taking.* Visually rich environment provides students with opportunity to implement various ideas and develop their *imagination.*

VI. CONLUSION

Studies on use of technology in gifted education are rare. The software evaluated in this study is available on the Internet, and the study results could be used to facilitate work with gifted students in schools. The selected educational software is dealing with primary school mathematics, since earlier research studies indicate usefulness of technology use in learning mathematics. Also, educational mathematics software commonly has features that are useful in work with gifted students.

The selected software is evaluated according to the list of creative thinking determinants. The list includes both Guilford's and George's determinants. The Guilford theory includes four determinants that are related to the development of creativity: fluency, flexibility, originality and elaboration. While George lists four additional determinants: curiosity, complexity, risk-taking and imagination.

The evaluation results indicate that the skill-based transmission software commonly does not provide environment that allows development of creativity. In opposite, the open-ended constructivist software is more favorable environment, in which students have opportunity to perform more complex tasks that encourage curiosity and imagination and allow risk-taking. Also, student can be genuine in his work, can express fluency and flexibility.

Finally, it is possible to conclude that the basic determinants of the ability of creative thinking, made on the basis of Guilford theory and George's list of additional creative thinking determinants can serve as guideline for a selection of software that could be used in gifted education.

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APPLICATION OF MENTAL MAPS IN HIGHER EDUCATION

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Abstract - Mental cards (cognitive maps, concept of card, mind map, cognitive maps) are graphical tools for organizing and representing knowledge. They include concepts, usually closed in a circle or certain boxes of knowledge of a specific kind, where relationships between terms are marked by connection of lines that link two terms. Cognitive maps are graphical overview of the program that one wants to learn or present, and it is often drawn as tree branches, in different colors and pictures. By making these maps, important properties of words and terms are revealed. Professors and students are using these maps for learning about relationships of these same terms, creating new associations to their meanings and by that enabling long-term memory.

I. INTRODUCTION

The success secret of the professors in the field of motivating students should not be sought only in the art of teaching, although that is an important element of education, but in the models of social promotion of students. Students are mostly interested in teaching when conditions to prove themselves within the program they are attending are created.

Cognitive maps (mind maps, mind cards) are among the skills of organization of texts, images, concepts, formulas, web pages, files on the computer, and are part of the skills of independent learning. Cognitive maps, popularly known as mental maps (in English “mind mapping”) represent a technique designed for easy organization of reading, study or work.

They belong to the group of mnemonics – which serve to retain materials that would otherwise probably be forgotten. Mental - cognitive maps will help both students and teachers in time self-organization as well as at learning in the organization of individual parts or the overall curriculum.

Mind maps directly affect the knowledge, i.e. they promote it in the best possible way. Maps as a special way of organizing hundreds of data and information are part of the skills of independent learning. They fall into the category of skills that are applied in organization and elaboration of textbook texts, knowledge that is stored on the web, computer files, etc. They are also referred to as mind maps or cognitive maps. Today, they are mentioned in many books as path to successful learning.

The technique is based on scientific knowledge about how the brain works, how it preserves and processes the information, and how the information and data are retained in memory and how they are later recalled.

The cognitive map is, above all, a learning technique trough which the information are entered into the brain in the easiest possible way, and it also provides that these information are later used successfully by students. Cognitive maps operate in a natural way of working of the human brain, which by its nature is not linear, because every idea that comes along in the human brain is preceded as an image, and each image has hundreds of links in the memory.

The brain remembers key words and images, not sentences. Since the cognitive maps show more visually the links between the key words, they are much easier to recall than linear notes.

Cognitive maps are an expression of the radial modes of thinking (all proceeds from the center) which is a natural way of functioning of the human brain. With the help of cognitive maps, each new idea *hooks* to those that already exist. The more of these *hooks* the easier it is to catch any information needed by the user.

II. MENTAL MAPS - EFFICIENT LEARNING

Mental or cognitive (mind) map is a kind of diagram or schedule of a specific form showing the concepts, ideas or thoughts in a certain way. This is a schematic representation of knowledge and it contains words, sentences, symbolic pictures or drawings, and various other characters that represent the meaning of these ideas or thoughts. The appearances of the map is designed so that the center is the keyword, that is an idea or a theme, and around it are other star-branched ideas, providing that all these parts are interconnected in graphic, semantic way and form a whole. Those elements that branch are divided into groups, or nodes.

The purpose of a structured presentation is to help easier understanding and remembering of any materials, as well as organization of the type of knowledge in order to solve a problem or make a decision.

Concept maps are tools for organizing and representing knowledge. They include concepts, usually enclosed in circles or boxes of some type, and relationships between concepts or propositions, between two concepts. *Linking words* on the line specify the relationship between the two concepts. Joe Novak defines "concept" as a perceived regularity in events or objects, or records of events or objects, designated by a label. [4]

Methods of mental map making (special ones not linear graphic style and exterior) represent a visualized approach to work on a task that is often complex, broad and conceptual in order to highlight what is important in it. Mental maps have been used for hundreds of years, but today there are electronic tools (software) which facilitate the whole process, by combining and providing the adding of elements of modernity with the use of computers, information found on the Internet, files in personal computers, etc. They are usually prepared by teachers, students, but also by doctors, engineers, architects, psychologists, psychiatrists, teachers, educators and so on.

To the otolaryngologist this means that the maps are a really smart way of developing independence in learning, and indirectly, a success in learning. By organizing information in this way, students gain valuable experience about the importance of specific visual presentation of material that they want to learn. Besides, in this way students become aware of their learning styles which brings them more understanding and more insight into what the uses of the information they need to remember are. Maps can be created by professors and students.

New concepts therefore, are memorized in the associative sequence of images, words and meanings that the teacher and/or student created only by making such a map.

This creates the structure of materials similar to schemes, sometimes making endless knowledge base whose contours are created by them. What is learned becomes an active part of the knowledge, not just a bunch of information stored in memory to be activated only on a superficial level of recognition.

Cognitive maps are a natural system of organizing information. They are a tool that integrates all the brain functions - the sense of words, pictures, numbers, logic, rhythm, color and spatial relationships - which enables people to use for real their infinite capacity of the brain.

It is important to note that this is not a new *invention*. We all use these principles in our own way, in various situations, to a greater or lesser extent. What is new here is an aware and planned approach to this type of work at faculties and higher education institutions.

Cognitive or mind or mental maps have a wide range of application and are used often in business and educational purposes, when coding, brainstorming, summarizing the knowledge in a particular field, when reviewing, clarifying, or as mnemonic means (mnemonic techniques). For example, when listening to the lecture method of recording keywords related to a central problem or theme can be applied.

Surveys which were done in the field of cognitive maps showed that the students are learning in an easier, better and more efficient way (about 15 to 20%) with the help of these maps than when applying traditional *linear* methods. For this purpose, today, there are various computer support programs that can help create mental maps. Among them the most popular applications for this purpose are: MindMenager and FreeMind, but there are indeed many more and all of them are very easy to install and use.

Mind maps; represent a way to put, for example, a lot of information on a single sheet of paper, and a good way to organize notes. It is also possible to summarize the entire book in this way, making it easier for students to recall later all the major elements, without looking back at the details. The human brain likes to remember only the key ideas and key words.

Moreover, mind maps clearly define key terms, separating important from unimportant. This allows the students not to wander and waste time on irrelevant details.

The map is drawn in the way in which the center of the mind map is drawn first, and that represents the key concept, the key idea, or better yet, the sketch of the main idea. Needless to say, that one picture is worth a thousand words; the human brain will first remember some picture or drawing and will forget it the last.

If the central drawing is specific, hilarious and contains association with the key word, the human brain will adopt the picture in a split second. Mind maps essentially contain the association of thought arising from, or related to a central point. From the central gallery other topics branch, which may further branch out into less important concepts.

Mind maps are usually drawn in different colors (lines, shapes, forms ...) with the use of electronic media (computer) or on paper, when crayons or markers can be used. It is essential that the central drawing contains at least three colors in order to create the illusion of three dimensionality that acts convincingly to human mind. The more colors the better, the same goes for the drawings. The human brain loves paintings and drawings. In that way everything becomes more interesting, more beautiful and easier to remember if it constantly makes a colorful association with the given concept. Thus, a cognitive map is better done when there are more drawings, and in doing so only positive associations are recommended.

The basic principle of efficient memorizing is the information in long-term memory that must be well organized and clearly structured; otherwise there will be a difficulty in finding the desired content. Well organized means: meaningful, logical and hierarchical. Cognitive maps are useful because of:

1. Quality of information organization;
2. Integration of knowledge.

2.1. Quality of Information Organization

Each cognitive map serves as a network or framework around which information can be collected and logically structured as follows:

- hierarchical (superior elements include sub-elements),
- time, i.e. parallel (elements appear, are in effect, are influenced - at the same time),
- successively (some elements follow each other),
- logical (e.g., multiple factors simultaneously affect the third element, and some elements are in the relationship),
- Or all together.

This ensures a meaningful organization of knowledge in long-term memory. Meaningful organization provides insight into the relationship of information, and thereby improves the quality organization of memory.

2.2. Integration of Knowledge

More cognitive maps can easily be combined meaningfully into a single cognitive map and there is a possibility of creating links between different areas of knowledge and information into one big meaningful whole.

Multimodal coding of information – Creation of cognitive maps produces dual trace of memory: verbal and visual. This will activate both hemispheres of the brain which increases the ability of memory and creative thinking. Verbal information is the key word mentioned in the cognitive map, and the visual one is the graphical representation of the cognitive map. Cognitive maps are especially useful for very abstract concepts and information, as for abstract concepts a verbal clue is only created by rule, so the retention and retrieval of these terms is less likely to happen.

The process of making a cognitive map requires a *deeper analysis of cognitive information*, i.e. it directs the person to understand:

- the logical relationship among cognitive elements and particles of knowledge and information,
- hierarchical relationship between elements,
- In addition, cognitive maps encourage *elaborated encoding*, i.e. create associations between the attributes or properties of new particles that have yet to be remembered and between the attributes or properties of new and old, but preserved particles.

III. BASIC PRINCIPLES OF PRODUCTION OF MENTAL MAPS

Basic principles to be followed in making cognitive maps are as follows:

1. hierarchy and
2. Numerical order.

By using a hierarchical organization, an insight into the relationship and connectivity concepts is created. This makes the process of remembering easy, because things are organized logically. If necessary, numbers can be used to connect the data in a row - chronologically, by importance and/or by a specific order.

3.1. Principles and Techniques Applied in Creation of Cognitive Maps

1. ***Highlighting*** – highlighting is the key to improving memory and increasing access to needed information. All of the recommended techniques for highlighting can be used for association and vice versa. These techniques

are used to achieve optimal emphasis in the maps that are made;

2. *The central character* - the picture in the center represents the focus for the brain and automatically attracts attention. If in the middle there is a word, it would be desirable to use the illusion of three-dimensionality so that it can be highlighted;
3. *Pictures* - pictures are worth a thousand words. In addition, they are attractive and can prevent boredom in the process of learning;
4. *Colors* - colors stimulate memory and creativity, and give life and attractiveness to the picture;
5. *3D* - three-dimensional characters pop up and make things easy to remember, and are used for major parts of the map;
6. *Synesthesia* - in maps words and images that represent a combination of senses (sight, hearing, smell, touch, kinesthesia, taste). So, instead of writing on the map about plants the word *flowers*, it is easier to put in a picture (flowers in jpg or in a different light format). This increases the possibility of memorizing;
7. *Sizes* – variation of font sizes, characters and branches codes the relative importance of concepts in the hierarchy;
8. *Spacing* - spacing increases the transparency and clarity, while leaving enough room around the concepts it provides the visibility of the map. In addition, the map will remain *open* for possible additions or changes that can be made by students and/or teachers.

Associations help to deepen the understanding of any material or problems. By linking things together, the brain gives meaning to experience. e.g. *Arrows* automatically link the human eye to connect the parts. They can be one-way, two-way, 2D, 3D, different sizes, colors and shapes. *Colors* stimulate the brain, because certain colors can encode interrelated areas. This will lead to easier visibility, better memory and connectivity.

Codes and *abbreviations* help find terms that are processed quickly. They can be used in notes to mark things that are repetitive. The more the notes are clear, it will be easier to remember and navigate around them. *One word on the line* - words, attracts many associations. By putting only one word in a line that connects the concepts leaves free room for new ideas and visibility, while at the same time the basic idea or phrase is not lost. Printed letters are clearly formed, so the brain *records* them more easily. What is very important is the saving while reading and memorizing. Also, large print encourages shorter and simpler expression. *Equal length of lines and words* and *connecting of multiple branches* help connecting thoughts, and bold central line allows us to highlight certain parts of the map. *Framing* – helps the linking of more information, because in such a way there is an immediate access to all information *within the same group*. *Clear pictures* - promotes clarity of thought to the creators and users of cognitive maps, and *display of paper horizontally* gives more space for drawing a specific folder.

There are many *open source programs* for the realization of cognitive maps. One of them is the *FreeMind* software for creation of cognitive maps, defining the idea or concept. Software such as FreeMind can be used for a lot of things, but it can also present an idea visually, it can for example create an overview of a business plan, show lecture of professors, review the most important files on the hard disk, give an overview for the most commonly used links on the internet, give an overview of marketing strategies of a company or brand, and so on.

The opportunities are huge, almost limitless, but perhaps most importantly, FreeMind has the potential to affect the creator or user of cognitive maps to change the way certain things on our computer were carried out. As with all software that the company Aranea Network Ltd. advocates (and exclusively uses), FreeMind is also a FOSS, meaning that it can be installed as a completely free and legal software on computers at Faculties, higher education institutions or personal computers of students and professors.

A concept map is a graphical representation of relationships among concepts. Willis and Miertschin suggested the use of technology-based concept mapping as an active learning strategy that can enhance learning and thinking skills, particularly among students native to a digital environment [6].

Within FreeMind program a cognitive map was created (Figures 1 and 2) for the subject of Electronic Business, used at the Faculty of Information Technology, University of the Mediterranean. The Faculty of Information Technology was the first Faculty in Montenegro which introduced the option of distance learning.

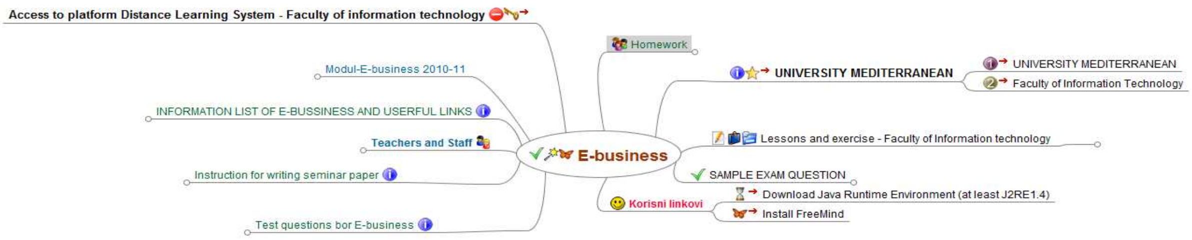

Figure 1: Example of a cognitive map created for the subject of e-Business at the Faculty of Information Technology - Map

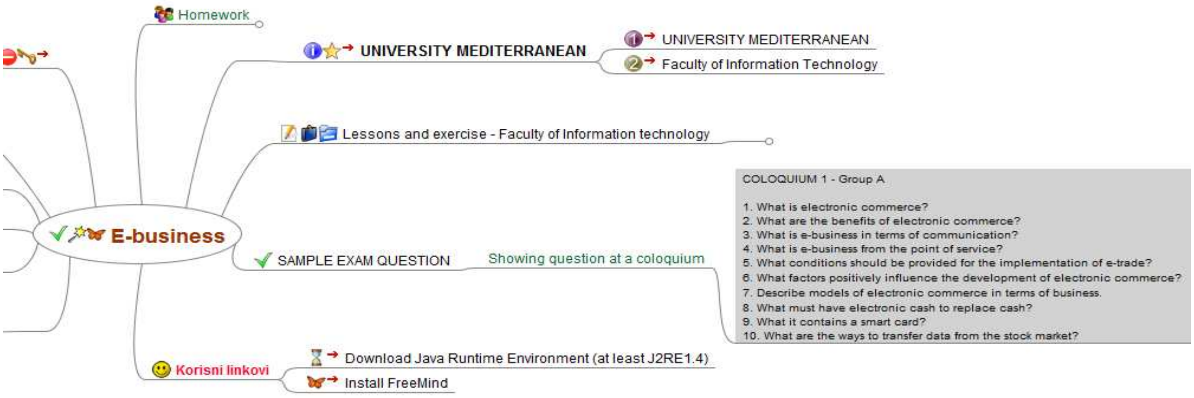

Figure 2: Review of the weekly teaching content for subject E-Business

American Association for Distance Learning (The United States Distance Learning Association), defines the concept of distance learning as: "Achieving the knowledge and skills through delivered information and directions, by applying different technologies and other forms of distance learning."

Distance Learning (Distance Learning System - DLS), within the framework of distance learning and cognitive maps represents a performance of training, learning or electronically educational program, usually via the Internet. It is based on the use of modern computer and communication technology. The introduction of distance education and cognitive maps can be viewed as an evolutionary development of new methods of education. Cognitive maps and distance learning are also a challenge and a tool for improving and upgrading the educational process in our country and are a foundation for new and better ways of managing knowledge. Intensive introduction of information technologies in educational process has become a priority for modern higher education institutions around the world.

There are two features of concept maps that are important in the facilitation of creative thinking: the hierarchical structure that is represented in a good map and the ability to search for and characterize cross-links. In a concept map the concepts should be represented in a hierarchical fashion with the most inclusive, most general concepts at the top of the map and the more specific, less general concepts arranged hierarchically below. The hierarchical structure for a particular domain of knowledge also depends on the context in which that knowledge is being applied or considered. Therefore, it is best to construct concept maps with reference to some particular question we seek to answer or some situation or event that we are trying to understand through the organization of knowledge in the form of a concept map.

Another important characteristic of concept maps is the inclusion of "cross-links." These are relationships (linking lines with linking words) between concepts in different domains of the concept map. Cross-links help us to see how some domains of knowledge represented on the map are related to each other. In the creation of new knowledge, cross-links often represent creative leaps on the part of the knowledge producer. Final features that may be added to concept maps are specific examples or actual images of events or objects that help to clarify the meaning of a given concept. In figures 1 and 2 is present cognitive map for E-business at Faculty of information technology.

It is often implicitly assumed by researchers that their readers understand what cognitive map and cognitive mapping are, and their justification for study. This paper differs in this respect by explaining explicitly the ‘what’ and ‘why’ questions often asked, demonstrating cognitive mappings multidisciplinary research worth. First, it examines questions concerning what cognitive maps are, the confusion inherent from the use of the term ‘map’, and the usage and reasons for alternative expressions. Second, it examines the theoretical applications or conceptual research, concerning cognitive maps role in the influencing and explaining spatial behavior; spatial choice and decision making; way finding and orientation; and the cognitive maps utility and role as a mnemonic and metaphorical devise; a shaper of world and local attitudes and perspectives; and for creating and coping with imaginary worlds. Third, it discusses cognitive mapping's practical and applied worth, concerning the planning of suitable living environments; advertising; crime solving; search and rescue, geographical educational issues, cartography and remote sensing; and in the designing and understanding computer interfaces and databases, especially Geographical Information Systems (GISs).

IV. CONCLUSION

Cognitive maps are primarily intended for visual organization of ideas, plans, concepts, strategies, tactics, and are used by managers in the marketing sector, professors at the university, student for learning, teachers in kindergarten, surgeons in theaters, architects and administrators of computer networks, programmers, etc. Cognitive maps are really a smart way to develop independence in learning, and indirectly achieve success in learning.

By organizing the information in this way, students gain experience about the importance of specific visual presentation of the material to be learned. In addition, this is just another way that they become aware of their learning style that brings them more understanding and more insight into what the uses of the information they need to remember are. While making the maps the intrinsic properties of words and concepts are revealed, they learn about their mutual relations, they implement an intensive and independent thinking. FreeMind is just one of the software used for mapping, which facilitates the learning of all possible topics that may appear linear, circular, and hierarchical. Maps with the help of the central image - allow you to connect threads of knowledge, while with the linear learning or reading this is not happening.

In Montenegro, at the higher education institutions cognitive maps or mind maps are rarely used, and they have become present only in recent times, while for example in America at some institutions of higher education they are a compulsory subject. They can be used to learn everything, even the mathematical tasks. Seminars about mental maps can be arranged everywhere and designed for everyone: elementary schools, students, people of all professions, and even retired people. Maps help the development of creativity, development of methods of overcoming memory and they ensure long-term memory. They also enable students to learn from thicker literature; business people use them for better organization of work.

In addition, modern concept mapping software tools enable instructors and students to create visual navigation structures through complex knowledge domains. The authors find value in visual navigation structures for their relevance to organizing and simplifying learning environments and for their appeal to visual learners. This paper investigates different ways to develop digital interactive concept maps (CMaps) to help students navigate complex knowledge domains, such as the content of a course or a curriculum. CMaps can be used to present information in a no sequential way or in several different ways, depending on the need. Interactivity enables students to easily locate digital information artifacts pertinent to a concept (media files, slide presentations, web pages, etc.) by clicking on links associated with a CMap node representing the course concept or category.

A review of recent literature is provided, different software tools are compared, and the authors document their personal experience.

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IDENTITY MANAGEMENT OF HIGH EDUCATION SUPPORTED BY SMART CARD

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Abstract - The Identity Management is a system used to support managing of personal information of users. The Identity Management System is very convenient for the support mobility of students, teachers and scientific workers in European High Education Area by beforehand established standards for attributes of identity. The smart card is a tool for providing security of identity data.

I. INTRODUCTION

The **World Summit on the Information Society** - WSIS [3] was a pair of United Nations sponsored conferences about information, communication and, in broad terms, the information society, that took place in 2003, and established definition of Information society. An Information society is a society in which the creation, distribution, diffusion, uses, integration and manipulation of information is a significant economic, political, and cultural activity. In other words it is a Knowledge society, society that creates, shares, and uses knowledge for the prosperity and wellbeing of its people. The Knowledge Society generally refers to a society where knowledge is the primary production resource instead of capital and labour. The conditions for generating knowledge and processing information have been substantially changed by technological revolution focused on information processing, knowledge generation, and Information and Communication Technologies.

This Society offers large possibilities such as new tools in education and training, easy access to public services, inclusion of disabled persons and bridging regions.

In developed Information Society, creation, distribution and manipulation of information becomes significant economical and cultural activity. Today, having proper information means advantage in economical race. The speed and efficiency of information exchange gives sensibility to act on any change on market condition, prompt act to improve position.

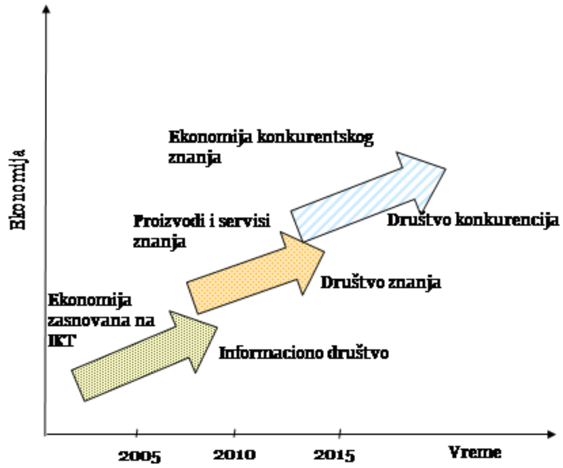

Figure 1. Development of economy and society

II. IDENTITY MANAGEMENT

Each organisation, which business is supported by IT through network of computers, could be presented as business building consisting of many offices and employees. In that situation the System Administrator gives or does not give privilege to access to the network resources. The management of this kind of data is simplified - Identity Management - IdM.

The Identity Management controls all users concerning the way of access to resources. If system requires only user name and password to access private network, that represents minimal form of IdM. For Identity Management System, we need more than simple log on data.

The Identity Management System IdMS provides management of adjusted access to IT environment for each user, determined by user's business function and required security. The IdMS improves business process and common usage of information. High level of security is provided by adequate managing of this system. In spite of risk of unauthorised access to system, many organisations did not implement tool of IdM. Why? Because it is complicated. It is necessary to establish all authorisations according to legal regulations in order to provide privacy, and develop central DB of IdM, manage with authentication of each user and stimulate data management policy.

The consolidation of control access is very important for successful implementation of IdM strategy. On the level of software application there is some control. Because of lack of quality testing, control of access to each application has weak points. The centralised access to IdM provides automation and speeding up of the process. Beside the technology, it is necessary to define management of accounts policy. The consistent monitoring of access to system resources provides secure system. Simply, we can say that IdM is set of technologies to support managing of identity.

It is important to emphasise that each identity has a life cycle consisting of:

- *Account provisioning* - refers to a company's ability to provide its employees, business partners and customers with access to IT systems, applications and Web portals,
- *Account maintenance* – provides updated identity and
- *Account de-provisioning* – deactivation of users account.

The Identity Management System modules:

The first module is establishing of identity by link on a person's name or object and reestablishing of identity, e.g. by link on a new or added name or subject's or object's number.

The second module is identity description which is done by an arbitrary assignment of one or more attributes which are used for a certain subject or object as an identity, or re-description of the identity (e.g. changing one or more attributes of subject or object identity).

The third module represents activity flow, in which it is necessary to record and/or insure access to the identity activity protocol and optionally analyze the sample of identity behavior.

The fourth module deals with the destruction of identity if the user leaves organization, or identity management system.

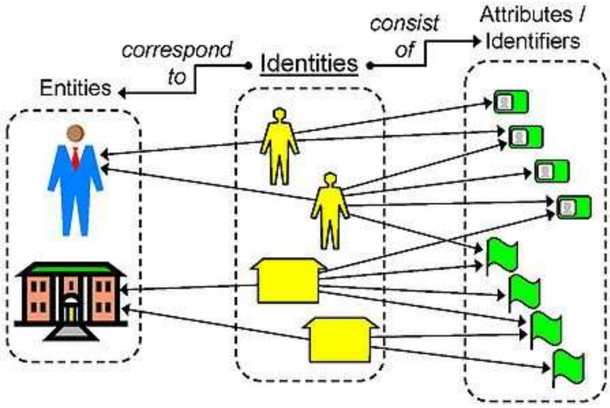

Figure 2. Identity concept (Author: Audun Josang)

The introduction of biometrical data into identity management system raises the level of identity data security.

How to improve quality of Identity management?

From the beginning of civilization, the identification of a human body was crucial in the creation of human society [1]. Hence, the identification of a person is an integral part of infrastructure which supports financial business, care for human health, distance learning, communication, judiciary, border services and many other areas.

Biometrics which refers to the automatic person identification, based on its distinctive anatomic and behavior characteristics, can become an essential component of the effective person identification. Biometric components of an effective solution in person identification cannot be mutually used by several persons, cannot be shared or lost. Essentially, they represent physical identity of the person. Biometrics represents automatic methods of the person identification based on physical characteristics or behavior. It represents a simple relationship human – machine, insuring three basic functionalities: positive identification, wide range identification and authentication.

As society becomes more electronically connected and represents a large global community, it is necessary to enable a reliable identification of a distant person by method of automatic identification. Representatives of such kind of surrogate identification are passwords, which are mostly used as an electronic access control, and cards mostly used in bank and administration applications. Cards and passwords can be used by other persons besides those to whom they are assigned, by which a unique person identification is not insured.

Generally speaking, biometrics is exploration of measarable biological characteristics. Regarding computer security, biometrics refers to techniques of authentity check, which rely on measarable physical characteristics, which, subsequently, can be automatically checked. Any reliable system of person identification must include bimetrical components.Biometrics has an important role in applications for sample identification. There are number of useful biometric solutions already applied in practice.

Throughout the history, the problem of identification was elusive and inapprehensible in terms of efforts necessary for the achievement of satisfactory solutions. Besides, even until now, a man could identify a person with enormous accuracy, thus biometrics was considered unnecessary. Biometrics is considered as an essential technology in defining identification security system, because it insures the highest level of secrecy in identity verification.

Precondition for biometrical identification is to create data base with samples, which will serve as a comparative tool, and finally for identification.

One of the safest and most known forms of electronic identification is **smart card**. By adding biometrical data on smart card, the security of identification is increased.

Smart card is a card of standard dimensions with an integrated chip, integral circuits which can process information. Integrated chip can contain significantly more data than any other means of data upload, such as bar code, magnetic tape, optical tape, etc. This card is recognized as one of the safest and most known forms of electronic identification, and by adding biometrical data on smart card, the security of identification is increased.

Smard card is designed in a way to protect data which contains; most often requires PIN code (Personal Identification Number) in order to verify the identity of a card's user before authorizing access to card's information.

Card's computer chip requires smart card's reader, in order for a communication with a computer platform to be successful. A unique technology for chip protection is used. Biometrics increases the level of smart card's protection and represents very reliable solution from the aspect of privacy.

III. Electronic Identity Management

In IT technology, Identity Management is regarded as management of information which represents items in real life, for example users, organizations, equipment, services, etc. Identity engineering requires explicit information. IT industry has developed several identity management interpretations. The evolution of Identity Management is closely related to the development of Internet Technologies. In the environment of static web sites and portals of the 90s, corporations have explored the delivery of information from the web sites. Because information changes out of different reasons, the possibility of conducting self service or updating help-desk shapes information more effectively, which is nowadays known as the Identity Management.

IV. Identity Management in HE

he precondition for the establishment of European dimension in higher education is overcoming present obstacles. The process of Higher Education reform in Europe, the Bologna process (the establishment of EHEA by 2010, the main goal of Bologna process), promotes students' and teachers' mobility. The establishment of this kind of mobility within the EHEA requires certain preconditions, namely defining standards which have to be accepted by all higher educational institutions. Larger mobility of higher education within the EU enables better exchange and flow of information and ideas, and the adoption of good practice of the higher educational systems within the EU members.

Mobility is the means of enlargement of effectiveness and the quality of educational system among the European Union members and other European countries, because it enables better exchange and flow of knowledge and ideas, as well as the adoption of good practice.

The precondition for quality establishment of mobility is the establishment of Identity Management in higher educational institutions. I will state two examples.

For example, at London Kingston University, with 23000 students and 2000 employess, the project *University without walls* is being developed, which will enable virtual access to all university resources from any location. This kind of project requires the support of a complex Identity Management, which, for many, represents the main security challenge.

At Belfast Queen′s University, new expanded smart card system is being implemented, which offers additional improved services. New card will be given to all employees and students. Some of the card's characteristics are:

Acces to data and books in library

Access to all university areas

- Access to parking lots
- Shopping in university stores
- Paying in restaurants, etc.

V. CONCLUSION

Identity Management has an important role in educational processes, especially within higher education. Its usage, with respect to generally accepted standards for identity attributes, accompanied by biometrical data, can effectively support basic principles of Bologna process, such as the mobility of students, teachers, scientists and other participants of the higher education within the EHEA.

EUA (European University Association) should define necessary standards which refer to education data, scientific research, bimetrical data, in order for higher educational institutions to adjust their ID systems, implement those attributes into the smart card identities, thus insuring mutual compatibility.

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ON LINE EDUCATION IN PANDEMIC EMERGENCY SITUATION

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Abstract - The purpose of this project is to display the possibilities of IT-based education in case of emergency situations such as sever influenza epidemic or pandemic situations that will result with school closure and state of quarantine. The hypothesis of this paper is to use available web technologies for continuous education in the epidemic or pandemic situation. The paper will offer an overview of requirements and advantages of e-learning and technologies that are available today so as benefits in the long run and short run for pandemic influenza preparation plan and field assessment for implementation of e-learning methods.

I. INTRODUCTION

There is no generation that had such an opportunity to obtain information about any area of interest. With today's technologies and young people that are native with technologies such as laptops, smart phones and various digital technologies that can ensure an easy and effective way to educate students in the time of emergencies [1].

As the past events of H5N1 in Asia and a possibility of outbreak of H1N1 or potential mutations of influenza, will result with educational facilities closure and education discontinuity. Therefore, education institutions should plan to be able to respond in a flexible way to varying levels of severity and be prepared to take additional steps of education continuity if a potentially more serious outbreak of influenza evolves during the fall and winter. The continuity can be maintained with e-learning, which will provide education from home, and teacher student communication.

Online learning can provide a short-term solution and a long-term framework for options related to the continuity of learning and preparedness for:

- Weather closures
- School dismissals and closures
- Natural disasters
- Flu and other pandemic preparedness

Using technology for education purposes can have a big impact on efficiency and continuity, which can be crucial in emergency situations. In this case the aim is to make a best use of technologies available today for quick distant learning that will in emergency situation improve the educational system and contribute to a continuous educational sequence. The subjects in this case are:

Teachers who should be trained to use most common technologies for teaching and evaluating students over internet in conditions that do not allow a normal schooling

Students and parents, to access and use educational materials.

A. *Specific goals*

Short and Long term frameworks to help schools adopt e-learning for learning continuity in emergency situation would require an assessment of readiness which include preparation of participants for e-learning, availability of instructions and technology tools and platforms availability.

Schools can benefit from readiness assessment research for e-learning as it will result with data of what the students possess on their home technology inventory. In case of insufficient elements, a formulation of plan how to expend the access of every student and teacher with required technology for long and short term.

For teacher:

- Internet access,
- Usage of LMS/CMS,
- Usage of communication and distance learning tools.

For students:

- Internet access
- Knowledge to access materials and servicers
- Knowledge to find information

Online learners should be provided with a variety of learning activities to achieve the lesson learning outcome and to accommodate learners' individual needs. Examples of learning activities include reading textual materials, listening to audio materials, or viewing visuals or video materials. Learners can conduct research on the Internet and link to online information and libraries to acquire further information. The preparation of a learning journal will allow learners to reflect on what they learn and provide personal meaning to the information. Appropriate application exercises should be embedded throughout the online lesson to establish the relevance of the materials.

B. E-Learning solution

Since E-Learning is based on technology, some fundamental elements are necessary for every individual that is participating. Students and teachers will require an internet connection, computer, audio speakers, microphone and webcam. With this basic equipment it is possible to transmit an audio-video lecture, participate in web conferences.

Creating a totally online learning mode demands much dedication and effort in order to reach or exceed face-to-face effectiveness, so expectations of eLearning have to be tempered.

Tools that can be used to achieve an effective learning mod:

Administration

- Online syllabus (accessible via mobile phones and computers)
- Announcement with SMS, Email, Twitter like sites.
- LMS/CMS

- Lectures
- Types
- Webcast and Podcast
- Screencast
- Tutorials
- Hosting for sharing presentations and documents
- Slideshare (www.slideshare.net)
- Scribd (www.scribd.com)

- Tutorials
- Chat rooms
- Forums

- Communication & Collaboration
- Skype (audio/video conferences)
- Blogs
- Wikis
- Google Docs

This will provide learning continuity and virtual education to help establish new school models:

Long term - using blended models of online learning every day will help engage students in 21st century classrooms.

Short term - preparing schools for readiness to use online learning for learning continuity in the event of school closures

II. CONCLUSION

Online learning can be solution for maintaining learning continuity when institutions are planning for pandemics, times of crises, weather and school closings. This readiness assessment should develop for schools and regional planning for academic continuity in the case of a pandemic or natural disaster causing school buildings to be shut down.

By well-timed readiness assessment and planning a framework for continuous learning in emergency situations modeled at the level of school facilities and whole region, and preliminary e-learning usage with conventional methods of teaching can have positive effects on readiness of students and teachers in the potential pandemic situation.

A further use of e-learning model for pandemic emergency situations can be used for education in rural areas with scattered households and difficult transport condition, or insufficient numbers of students.

The biggest obstacle for implementation of this model is the internet access in rural areas and households that are difficult to connect on a broadband; in this case the best solution would wireless connection offered by mobile telephone companies.

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MOBILE ROBOT MOVEMENT ON DIFFERENT TRAJECTORIES IN WORKING AREA

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Abstract — The synthesis of a mobile mechatronic system fits the issue of mechatronic design that has become a topicality subject. At the same time, designing mechatronic systems relies on a modeling/ simulation-experimentation balance. The issue of planning and managing the autonomous mobile system is structured on multiple levels. Usually, the purpose is to synthesize a single trajectory, so that the mobile system would move without risking a collision with obstacles inside the working environment.

I. Introduction

Since its inception in the early 1960s, robotics has generally focused on the design and control of robot manipulators. To a large extent, this has been motivated by the needs of industry. Robot manipulators have found applications in factories (notably, automotive spot welding) at a rapid pace, in spite of the fact that the design, control, and programming of these robots are primitive. Reactive behaviors (like the stretch reflex in humans) do not require any deep cognitive ability, but on-board intelligence is necessary if the robot is to perform significant tasks autonomously, and actuation is needed to enable the robot to exert forces upon the environment [1]. Generally, these forces will result in motion of the entire robot or one of its elements (such as an arm, a leg, or a wheel). These technological advances have, in term, made possible the automation of new applications: assembly, conveyor-belt following and seam welding are some examples.[2]

One purpose of this study lies in presenting a method of detecting the distance between the mobile robot and obstacles and recording it, and in the same time the possibility of implementing it in order for it to be used by individuals (subjects) in applied studies. Another purpose it is to present the main issues that might appear during the experimental analysis of a mobile robot.

The application of mobile mechatronic systems has grown exponentially during the last period of time. Simultaneously, increasing the system's performances, safety and reliability has become a must. Built as autonomous mobile systems, equipped with sensorial elements, their purpose is to operate and transmit data in real time from inaccessible, narrow, toxic or hardly-reachable environments, from which, though, information is needed [3].

The synthesis of a mobile mechatronic system fits the issue of mechatronics design that has become a topicality subject. At the same time, designing mechatronic systems relies on a modeling/ simulation-experimentation balance.

The issue of planning and managing the autonomous mobile system is structured on multiple levels (Fig.1).

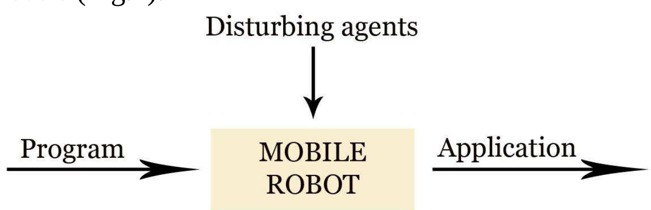

Figure 1. Mobile robot working mode

Usually, the purpose is to synthesize a single trajectory, so that the mobile system would move without risking a collision with obstacles inside the working environment.

II. Mobile Robot stucture and cinematic model

To be able to study the behavior of the mobile robot in the working area, I used an educational kit which offers the possibility to have an multifunctional robot, that can be used for different applications. LEGO MINDSTORMS Education (Fig. 2) is the next generation in educational robotics, enabling students to discover Science, Technology, Engineering and Mathematics in a fun, engaging, hands-on way

Figure 2. Lego Mindstorms Robot

LEGO MINDSTORMS Education features an advanced 32-bit computer controlled NXT brick, Interactive Servo Motors, Sound, Ultrasonic and other sensors, Bluetooth communication and multiple downloading capabilities. The icon-based LEGO MINDSTORMS Education NXT Software is built on the LabVIEW™ software from National Instruments, an industry standard with applications in many engineering and research fields.

Most of the parts in the MINDSTORMS NXT set are “stud less”, but that doesn’t mean they won’t work perfectly well with other LEGO. Many TECHNIC sets contain normal bricks with pin holes that you can attach to the NXT creations using normal TECHNIC pins or axles. BIONICLE pieces fit very naturally, and you can integrate studded bricks and stud less pieces in thousands of ways. With a little bit of firm pressure, the studs on the top of bricks will also fit in the holes of the beams in place of pins as well

Each port is separate, so we can have sensors on four different ports and read all of them independently

The mobile robot is simpler in construction and thus cheaper, with less controllable axes and ensures the necessary mobility in plane. Due to this reason a kinematics model of mobile robot with two degrees of freedom **h=2**.

In Fig. 3 a generalised model of a Mobile robot with wheels with **h=2** is presented. It includes two symmetrically allocated driving wheels with radii **r.**

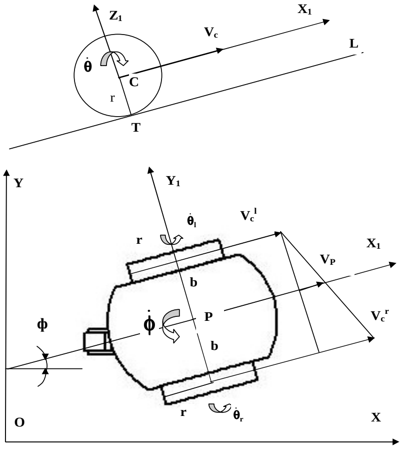

Figure 3. A general model mobile robot with wheels

The Mobile robots with wheels include a various number universal wheels for keeping up the balance in plane. The investigated Mobile robots with wheels possess a single universal wheel. This wheel is not a driving one and it is not included in the kinematics model. In the robot centre P is connected a local co-ordinate system $\mathbf{PX_1Y_1}$, where $\mathbf{X_1}$ is along the axis of symmetry, and $\mathbf{Y_1}$ is along the axis of the driving wheels. The angle between the axis $\mathbf{X_1}$ and the axis X of the immovable co-ordinate system **OXY** is denoted with **ϕ**.

The distance between the driving wheels along the axis $\mathbf{Y_1}$ is **2b**, and the angular velocities of the left and the right wheel are respectively $\dot{\theta}_l$, $\dot{\theta}_r$. When one wheel is rolling on a straight line without slipping with angular velocity $\dot{\theta}$, its centre is moving with velocity $\mathbf{V_c}$**.** The velocity of the oscillate point **T** with the plane **L** is 0 and thus the following equation is fulfilled: $V_T = V_c - \dot{\theta} r = 0$

The upper equation can be integrated and can be presented as a link among the angular and the linear position of the wheel: **l - θr = 0.** When the wheel is rolling along a curved line the linear velocity of its centre $V_c = [\dot{X}_c; \dot{Y}_c]^T$ in the base co-ordinate system **OXY** depends on the wheel orientation in the plane defined by the angle **ϕ**

$$\left| \begin{array}{l} \dot{X}_c - \dot{\theta} r \cos\varphi = 0 \\ \dot{Y}_c - \dot{\theta} r \sin\varphi = 0 \end{array} \right. \qquad (1)$$

The upper equations can not be integrated in order to define relations only between the wheel positions. In the plane motion on the wheel velocities are imposed restrictions, thus the mobile devices from the type shown in Fig. 1, are called Mobile robot with wheels. The mobile devices include two co-axial driving wheels, the velocities of their centres $\mathbf{V_c^r}$ и $\mathbf{V_c^l}$ are co-linear with the axis $\mathbf{X_1}$ of the local co-ordinate system $\mathbf{PX_1Y_1}$. The velocity $\mathbf{V_p}$ of the centre P of the mobile platform is also co-linear with the axis $\mathbf{X_1}$. The plan of velocities of Mobile robot in the plane OXY is presented in Fig.2 The following equations can be derived:

$$V_p = 1/2(V_c{}^r + V_c{}^l) \quad (2)$$

$$2b\dot{\varphi} = V_c{}^r - V_c{}^l \quad (3)$$

If we derive the upper equations along the axes of the base co-ordinate system OXY, where the velocity of the centre $\mathbf{V_p}$ is presented by the co-ordinates $V_p^0 = [\dot{X}_p; \dot{Y}_p]^T$, and the velocities $\mathbf{V_c^r}$ и $\mathbf{V_c^l}$ of the right and the left wheel is defined with the help of (1), thus equations are derived defining the kinematics of Mobile Robot in the base co-ordinate system [4].

$$\left| \begin{array}{l} \dot{X}_p = r/2 \cos\varphi\dot{\theta}_r + r/2 \cos\varphi\dot{\theta}_l \\ \dot{Y}_p = r/2 \sin\varphi\dot{\theta}_r + r/2 \sin\varphi\dot{\theta}_l \\ \dot{\varphi} = r/2b\,\dot{\theta}_r - r/2b\,\dot{\theta}_l \end{array} \right. \quad (4)$$

If the velocity $\mathbf{V_p}$ of the centre of the mobile platform and its velocity of rotation $\dot{\phi}$ we combine in the vector:

$$\dot{X} = [\dot{X}_p; \dot{Y}_p; \dot{\varphi}]^T \quad (5)$$

and the velocities of the driving wheels $\dot{\theta}_l$, $\dot{\theta}_r$ we combine in the vector

$$\dot{\theta} = [\dot{\theta}_r; \dot{\theta}_l]^T \quad (6)$$

then the direct task of the kinematics of WMR is presented by the vector equation

$$\dot{X} = S\dot{\theta} \quad (7)$$

where

$$S = \begin{bmatrix} r/2 \cos\varphi; & r/2 \cos\varphi \\ r/2 \sin\varphi; & r/2 \sin\varphi \\ r/2b; & -r/2b \end{bmatrix} \quad (8)$$

The direct task allows for each position of Mobile robot definition of (3x1) the vector of velocities (5) of the centre P from (2x1) the vector of velocities (6) of the driving wheels.

It is necessary to solve the reverse task of the kinematics in order to plan the robot motion and the robot control. In order to find a solution for the reverse task of the kinematics of robot, the pseudo inverse matrix $\mathbf{S}^+$ **of** (8) can be used, because matrix (8) is not a quadratic one.

$$\dot{\theta} = S^+\dot{X} \quad (9)$$

It is necessary to use an additional restriction on parameters (5) [5].cause in this case the number of the input parameters (5) is bigger than the number of the output parameters (6).

$$A\dot{X} = 0 \quad (10)$$

Matrixes $\mathbf{S}^+$ and $\mathbf{A}$ can be easily defined by using the equalities (3) and (4) presented in the form below:

$$\left| \begin{array}{l} V_p + b\dot{\varphi} = V_c{}^r \\ V_p - b\dot{\varphi} = V_c{}^l \end{array} \right. \quad (11)$$

when we define the upper equations along the axes of the local co-ordinate system PX_1Y_1. The velocity of the centre $V_p = [\dot{X}_p; \dot{Y}_p]^T$ is defined along the axes $\mathbf{X_1}$ and $\mathbf{Y_1}$ by means of consideration of their angle of rotation $\boldsymbol{\phi}$. In this way equations (11) along axis X1 present:

$$\left| \begin{array}{l} \dot{X}_p \cos\varphi + \dot{Y}_p \sin\varphi + b\dot{\varphi} = r\dot{\theta}_r \\ \dot{X}_p \cos\varphi + \dot{Y}_p \sin\varphi - b\dot{\varphi} = r\dot{\theta}_l \end{array} \right. \quad (12)$$

and along axis $\mathbf{Y_1}$ present:

$$-\dot{X}_p \sin\varphi + \dot{Y}_p \cos\varphi = 0 \quad (13)$$

Equations (12) express the reverse task in kinematics (9), from where for the matrix $\mathbf{S}^+$ we can derive:

$$S^+ = \frac{1}{r}\begin{bmatrix} \cos\varphi; & \sin\varphi; & b \\ \cos\varphi; & \sin\varphi; & -b \end{bmatrix} \quad (14)$$

Equality (13) expresses the equation of the links (10) between the velocities including the matrix:

$$A = [-\sin\varphi; \cos\varphi; 0] \quad (15)$$

III. WORKING AREA WITH OBSTACLES AND TRAJECTORIES

Depending of the working area the mobile robot can make his own choices [6]. We can have one or two obstacles or we can have many obstacles (Fig.4). Also the path of the mobile robot can have different shapes depending of the obstacles involved and what is the mobile robot path that his sensors indicate to be fallow, as we can see in Fig. 5 and Fig. 6.

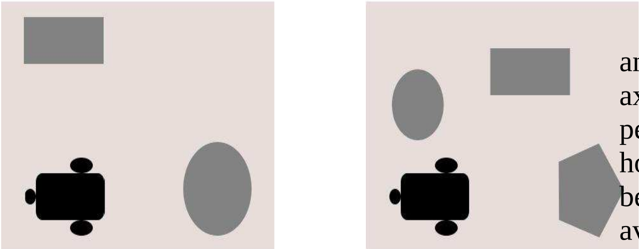

Figure 4. Obstacles in working area

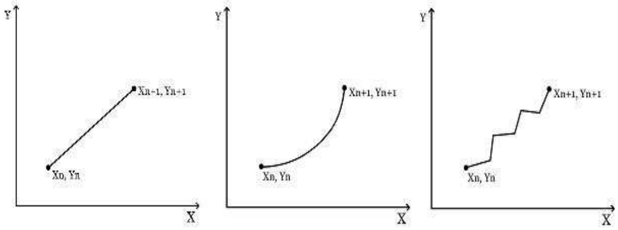

Figure 5. Different trajectories (strait line, curb line, zig zag line)

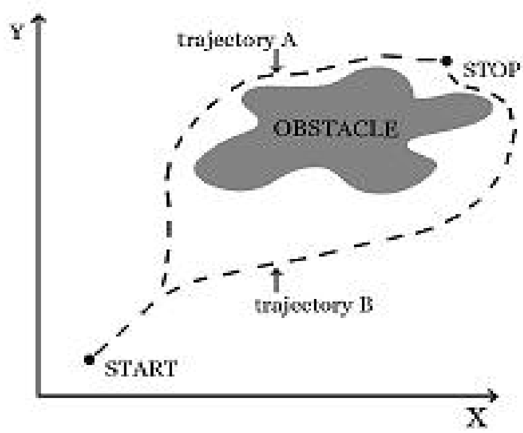

Figure 6. Mobile robot possible path

IV. EXPERIMENTAL PART

The experiment it is develop on an educational kit. I made three tests, on three different paths: straight line, curb line, zigzag line. The test was made in a indoor building, on a flat concrete platform (4000 x 3500 mm).

This was possible because the NXT has an internal memory that can stock information on it. The disadvantage it that the free space of the memory it is limited.

To be able to program the robot, I used Mindstorm program. This allowed me to program the block, for different tests, but steel only used one main structure of program. The only deference between the programs used, are the variable such as: length of the path and shape of the path. The main blocks of the program are: the acceleration block, the gyro block and the file access block.

The Accelerometer Block has three outputs, *x*, *y* and *z* which are derived from three measurement axes. These axes are set in the three principal perpendicular directions as defined by the sensor housing. The *x* axis is the principal axis which can be compared against the threshold as well as being available as an output value. It represents measurements of acceleration along the body of the sensor.. This axis may also be used to measure the forward/backward tilt assuming the sensor is mounted "level" on the robot. Forward/backward tilt is sometimes referred to as "pitch". The *y* axis is only available as an output value. It represents measurements of side to side acceleration as shown in the picture. This axis may also be used to measure the side to side tilt assuming the sensor is mounted "level" on the robot. Side to side tilt is sometimes referred to as "roll”. The *z* axis is only available as an output value. It represents measurements of up and down acceleration as shown in the picture. This axis will be measuring the downward force of gravity if the sensor is mounted "level" on the robot.

The gyro sensor block measures the rate of rotation and the direction of rotation in the horizontal plane of the sensor. It returns the reading as the number of degrees per second of rotation. The block has the capability to adjust for the offset or bias of the sensor ensuring the output is zero when no rotation is present. There is also a boolean output which returns "true" whenever the rate of rotation is greater or less than a defined trigger value.

For example, to write to a file and then read from the same file, I must close the file between those two actions. I would need three File Access blocks to accomplish this task: the first File Access block (with “Write” selected in its configuration panel) would write data to a file; a second File Access block positioned somewhere later in the program would have to be set to close the same file; a third File Access block (with “Read” selected in its configuration panel) would be able to read the file. These three blocks could be positioned right next to each other or could be spaced throughout your program.

After sever experiment we were able to obtain a path for each of the trajectories that the robot used. In Fig. 7, Fig. 8, Fig.9, it can be seen the errors that appears on the movement of the mobile robot.

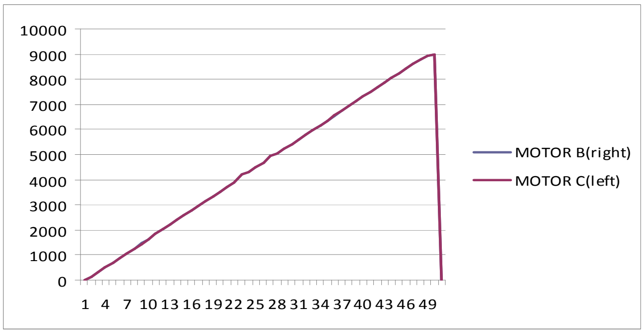

Figure 7. Deviation variation from the original trajectory (strait line)

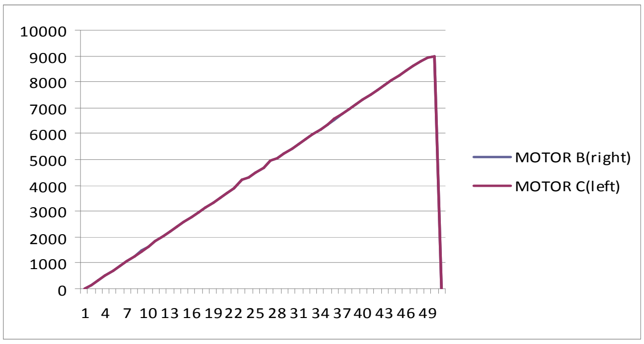

Figure 8. Deviation variation from the original trajectory (curb line)

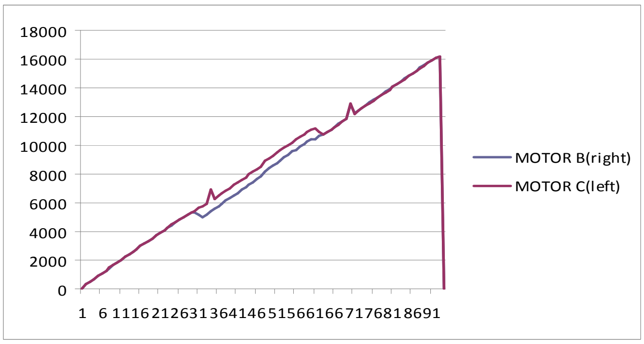

Figure 9. Deviation variation from the original trajectory (zig zag line)

After the values were analyzed it is clear that we have errors for each trajectory. These deviations can be caused by a number of facts, and can be included in the displacement errors category. Also we are able to see the path of the robot with out seeing the program (for example the change of the direction at the curb line path). This is seeing also on the graphics above. The problem of drift in the movement of the robot is it very important, because only a little drift can give a big deviation from the normal path. Because I was able to record 6 values, the prediction can be more precise. That's way for future research I proposed to find a way of working with the data's obtained, by using Kalman Filter.

V. ACKNOWLEDGMENT

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IMPACT OF TECHNOLOGY ON EDUCATION

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Abstract - Technology impacts all areas of life, including education by providing easy, fast and affordable access to information. Due to that traditional education is evolving in order to attract and maintain students. Universities are offering new programs which provide flexibility in terms of attending classes, tuition payments, etc. so that they appeal to more potential students, and fit easier into today's busy schedules.

I. INTRODUCTION

Development of technology brought us television, computers, internet, smart phones, etc. Technology today is removing barriers of distance, and time, and it's providing easy, fast and affordable access to the information. It impacts all areas of life, including education.

II. AVAILABILITY OD INFORMATION

Due to technology advancements, education evolved beyond classrooms and libraries. Today, computers and internet access are affordable to many, and with them access to vastness of knowledge becomes available. If you are interested in learning about e.g. SQL Servers, you don't need to enroll into database management course. You can learn about SQL Server by going online and searching for the resources with queries similar to "Learn SQL Server", or "Beginning SQL Server". Any of these queries will return millions of results, and they are available with a click of a mouse, many of them free of charge. Instead of going to a library to look for a book, resources like http://www.wikipedia.org are providing great electronic libraries of knowledge at no cost to users. Additional bonus is that searching for an information needed is much easier with in-built search online, than searching through a thousands of books in a library. Or are you more of a visual person? Do the query "Beginning SQL Server" on http://www.youtube.com, and you will get results that include video recordings of people talking/teaching SQL Server. Are you more of a hands-on person? Search online for "SQL Server virtual labs". I had an opportunity to use *Microsoft SQL Server Virtual Labs* (http://msdn.microsoft.com/en-us/cc138238.aspx) that allows users to remote to lab machines with SQL Server installed, and to learn by following steps in hands-on labs.

These examples on how to reach learning resources are illustrating only few of many resources available.

III. EVOLUTION OF EDUCATION

It's amazing how much knowledge is available to people outside classrooms. This presents a challenge to traditional schools on how to maintain and increase number of students attending their classes. With so many resources available outside classrooms, why would students spend hours in the classrooms listening to teachers who write on whiteboard, if they can learn from the comfort of their home at their own pace? Many Universities are tackling these challenges in different ways by: introducing distance education, offering programs in different languages, financial aids, and accelerated programs.

Distance education is described as "*a process to create and provide access to learning when the source of information and the learners are separated by time or distance, or both*". [1]

Universities are offering distance education by utilizing technologies:

- Web conferencing (audio/video)
- Phone
- E-mail
- Recordings (audio/video)
- Online materials (soft copy)
- Print materials (hard copy)

All these technologies are providing flexibility in exchanging information compared to traditional education in the classroom. Now students don't need to be physically present in classrooms, they can watch webcasts and recordings of courses, learn online, read e-books, contact their professors by e-mail, instant messaging and/or phone, exchange information on online forums, submit their assignments through the internet, and take exams online. It's easy for students to obtain degrees from Universities that are located in different countries, since they don't need to be physically present in the classrooms in order to attend courses.

Universities are acknowledging that students today have other choices available, and strive to attract and maintain those students. This is raising the bar for Universities related to quantity and quality of programs they are offering.

Up-to-date University website with detailed information related to application, studies, financial aid, programs offered, contact information, etc. is a standard. If potential students can't find information they need promptly, they will move on to a different web site, which means that they will probably end up applying to a different University. In order to attract more students, Universities are simplifying application process, and also emphasis is made on prompt e-mail correspondence. Live chat is used for providing instant information to potential students.

Many Universities from non-English speaking countries are offering education in English language with goal to increase pool of potential students. Example of such University is *Freie Universitaet Berlin* from Germany, which offers various programs taught entirely in English [2]. This University does not charge tuition fees for many programs offered, which is very appealing to students with limited budget.

Recently Universities started offering online education, which can be customized to accommodate student's schedule. Example of such University is *University of Phoenix*, USA which offers degree programs that can be earned entirely online [3]. This University is attracting students by emphasizing their schedule flexibility, online programs, small class sizes, and faculty members who have real-world work experience. All these factors are appealing to many people who can't afford to attend full-time studies for 4 years, and put the rest of their life on hold, so this program fits perfectly in their busy lives. There are many locations in US from where students can attend courses, and if that does not fit their schedule, they can attend courses online. Also, small class size increases possibility that faculty members can spend more time with each student individually, while real-world experience of faculty members provides security to students that they are acquiring skills relevant to the current job market. One more example is *University of Southern California* who is attracting students with accelerated programs, online learning, field-based experiences and tuition reimbursement programs [4].

There are Universities that offer extensive practical programs and distance education with goal to accommodate need of students to finish on-campus studies as soon as possible and join workforce. Example of such University is *Maharishi University of Management* in Iowa, USA which offers MSCS degree after 7 months of on campus studies and two years of distance education while doing paid practical training in a US IT Company [5]. During those 7 months on campus, students are attending only one course at a time with goal to focus in depth on subject at hand. Most of the courses on campus are 4 weeks long with structure: theory class in the morning, labs in the afternoon, daily home-works; midterm exam after 2 weeks, final exam after 4 weeks. After completing mandatory number of units for on-campus studies, students have one week long job workshop which will help them to create CV, and to prepare for job interviews which they need to take in order to get paid practical training. Distance education (DE) is done during practical training (full time paid job) with structure:

- Each DE course has duration of 3 months;
- Students learn by watching previously recorded classes, from books, and various online resources;
- Students submit their labs and assignments through online forms and e-mail;
- Professors are available on phone, instant messaging and e-mail;
- Students taking the same class have online groups and forums where they can exchange knowledge and information;
- Exams are taken online or in the local library with proctors present;
- After each DE course students receive surveys where they can express: what area of the course they enjoyed, what area can be improved, and any other feedback they might have. This feedback is used to improve future courses.

All this allows students to start working after only 7 months of studies on campus, and to complete their degree while working.

IV. CHALLENGES

As described above, Universities are applying different strategies to attract and maintain students.

With so many Universities and various programs available all over the globe, it's challenging for students to find and select University that fits their needs, desires and any other requirements they might have. This caused many online sites to offer services of matching you with Universities and programs. Examples of such sites are:

- http://www.masterstudies.com,
- http://www.collegeboard.org/,
- http://www.university-world.com/,
- http://www.find-universities.com/,
- http://www.searchuniversity.com/, etc.

These sites have a goal to match your search criteria with Universities and programs offered. These sites seem to be quite helpful for students searching for their future education, however, since there is no central place where this information is gathered and maintained, search results of these sites are limited to the data they have, and also data can be stale if not updated by persons maintaining the database with University and programs info.

Development of technology presents a challenge to Universities to evolve beyond traditional classroom teachings, and to increase variety of programs offered.

Another challenge that Universities have is to educate faculty to use technologies available if they want to utilize their benefits fully. As part of introducing new programs, Universities need to develop and adopt new strategies, and to market themselves in order to appeal to future students. Focus is shifting to the students and their needs. Potential students are looked at as potential customers. Universities are attracting students with well-built informative web sites, marketing achievements of their faculty and students, organizing open seminars, and visitor's weekends, newspapers and TV ads, etc. Universities are marketing their programs, so that students get attracted.

V. CONCLUSION

Technology is providing options for students, and forcing Universities to evolve their ways of teaching, and to offer variety of programs in order to attract more students. Utilizing technology advancements, education is becoming more flexible. Getting a University degree today does not mean that you are just out of high-school, that you need to put your life on a hold while studying, or that you don't have something else going on in your life, education today is available to many: people in other geographic locations, people who are working in full-time jobs, busy moms, etc.

If you ever wonder *what is the impact of technology* think of how would you 15 years ago go about finding some information that is related to e.g. your field of study, and compare that experience with how would you do it now. It's without any doubt that technology is making our lives easier. With help of technology we can complete some of our tasks faster (e.g. searching for information online vs. searching in the library), and that will provide us with extra time to focus on other things, and achieve more.

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BALANCED SCORECARD FOR STUDENT TEAMWORK SOFTWARE PROJECT MANAGEMENT

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Abstract - The balanced scorecard is a strategic management system that is used in business, government and nonprofit organizations worldwide to align business activities to the vision and strategy of an organization, improve internal and external communications and monitor organization performance against strategic goals. During many years of development, original balanced scorecard framework was adapted by many scientists and practitioners to specific implementation areas, such as project management, IT project focused organizations, information systems development, training and education process etc. We propose a balanced scorecard model for software project management of students' teamwork. Design of web based information system is proposed according to previously presented balanced scorecard model.

I. INTRODUCTION

In the process of university education, it is very important to prepare students for future professional environment. "Production requires not only traditional factors, as capital and labor, but also factors referred to as intangible assets [1]." "Teamwork is considered as important generic skill that we can provide to graduates entering the information technology profession." [2] Software project management requires teaching students technical skills and management skills [3]. "Successful software project management is not a skill that students will master from a single course of instruction" [4].

Education process is long-term set of activities, whose results can be evaluated after graduation of students - when being employed. Balanced scorecard (BSC) can be implemented at strategic management level of constantly improving university business processes, as well as at micro level of students' teams that present "simulating organizations" working on their projects.

In this paper we present comprehensive literature survey with related work in the field of balanced scorecard implementation. We propose new BSC model as a strategic management system and as a performance measurement system.

II. LITERATURE SURVEY

A. Related Work on BSC Implementation

Balanced scorecard is performance measurement and strategic management system that enable monitoring of organizational performance and alignment to achievement of strategic goals, "with concepts of cross-functional integration, customer supplier partnerships, continuous improvement and team accountability." [5]

Development of BSC concept started as a performance measurement system [6] of business organization that introduced performance metrics [7] of four perspectives: financial, internal business, customer, learning and growth. These perspectives affect each other in the process of implementing vision and strategy of an organization and their cause-effect relationships are presented by strategy map [8]. BSC is developed into a strategic management system that include processes [9] and procedures [10] for implementing BSC within an organization. Implementation of BSC lead to adaptation of BSC to non-business organization, synergy of BSC and other models [11, 12, 13] and implementing BSC software tools [14, 15].

Literature survey of BSC implementation in the specific problem domain of student teamwork software project management show that BSC was not implemented in this particular domain, but only in close fields such as:

- Information technology project management [16, 17], information system project management [18, 19], software project management [20]

- Learning and growth perspective of BSC [21], vocational education [22], IT education and research [23], higher education [24] with technology support [25], knowledge management [26], human resources management [27].

We propose new BSC model based on theoretical concepts, practical issues and educational context regarding students' teamwork software project management.

B. Theoretical Concepts

Kaplan and Norton classified [9] intangible assets of an organization as three categories:

- Human capital (employees skills, talents and knowledge),
- Organizational capital (culture, leadership, employee alignment, teamwork, knowledge management),
- Informational capital (databases, information systems, networks, tecgnology infrastructure).

Team is defined as "a group of at least two people who are working toward common goal/objective/mission where each person has been assigned specific roles or functions to perform and where completion of the mission requires some form of dependency among the group members" [28]. Teamwork is organized as multi-task units that perform their goal-oriented activities simultaneously [29].

The most effective number of students in teams is 2-12 students, while professional software teams are most effective with 4-8 members. Teamwork performances depend on working problem context, composition of team, competencies of team members and change management. Team cohesion and clear roles and responsibilities are crucial for success. There are three mayor categories of high performing teams competencies: task related competencies, relationship and process related competencies and team building competency [29]. Regarding working locations, team can be on-site teams (one location for whole team) and multi-site teams (distributed, remote, global teamwork).

C. Practical Issues and Solutions

Some of real world software project management best practices included in educational contents [3] are:

- Accurate project metrics and measurements, accurate time/cost estimation, project management and software development methodology, project status reporting, automated tool usage.
- Good communication with client, user involvement, adequate understanding of customer problems and requirements,
- Team leadership, participation in decision making, good communication among project staff, morale boosting rewards and performance appraisals.

Most important issues regarding teamwork software project management and engineering include: coordination [30], communication speed [31], knowledge sharing of distributed teams [32] and adjustment of heterogeneous teams [33].

Specialized software ("groupware") is used to help organize, communicate and integrate teams and their work, specially in distributed working environments. They support acitivities such as meetings [34], organizational learning [35], self and peer assessment [36], integration of process and project management [37] for collaborative multi-site development [38].

D. Educational Context

Software project management courses are organized at undergraduate [39] and graduate studies level [3]. Teams of students do their projects, simulating professional environment [40]. Course-spanning approach [2] enable students' teamwork knowledge and skills to be developed over many courses.

Educational contents include general aspects (project management [41], software engineering [42]) and specific teamwork software development and management aspects, hard skills (technical skills) and soft-skills (non-technical skills) [43, 44]. Educational framework for course in team software engineering is given in introductory Team Software Process (TSPi) [45, 46].

Collaboration between universities and countries is especially important for students' teamwork to face challenge of large-scale projects [47] and distributed software development [48]. Issues such as instructional design, student work assessment strategies [49] and evaluation [50] are specially important in distributed environment.

P3M3 methodology (Portfolio, Programme and Project Management Maturity Model) is used for student team project evaluation [51]. "Small software organizations and small team projects, such are all students' projects at universities, may find it difficult to achieve higher levels of maturity according to CMM" [52].

III. RESULTS

Results of this research are analysis of related work (previously presented) and a synthesis of new BSC model that is presented at two levels - macro level (BSC as strategic management system) and micro level (BSC as performance measurement system based on student's teamwork activities and knowledge areas). Web based information system is designed upon BSC model as a performance measurement system.

A. BSC as a Strategic Management System

BSC as a strategic management system is constructed as a cascade of models that are related to all stakeholders and their influence to the quality of the process of education of students' teamwork software project management.

All stakeholders plan and execute their acitivities according to strategic goals. Success of these activities is evaluated by performance measures that are designed according to key performance perspectives.

B. Educational Framework for BSC as a Performance Measurement System

We propose multi-subject approach to learning software project management teamwork at undergraduate and graduate level through many subjects dealing with psychology, technology and management aspects. This way students could learn all important aspects of teamwork, customer relationship and improve individual qualities in knowledge, technical skills and soft skills (personal, team member, team leader, team, multi-team aspect). These knowledge areas are compared to original BSC perspectives: learning and growth, internal business, customer, financial. We also propose cross-subject approach where practical exams could include aspects from differenct subjects. This could be organized as separate practically oriented (teamwork projects) integrated subjects.

Student team could be created externally (from teacher initiative) or as a self-organizing team. Each student should perform team-leader and team-member role during many teams he is engaged during study period. For multi-team and global team approach, centralized team must be assigned. Teacher can assign a task to a team or a team can choose project theme and scope. After project outline has been approved, internal teamwork starts with organizing work, creating results and monitoring progress by evaluation of partial results at milestones. Process continues until quality and quantity of results is appropriate. Students' team can then submit their work for external evaluation, where grading structure consist of project proposal, project process and project submission quality assessment.

Finally, new BSC model as a performance measurement system consist of: three aspects (individual, customer relationship, teamwork), perspectives (knowledge, technical skills, soft skills - personal, team member, team leader, team, multi-team) and appropriate measures. These measures are evaluated during educational process externally from teaching staff by using different assessment types and internally during the process of teamwork.

TABLE I. STRATEGIC CASCADE OF BALANCED SCORECARD FOR STUDENT TEAMWORK SOFTWARE PROJECT MANAGEMENT

No.	Level	Strategy goals Mission / vision	Perspectives (areas) for performance measures	(part of) Performance measures
1	Society	Close cooperation of research, education and industry (production) for the benefit of society	Cooperation level of business to education Cooperation level of business to research Alignment level of research and education	Number of meetings Number of cooperative scientific papers published Number of successful cooperative projects Percentage of scientific content in curriculum Percentage of business issues content in curriculum
2	University	1. Quality research 2. Quality educational results - student knowledge and skills 3. New technologies - creating in research and using in education	Quality of research Quality of education Alignment with new technologies	Number of international papers published Number of international projects involved Number of patents for new technologies Percentage of students employed Percent of new technologies included in educational process
3	Business organization	1. Employment of quality personnel 2. Feedback to university about knowledge needs in business environment 3. Satisfied customers 4. Satisfied employees	Employment quality Feedback evaluation Customer satisfaction Employees satisfaction	Number of employees fully engaged Number of years of employment Percentage of courses content covering needed technology Number of jobs/projects from old customers Number of new customers Number of years of employment per employee Number of satisfied employees
4	Course	Subjects' contents and	Content alignment with	Percentage of content regarding business needs /

		teaching methods according to business needs and research results in the field of: - teamwork - software project management - performance management	business needs Teaching methods alignment with business needs Content alignment with research results Teaching methods alignment with research results	research results Number of teaching methods regarding business needs / research results Student grades according to particular method and content
5	Subject	Realization of all necessary educational activities in aim to teach students particular content	Student knowledge Student skills	Percentage of successfuly finished student activities according to defined / expected content and methodology
6	Team	Finalization of project according to specified scope of quality and time	Quality of project results Project duration User satisfaction Team cohesion Team communication	Number of implemented use cases and software functions Time of realization of project (days) Number of implemented tasks from requirements Number of bugs resolved Number of days delay for communication issues
7	Student	Getting maximum grades Getting maximum knowledge and skills Spending minimum time and effort in educational activities	Grades Knowledge Skills Time Effort	Exam grades Percentage of successfully learned items at tests Number of tools learned Time spent on each task (days) at project Total time engaged for the project Number of tasks assigned for the project Complexity of tasks at project

By the end of teamwork process and product delivery, each participant at team is evaluated and positioned at the list of all students regarding grades he gets. Knowledge and technical skills are evaluated for each student externally by teaching staff and internally by success of tasks they finish when individually assigned. Since each team member has clear roles and responsibilities, it enables teaching staff to recognize contribution and grade it accordingly. Soft skills will be evaluated by peer assessment from other team members. During study time it is recomended that teamwork projects are organized within many subjects as well as at at least one integrated teamwork project. Since student can be assigned or choose to be at different teams for different subjects, his teamwork behaviour, knowledge and technical skills grades will affect his position at the list of all students, so his future engagement in some other teams will depend on his results he show at previous teamwork engagements.

TABLE II. EDUCATIONAL FRAMEWORK FOR BSC AS PERFORMANCE MEASUREMENT SYSTEM

Multi - subject approach	**Aspect**	**Perspective**	**Issues/questions as a basis for measures**	**Assessment type**		
Educational goals (*learning and growth perspective*) for subjects: (undergraduate level): • Psychology • Project management • Software engineering (graduate level): • IT project management • Knowledge	TEAMWORK (*internal business process perspective*)	Knowledge	Knowledge management, Distributed collaborative development, Software integration	tests, essays and literature surveys with writing and oral presentations		
		Technical skills	techniques and tools for communication, groupware tools	technology presentation and survey and practical exam in using tool		
		Team member soft skills	team participation in decisions, willing to share information, provide feedback, open communication, mutual respect, collaborate, trust, support to each other, adjustment to background diversity, commitment, expressing feelings and opinions, provide feedback, openness for new ideas, good communication	Peer assessment questionaire from other team members and team leader regarding one specific team member	Teamwork project	Process monitoring (milestone reporting) Communication qualities (frequency) Results (artifacts, product) evaluation
		Team leader soft skills	set goals, make assignments, generate commitment, show contribution of members, evaluate how the team is performing, coordination, integration of work, morale boosting rewards, performance appraisals, managing conflicts, build trust and support among team members, express feelings, coordination	Peer assessment questionaire from team members regarding team leader		

Management • Customer relationship management • Collaborative software development • Distributed software development • Teamwork psychology • Teamwork information technology		Team soft skills	effective meetings, team cohesion, clear roles and responsibilities, knowledge sharing	Peer assessment questionaire from all team members and team leader regarding team as a working unit		
		Multi-team soft skills	adjustment of heterogenous teams, integration, coordination	Peer assessment of one team members regarding cooperation with other teams	Multi-team project Global collaborative project	
	CUSTOMER RELATIONSHIP (*customer perspective*)	Knowledge	Capturing and understanding client requirements, software quality, software testing	tests, essays and literature surveys with writing and oral presentations		
		Technical skills	Client requirements modelling tools, software testing tools	technology presentation and survey and practical exam in using tool		
		Soft skills	Interaction with customer and customer involvement	Practical field work (within project) with real customers		
	INDIVIDUAL (*internal business process perspective*)	Knowledge	Project management, Software engineering, Process management, Product evaluation (Software metrics), Change Management, (*financial perspective*): Project estimation (costs, time), Project status reporting	tests, essays and literature surveys with writing and oral presentations		
		Technical skills	project management tools	technology presentation and survey and practical exam in using tool		
		Personal soft skills	self assessment	Self assessment questionaire regarding project goals and teamwork accomplishments		

C. Web Based Information System

According to previously presented BSC model as a performance measurement system, a web based information system is designed to enable:

- Teaching staff and team members to monitor progress and estimate success of students' teamwork software projects
- Creating a team according to list of students regarding previous teamwork achievements
- Internally organize work at team level
- Evaluate results
- Self-evaluation of results

Proposed web based information system is based on web forms and graphical presentation of statistics regarding data entry. It consists of several modules,as presented at Table III.

TABLE III. MODULES OF PROPOSED WEB BASED INFORMATION SYSTEM

Module	User profile
List of students regarding previous teamwork achievements	Teaching staff, students (team member)
Team creation	Teaching staff
Task assignment	Team leader
Process monitoring	teaching staff, team members, team leader
Communication quality	team members
Artifacts evaluation	team leader, teaching staff
Self evaluation	team member

IV. CONLUSION

Student teamwork in the field of software project management can be assessed from psychology aspect, organizational/management aspect and technical aspect. These are knowledge and skills domains of balanced scorecard framework we propose. This framework is presented at strategic and educational level. In aim to apply it at universities worldwide, it should be adapted to specific requirements of educational systems of those countries.

Need for collecting data from distributed locations for global software development, their processing and visualization lead to creating central communication place/tool - web application. Designed solution is based on web forms for questionarries data entry. Future improvement of the designed web based information system would include automated data collection from diverse technology environments that produce project implementation artifacts.

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EVALUATION OF STUDENTS' WORK ON DATA MODELING – TEACHING IMPROVEMENT IMPLICATIONS

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Abstract - Data modeling is one of the most important activities in the process of information systems development. This paper presents educational context for evaluation of students' data models and implications to quality of teaching process.

I. INTRODUCTION

Data model correctness is one of aspects of data quality (DQ), as a general concept. The consequences of poor data quality systems functionality could be experienced in everyday life and has far-reaching significance for efficiency and effectiveness of organizations and businesses. One of examples of data quality impact is the Data Warehousing Institute 2002 report which shows that data quality problems cost U.S. businesses more than 600 billion dollars a year [1].

Quality data modelling depends on education, experience, project limitations and operational needs of real systems. In aim to improve teaching in the field of data modelling, our goal is to create an educational framework which would help in evaluation of teaching conceptual data modelling.

First we propose model for evaluation of elements of teaching process in data modelling and analyse available evaluation data. Analysis of problems and suggested solutions are described. Contribution include educational framework for teaching and examining students' work in data modelling. We also consider automation of the evaluation process of students' data models.

II. EVALUATION MODEL

We propose a model for evaluation of all important aspects of teaching process (Fig.1), presented at Table I.

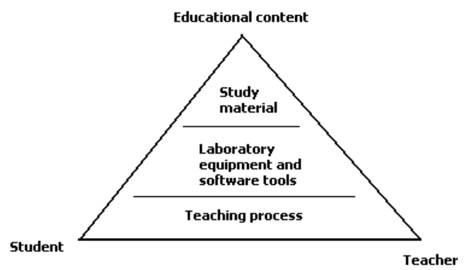

Figure 1. Factors of educational process

TABLE I. EVALUATION MODEL

Factor category	Perspective	Evaluation technique /tool
Student	Previous knowledge	Marks from previous subjects
	Interests	Questionaire about IT related interests Attendance and working effort estimation during lectures and practices
	Soft skills (intellectual)	IQ tests Personality tests
	Achievements	**Statistics on students' grades and exam errors**
	Workload	Questionaire with students' regarding workload Comparison of requirements of other subjects
Teacher	Behaviour, Availability	Qustionaire on students's evaluation of teacher and teaching
	Lecturing quality	
Educational content	Accurate according to technology progress	Research in modern technologies in this field: published papers from teacher Percentage of included scientific and technology content in curriculum
	Appropriate to study level	Questionaire with students about workload
Study material	Available	Library inspection results
	Complete	Comparing to curriculum and exam requirements - theoretical explanations, examples and exercises

	Clear and concise	Students' questionaire regarding study material
Laboratory equipment and software tools	Properly working	Laboratory administration register
	Modern according to advances in technology	Laboratory improvement plans and achievements report
	Appropriate quantity regarding to number of students	Number of students attending and number of computers in laboratory - comparation
Teaching process	Explanations, exercise, exam time and quality	Questionaire with students regarding teaching process

III. Empirical Survey

A. Process of data modelling teaching

Data models are specific theoretically based specifications that are used for creation of real databases of information systems [2]. Data model is a formal abstraction through which the real world is mapped in the database [3]. Data model enables representation of a real world system through a set of data entities and their connections. They can be represented in various ways: diagram (schema), data dictionary and formal representation [4].

At University of Novi Sad, Technical faculty "Mihajlo Pupin" in Zrenjanin, teaching conceptual data modelling is part of two main subjects: Databases and Information systems. Within the first subject, basic elements of data models and databases are presented, while at second subject data modelling is part of information system development and semantics of business problem domain is given in the form of text describing business process, business process models (PAM, BPM) and data dictionary from business process models. Conceptual data model (ER model) is designed by using CASE tool. Other models (relational, object-oriented model) are automatically generated afterwards, by using CASE tool functional features. Finally, database is created by using CASE tool according to previously generated relational model.

B. Evaluation scope - sample characteristics

Empirical survey that is conducted in this particular field is based on exam results (marks and errors) in subject Information systems at Bachelor degree levels, at University of Novi Sad, Technical faculty "Mihajlo Pupin" Zrenjanin.

TABLE II. Number of students exams on data modelling

Year	Stud. No.	PI	DI	M	F
2004/05	61	15	46	29	32
2005/06	87	24	63	54	33
2006/07	83	20	63	57	26
2007/08	61	11	50	50	11
2008/09	52	14	38	38	14
2009/10	51	11	40	43	8

Stud. No - Number of students at exams, PI - professor of informatics course, DI - engineering informatics course, M- male students number , F- female students number

C. Grading of students's work on data modelling

Exams on data modelling within subject Information systems are organized as partial testing of knowledge and skills regarding creating data models for certain business domain. These exams present partial testing (for educational content regarding data modelling) within subject Information systems. This partial test on data modelling are organized in two time period / term (first term and additional term - for those that didn't attend first term or wish to improve marks).

Table II shows number of students that get certain marks on data modelling exam (first term) and number of students that didn't attend at exam.

TABLE III. Number of students marks on data modelling at first term

Year	n/a	5	6	7	8	9	10	Number of marks	Average mark
2004/05	5	11	8	14	11	6	6	56	7.20
2005/06	6	6	13	30	14	16	2	81	7.33
2006/07	25	0	4	10	26	6	12	58	8.21
2007/08	10	0	2	9	16	11	13	51	8.47
2008/09	20	3	1	0	2	13	13	32	8.88
2009/10	19	7	4	11	5	4	1	32	6.94

n/a - Number of students not attending first term exam

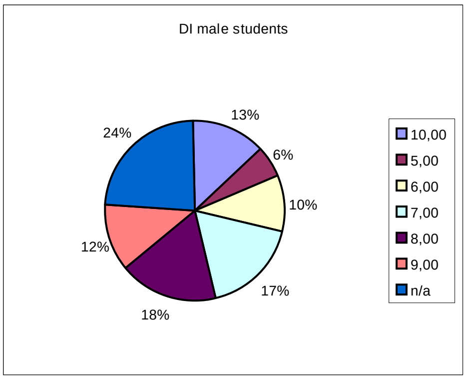

Figure 2. Grading of DI course male students

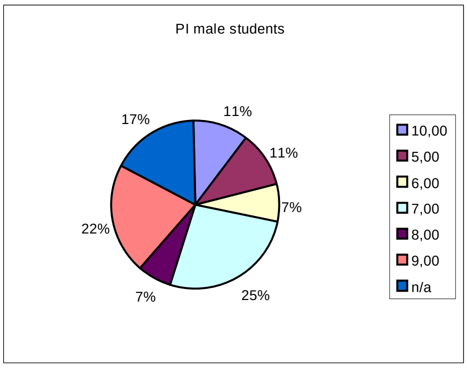

Figure 3. Grading of PI course male students

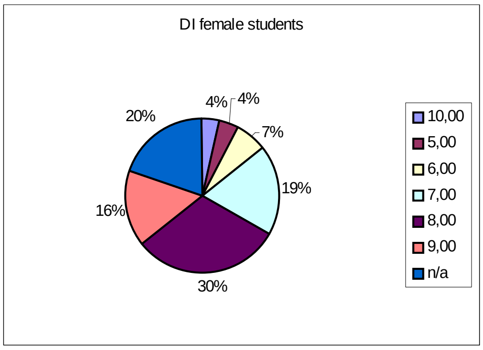

Figure 4. Grading of DI female students

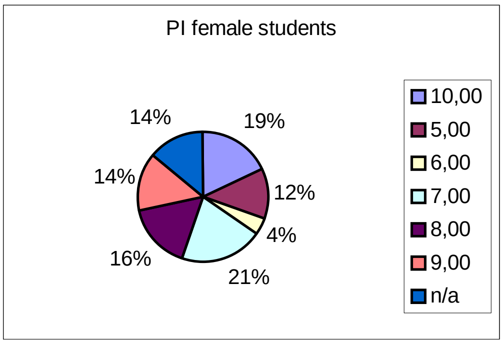

Figure 5. Grading of PI female students

D. Types of data modelling errors

Student errors could be classified as:

- Syntax and semantic related errors,
- Regarding elements of data model – entities, relationships and attributes.

Figure 1. shows statistics of students' errors categorized as syntax and semantic related errors.

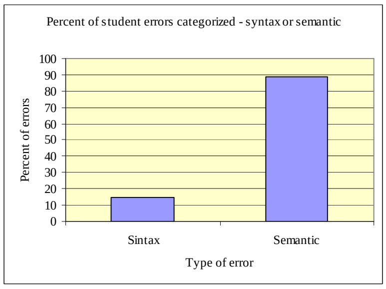

Figure 6. Students data modeling errors categorized as syntax and semantics

Errors are categorized by elements of ER data model. "Fig. 2" shows that most errors are made regarding attributes and entities and less regarding relationships.

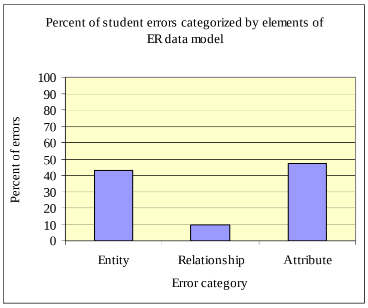

Figure 7. Students data modeling errors categorized by ER data model elements

List of some of typical errors are given below.

Syntax category (type) of student errors in data model:

- Identifier attribute is missing.
- Attribute without the domain/data type.
- Redundancy of attributes - repeating the same attribute at many entities, with the same meaning and different or equal name.
- Name of relationship is missing.
- Inadequate identifier attributes.

Semantic category (type) of student errors in data model:

- Using derived attributes.
- Incomplete set of attributes in an entity.
- No entity derived of a relation that has important attributes.
- Difference between general and specific, entities derived from attributes domain.
- Composite and complex attributes.
- Multi-valued entities.

- Not enough important relationships, needed to show different roles of entities related to other entities.
- Attribute named in plural.
- Entities of complex structure (made of other entities, entities named as documents).
- Name of an attribute is not clear, not easy to understand.
- Attribute attached to wrong entity (inadequate relation between entity and attribute).
- Putting attributes of similar names to one entity, where they don't belong together.
- Inadequate name of entity.
- Important relationship is missing.
- Inadequate relationship.
- Inadequate name of attribute, name of attribute as a data value.

E. Analysis of statistic results

Average mark of students work in data modelling was rising. Significant improvement was in 2006/07 year, from 7.33 to 8.21. The reason for this mark improvement could be in change of exam tests. Starting from that year, students got separated bussiness modelling exam and data modelling exam, while in previous years they were parts of one exam, so student had very hard exam that included both tasks.

Rising average marks lasted until 2009/10 year, when it significantly fall from 8.88 to 6.94. The reason for this fall could be in change of number of lessons and practical laboratory work hours per week. Previously they had 4 hours for lessons and 4 for practical laboratory work per week, and starting from 2009/10 they had 2 hours for lessons and 2 for practical laboratory work.

Number of students that didn't attend first term is significant (starting from 2006/07) comparing to number of students that got their marks at first term. The reason for this could be in rising demands for details at exams (after exam tests for busness modelling and data modelling was separated) and having difficulties to acomplish the required level. Starting from 2006/07 we included extra pre-exam preparation lessons time, in aim to help students get ready for exam by letting them practice at similar tests texts that could be included in real exam and self-evaluate their knowledge before actual exam takes place.

Analysis of data modelling errors show that many generations of students make similar types of errors. There are more semantic then syntax errors because:

- There are syntax verification of created models in CASE tools, while semantics verification is not available in CASE tools.
- It is much easier for students to know syntax rules then to apply appropriate semantics mapping of business domain to data model elements.

Syntax types of errors could have roots of problems:

- Inappropriate time for exam solving,
- Students' syntax knowledge,
- Too much syntax rules to memorize and apply.

Semantic types of errors could have roots in problems:

- Lack of framework for procedure and rules regarding semantic mapping direct students to applying heuristics approach, which they consider reliable and trustworthy.
- Inadequate students' soft skills and mental abilities (which leads to inadequate process of abstraction, generalization, specialization, analysis and synthesis).
- Inappropriate scope of problem domain at exams - too wide scope brings insufficient time for data modelling during exam period, but too narrow scope brings too simple models to create, not according to the needs of real organizations information systems.
- Inappropriate level of details required at exams - too much details is not easy to accomplish within specified time period for solving exam, but too low grading criteria lead to inadequate knowledge and skills needed for real world business environment.
- Data modelling is based on certain business domain which should be known to student, but real organizations need is to have student be ready for any problem domain.
- Insufficient convergence in solving problems. Students are used to apply convergent thinking, instead of divergent thinking and evaluation of many solutions. Design is creative work where there could be many solutions for data models and each can be evaluated from different aspects, but only one is to be submitted to teaching staff.

Additionally, there are few problems from teaching staff perspective:

- Workload in exam evaluation and grading: Large number of student works to examine according to many rules they have to follow; applying equal criteria and rules for all students.
- Examining models from semantic perspective, i.e. level of business problem alignment depends of business domain knowledge / experiences.
- Exam evaluation and grading of different solutions to a single business domain. It is hard to evaluate design, since there could be many solutions.

IV. Proposed solutions

A. *Strategic goals / actions for teaching improvement*

According to previously presented evaluation model, we propose set of goals and activities in aim to improve some elements of teaching process and students' outcomes.

TABLE IV. GOALS / ACTIVITIES FOR IMPROVEMENT

Factor category	Perspective	Goal/activity
Student	Previous knowledge	Adjustment of educational content from different subjects
	Interests	Including real world problems Including modern technologies Additional marks for working effort during lectures
	Soft skills (intellectual)	Including psychology as subject at course and psychology exercises
	Workload	Adjustment of workload with other subjects at a course Adjustment of exam scope
Teacher	Behaviour, Availability	Organizing teaching courses to improve teaching abilities
	Lecturing quality	Creating a manual with teaching instructions
Educational content	Accurate according to technology progress	Publish papers about recent technology issues Renew educational content frequently according to technology change
Study material	Available	Publish study material at website/distant learning system
	Complete	Set exam requirements according to available study material with explanations, examples and exercises
Laboratory equipment and software tools	Properly working	Frequent laboratory administation
	According to advances in technology	Frequent laboratory technology improvement
	Appropriate quantity	Laboratory equipped according to number of students

B. *Teaching process improvement*

Teaching process could be improved in several aspects:

- Educational content regarding the needs of software industry include all Bloom's taxonomy levels,
- Data modelling design patterns should be considered to be acceptable in educational process and exams, since they are used in professional environment. This could improve quality of students' data models.
- Creating a procedure and rules for semantic aspect of data models and business domain mapping,
- Creating software tool that could help students learn data modelling procedure, syntax rules and business domain mapping,
- Enhancing teaching time and teacher availability - giving additional exercises during free time, availability via e-mail, distant learning system with frequently asked questions and teaching material available.

C. *Enhanced Bloom's taxonomy for data modelling*

We propose enhanced Bloom's taxonomy [5] as an educational framework that describe the structure of educational goals to be achieved. It also presents a basis for selection of educatuional content and teaching methods as well as students' knowledge and skills evaluation.

TABLE V. ENHANCED BLOOM'S TAXONOMY LEVELS FOR STUDENTS' DATA MODELLING

Technical skills	Using CASE tools
Knowledge	Recall and reproduces data modelling concepts and syntax rules
Soft skills (intellectual)	abstraction, generalization, specialization, analysis, synthesis, evaluation, imagination
Comprehension	Understand reasons of errors Understand reasons of rules Distinguish correct and incorrect models
Application	Recognize data modelling errors Creates data dictionary, ontology and data model according to business domain (semantic aspect of data model) Creates data model without syntax errors Creates data model according to heuristics Adjust data model design patterns to specific business domain
Analysis	Creates submodels of complex model
Synthesis	Creates complex model of submodels
Evaluation	Check usability of conceptual data model by creating physical data model and SQL queries Uses ontology to compare data models Compares data models and choose best according to certain criteria (optimal model)

D. Grading process improvement

Grading process of students' work could be improved by:

- Educational content separated to multiple partial exams, so level of details and knowledge is rising and workload during exam is lower.
- Separating syntax and semantic aspect in grading of exam evaluation. Introducing grading levels: 1) syntax verified model, 2) semantic (business domain mapped) model, 3) optimal solution.
- Creating a tool for automated data model evaluation from both syntax and semantic aspect, to enable teaching staff improve objectivity, uniformity and efficiency of exam evaluation and grading.

E. Software tool for automated data model evaluation

Many of proposed activities for improvements' are already included in teaching process of data modelling. One of them includes creating specific software tools:

- Educational software for data modelling learning,
- Software tool for data models evaluation [6] and grading.

Software tool for data model evaluation from syntax aspect transforms XML form of data model made in CASE tool to predicate logic form suitable for automated reasoning tool Prolog and integrates it with reasoning rules regarding syntax aspect of data modelling. The following use case diagram (Fig.8) presents software functions of software tool for analyzing conceptual data model.

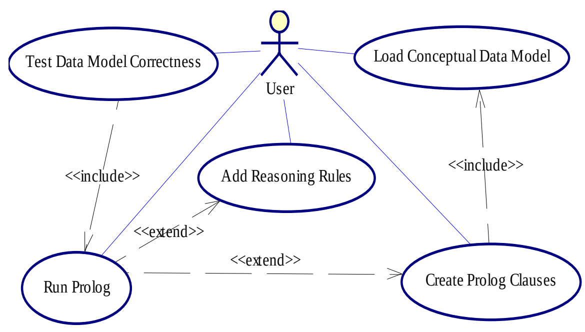

Figure 8. Use case diagram of a software tool for conceptual data model analyzing [6]

Software is developed in MS Visual Studio.Net environment. User interface with sample data model analysis is presented at Figure 9.

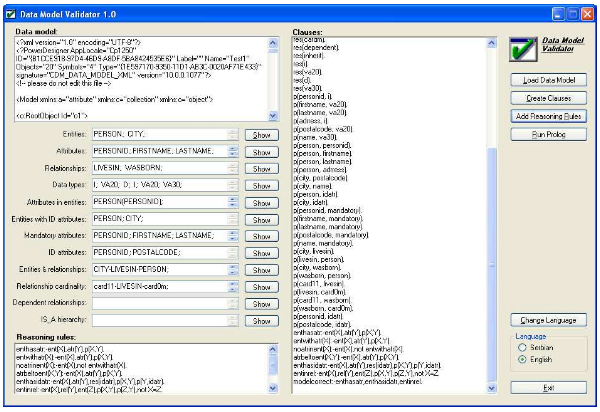

Figure 9. Software tool for conceptual data analysis [6]

V. CONCLUSION

In this paper we propose a framework for evaluation of educational process. We present results of statistics regarding students' grades and typical syntax and semantic errors in conceptual data modelling. We propose set of strategic goals and activities regarding improvement the educational process. Regarding teaching process, we propose enhanced Bloom's taxonomy as basis for educational content, teaching methods and evaluation of students' knowledge and skills.

Future work would include development of integral information system for education process evaluation, educational software for students' learning in the field of data modelling as well as enhancing functionality of developed software for data model evaluation. Existing software solution [5] includes syntax aspect and is developed for conceptual data model evaluation. It should be improved to enable evaluation of other data model types, as well as enabling semantic mapping to business domain to be evaluated by using ontology models.

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SCHOOL FOR THE FUTURE – WHERE AND HOW

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Abstract - The pedagogical views given in educational literature about a futuristic insight into the new philosophy of education are examined in this paper. This is an attempt to examine the objectives of the educational process in the near future, the role and functions of teachers and students in new forms of teaching and learning and the content of what they learn and why. It includes the main trends regarding the development of educational technology, basic development characteristics of school for the future, as well as demands and expectations of society regarding the role of schools in the future. The paper also includes the analysis and comparison of current methods and forms of teaching and learning and their negative and positive characteristics, compared to the futuristic understanding of the new forms of that work in the future. It can be seen as a prediction of the future look of schools, taking account of the current philosophy of education and basic pedagogical and psychological attitudes towards its realization.

Keywords: educational philosophy, goals and roles of future schools, learning and teaching in the future.

I. Introduction

With this study of modern pedagogical and psychological literature, as well as our pedagogical educational practice and knowledge, we tried to perform a comparison between traditional ways of realization of our educational process and prognosis, expectations, i.e. the futuristic insight on implementation and functioning of the school of the future; this is the school we must strive for and prepare for it today, and within the contemporary ways of conducting the teaching and training process we have to bring in some new elements, requirements, forms and methods for fulfilling this up to date teaching.

In any case, it will be difficult to come to terms with many of the stated positions, because our material and financial conditions, our current philosophy of education, i.e. our methods and forms of education, will not be compatible with them. Furthermore, we shall find it difficult to imagine that "the knowledge cannot be transferred", that "the student will have to decide on what, when and how to learn", and that the teacher is "someone who is not necessary included in that process". (Read more in the works presented in the Literature)

Differences and comparisons shown here indicate the present day (tradition) and the future. Acceptance of it will depend on the reader's insight into the relationship of the possibilities, aspirations and expectations for achieving those goals.

II. Comparison of Ideas and Attitudes in Relation to the Implementation of Educational Process, Now and in the Future

Analyzing the differences between the implementation of the educational process in the classical and proclaimed way of future schools, we have recognized the following **differences** that can be used to **grasp** the concept and the idea of the future school, the essence of its novelty and the necessary changes to be made, even today, as well as tomorrow:

Traditional (classical) school (teaching)	**School and teaching in the future**
II.1. Characteristics, role and function of the school and classes	
Curriculum defines what will be learned	Student decides what and how to learn
Uniform education – same for all students	Education adapted to the specific needs (society, employers and production)
Theoretical knowledge is primary	Practical, useful and usable knowledge as a primary goal
There are classes and hourly system	There are no classes and school hours
One class takes 45 min	Each class will last in accordance to the needs and the content
Schooling for a narrow professional education	For a wider humanistic education -learning of learning, life-long education, adjusted to professional challenges (changes)
Students are able to earn money after education	Students are not dependable on money, they are capable of facing the challenges (“to find their place in the world”)
Education for gaining the useful competences, measurable by tests and exams	Developing the competences usable in life, enabling adaptation to the changes in job requirements
Breeding and education according to the general norms	According to the student needs and their emotions, cognition and psychomotor abilities
Everyone must go to school	Schools that children would like to attend
School is repressive	School is motivational
Knowledge is the aim of education	The aims is training for coping with the load of information
School is normative	School is democratic
Schooling trains for the needs of the society	Schooling trains us for our own needs
Frontal work and ex-cathedra lecturing	Individual forms of learning, interaction, cooperation, team and partner learning
Training for a profession	Training for a profession and for a healthy and good quality life
Verbalism is dominant	Multimedia training, combination of active and verbal learning is dominant
Education is finished by graduating and getting a diploma	Life-long learning and improving is dominant (open-degree school)
Education of servants, believers and conformists	Education of creative people who think creatively and autonomously
School forms the ability to perform according to decisions of other people	School forms the ability to make your own decisions
Education for employment offices (for work, salary and productivity)	For a happy and productive life, work, and usage of a free time
Developing the working habits	Developing the will to learn and work productively
Developing the citizens with nationally determined characteristics	Developing the European citizens (European identity)
People not capable to change their jobs	Inevitable and necessary changes
Borders and barriers between disciplines	Diminishing
Diversity is not desirable	Highly desirable
Current competences are present	Developing the new competences
Fixed schooling year	Not fixed, and will never be; everything will be changeable
General teaching plan, the same for all of the students	Individual teaching plan, usually designed to one’s needs
There are classes, semesters, levels	There will be none of the current forms of organisational structures
Entire organisation and conducting of the teaching process planned in advance	Directing the students towards the useful learning strategies and independent work, aided with the educational technology
School gives the general education	Learning oriented to the labour market and specific education
Public and state schools with general education	Private schools with specific contents aimed towards the profession (jobs)
Students are inactive	Students are mostly active
The same working place for life	Training for many different jobs

Ages old terminology is being used	New terminology is formed and used – new concepts, terms and words
Closed educational system	Open educational system
Educational institutions are isolated	Educational institutions are connected and networked, with partner relations to its environment
State funding	State and private funding
Slow mobility of students and teachers	Higher mobility
Diplomas are recognized on a national level	Diploma is valid on an international level
National education	Democratic education
Work evaluation is based on error making	Errors are not the part of work evaluation
Generally accepted language in education, communication, science, work and life	New language is formed and used, new concepts, terms, words and metaphors
Rigid educational system	Flexible educational system
Barriers limits the access to education	The access is relatively free
Education not available to everyone	Available to everyone
Preparation for work	Preparation for active life
Traditional school	Non traditional school
Fixed school year	Not fixed, everything will be flexible
The beginning of digital revolution	The presence of a digital revolution
Collective education is present	Trend is the individualising of each person
Primary goal is the theoretical knowledge	Primary goal is the practical, useful and usable knowledge
Plan and program determines the scope of learning for every student	Student determines what and how to learn
Bell ends the class round	No class interruption
Orientation is on teaching	Orientation is on learning
National plan and program	European plan
Drill (tasks) and exercises (practice)	Communication (cooperation, access to Information, research)
Knowledge is divided into sectors	Interdisciplinary knowledge
Receiving the information	Understanding the information
Formal education	Non formal education
Education through levels	No levels
General education	Learning is oriented to labour market
Education is centralized	Decentralisation of education
Public and state schools – general knowledge	Mostly private schools with specific content aimed for profession (jobs)
Schools are not networked	Most of the schools are interconnected
Intellectual technologies are used less extensively	Contemporary information and communication technologies are largely used in education
Knowledge is absolute and generally accepted; it is precise and has an aura of truthfulness; the quality is the same for all students	Knowledge is determined by evaluation of the one who accepts it, relative to prior knowledge; capabilities and perception of that person
Information society	Knowledge society
Learning the knowledge	Implementation of knowledge
The goal - general and theoretical knowledge	Knowledge according to the needs
Adoption of prefabricated knowledge	Supporting the creation of personalized knowledge, based on personal and internal motivation and on knowledge construction
Society based on work	Society based on knowledge
General, wide scope knowledge, suited to a profession (job)	Specific knowledge
General program	Specialized teaching program
Inadequate and old-fashioned knowledge	Knowledge adapted to the present time and to the work process
Theoretical content	Practical content directed to completion of the work process
II.2. Roles and functions of a teacher	
Teacher's role is the most important	Teacher changes his role and becomes less significant
Teachers and schools are responsible for the learning quality, i.e. the student results	Students are responsible for the learning quality

Emotions are suppressed and controlled	Emotions are expressed freely, and without fear
Student demonstrates (shows) his knowledge and competency to the teacher	Student demonstrates his knowledge to his colleagues and his teacher
No self evaluation of knowledge, i.e. of the learned material	Self evaluation is present
Knowledge is not available to everybody	Knowledge is available through ICT
Teachers ask the students	Students ask the teachers
Teachers use media to conduct the teaching process	Students use media in learning
Development of current competences	Development of new competences
Criticism is not desirable	Critical relation to achievement is present (criticism is desirable)
Teacher is showing the facts (he is always the expert)	Teacher is a co-worker and assistant
Presenting the facts (memorising)	Discovering the relations/interconnections
Teacher is teaching	Teacher is guiding and advising
Teacher is the most important source of knowledge	Various knowledge sources are used
Learned material is showed by reproducing its content	Learned material is showed through solving the relevant problems and communicating the ideas
Learning the facts (memorising)	Learning the relationships (connections) through research and discovery
Accumulating the facts	Transforming the facts
II.3. The methods and types of learning	
Learning takes place in schools	Any time and place is suitable for learning
The childhood is meant for learning	The whole life is made for learning
The goal is accumulation of the facts	The goal is transformation of the facts
Quality of the facts is the most important thing	Quality of understanding the facts is the most important thing
Frontal learning	Individual and individualized forms of learning
Learning is boring	Learning is attractive
Learning according to needs of society, government or the country	Agreement and “negotiation” is used in learning, according to the student’s needs; the flexible plan and program will exist
Learning loading and memorising the knowledge, facts, data, principles, laws and theories	Independent learning consists of constructing and changing the attitudes and beliefs - learning with understanding
Learning for transfer and implementation of knowledge	Learning is the matter of choice; it is not transferable; it is a personal knowledge, it is valuable by itself and useful to the one who has acquired it
Teaching is dominant	Learning of learning is dominant
Learning for getting the grades and diploma	Life-long learning (diploma, certificate, licence, formal and informal verification of the competency)
Learning from the teacher	Learning from media and knowledge resources
Linear way of learning	Nonlinear and associative way of learning, by using the multimedia, hypermedia and hypertext materials
Classroom is a stationary, isolated room	Environment suitable for learning; electronic devices, laboratory, information centre, multimedia complex and electronic networks are available to students
Passive learning	Active learning
Learning is assisted by a teacher	Learning is mostly independent
No learning culture is present	The culture of learning is present
Memorising the facts is the most important thing	Discovering the relations is the most important thing
One-way communication within the teaching process	Interactive relations and forms of learning and methods of teaching are supported by the educational technology
Classic (traditional) way of teaching	Independent and active learning aided by the suitable information/communication environments and resources
Inadequate and old-fashioned knowledge	Knowledge adjusted to the present time, and to the process of work

Environments suitable for "learning of learning" are not available	Wide scope of information/communication environments is available
No self evaluation of knowledge (i.e. the learned material)	Self evaluation of knowledge is present and is always used
Demonstrating the success by showing the quantity of information	Demonstrating the success by showing the quality of understanding
Learning the facts	Learning the problem solving
Individualized way of learning	Learning and working within the team
Teaching material is based on facts	Content is based on problem solving
Printed material is the primary source of learning	Various multimedia and knowledge resources are used, besides the printed text
Learning the old, basic skills	Learning the new skills (using the computer and information literacy, foreign languages, business management, social skills, communication skills, technological culture . . .)
II.4. Role of the student	
Knowledge is not available to everybody	Knowledge is available through ICT
Changing the present job is not possible	Changes are present and unavoidable
All students learn the same material and in the same way	Not learning the same material
Student is a listener (follower)	Student is a co-worker
Diplomas are recognised within the national boundaries	Worldwide recognition of diplomas
Learning the theoretical contents	Learning the practical contents suited to task performing the work requirements
Success depends on the teacher and school quality	Success depends on the person who is engaged in learning (i.e. the student)
The success of students is reduced	Increased success of students
Methods and forms of teaching are equal for everyone	Not equal and different
Collective education is present	The trend is towards the person's individualisation
Teacher is in the centre of the teaching process (he is the most active person)	Student is in the centre of the teaching process (he is always active)
Teacher decides about the learning content	Students decide according to their wishes, needs, requirements and interests – they choose the learning content
Teacher determines (evaluates) the learning success	Student evaluates the success, along with his tutor, mentor and colleagues
Teacher teaches the new lessons	Students learn independently and interactively from different sources, in the presence of a teacher
Students listen to the teacher and repeat the learned lessons	Students learn actively from different knowledge sources and perform a presentation
Teacher teaches according to plan and program; student has to learn the material or else he fails	The teaching plan and program is already made, or it is designed to suit the student
Teacher determines the method of learning	Teachers and students make agreements about the methods of learning
Student learns alone	Student is learning within the team
Students rarely cooperate during the teaching and learning process	They cooperate
Firmly fixed teaching content for all students	Teaching content is adapted (flexible) to student needs; the students discover, research and construct the information
Methods and forms of work are the same for all students	Not the same; they are adjusted to students

III. CONCLUSION

Analysing the current, present **forms of teaching** in the world, including our country, it is evident that the teaching process, its forms, methods, modes and strategies are changing constantly, i.e. they are being adapted to new economic, technical, social and scientific changes, to the new conditions of conducting the learning process, **new possibilities of contemporary educational technologies**, **new theories of learning**, as well as the new insights into international relations and social systems.

This analysis shows that the earlier strategies, forms, modes and methods of conducting the teaching process have endured and are still going through the qualitative changes, which has led and still leads to the rise of new forms and methods of conducting the instruction. The future ways of realizing the teaching process will be characterized by the following changes:

1. Instead of the **classical** (traditional) way of teaching, **appropriate environments and resources will be formed** for independent and active learning, aided by the contemporary education technologies;
2. Instead of the previous **all-inclusive organization and conducting** of the teaching process, students are being **directed** towards the appropriate learning strategies and independent work aided by the educational technology;
3. Instead of **adopting the prepared knowledge**, the **creation of personal knowledge** is being stimulated, not based on the external leadership and action, but on the personal and internal motivation, interests, needs and intellectual capabilities;
4. Instead of **one-way** communication within the learning process, **interactive** relations and forms of learning, as well as models of teaching aided by the educational technology will be made possible;
5. Instead of **linear** (traditional) methods of learning, the **non-linear**, i.e. associative learning method aided by the multimedia, hypermedia and hypertext will be initiated.

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TEACHING INTRODUCTORY PROGRAMMING IN C# AND SMALL BASIC

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Abstract – The choice of the first programming language is considered to have a substantial influence on future development of computer skills. At the Faculty of Sciences, University of Novi Sad, two introductory programming courses are offered to the students of the first year of Mathematics. Here we consider the second course, called Programming 2, which is optional. This course is taught in C# and aimed towards developing general programming skills and building a foundation for scientific applications of programming. Since C# is a complex language, a question arises whether it is suitable for beginners. Small Basic is a much simpler programming language, targeted towards beginners. We conducted an experiment during the school year 2010/2011, in which we taught two distinct groups of students, one in C# and another in Small Basic. The group which was taught in Small Basic later transitioned to C#. We present the results of our experiment in this paper.

I. INTRODUCTION

At the Faculty of Sciences, University of Novi Sad, two introductory programming courses are taught to the students of the first year of Mathematics. The first course, named Programming 1, focuses on Matlab and is compulsory. The second course, named Programming 2, is optional. As Programming 1 is taught in a specific programming environment, we do not consider it introduction to general programming. Therefore the aim of Programming 2 is to familiarize the students with general and scientific applications of programming. We were placed before a tough choice of a first general purpose programming language for the course. We shall refer to such a language simply as the *first programming language*.

Programming courses are generally considered difficult and have low completion rates [1]. Students of mathematics have many difficulties to overcome while learning how to program. According to [2] there are five domains of problems in introductory programming courses:

- general orientation — the capabilities and applications of programs;
- the notional machine — an abstract model of the computer used for executing programs;
- notation — the syntax and semantics of a particular programming language;
- structures — the structuring of basic operations into schemas and plans;
- pragmatics— the skills of planning, developing, testing, debugging, documenting, etc.

These domains are not mutually exclusive, and they overlap. Students which encounter programming for the first time find it difficult to grasp these concepts and start learning efficiently. Another problem is that the students usually try to learn everything at the same time [3], without recognizing important concepts and gaining a solid foundation first. As a result, some students either fail or drop out of the course. Some of the students that pass the final exam get low grades. They try to avoid programming later in their careers, as they do not feel confident enough in their programming skills.

The choice of the first programming language is widely discussed as it has a profound influence on the formation of students' programming skills and techniques. Choosing a programming language also often means choosing a related programming paradigm [4]. Moreover, the limitations, either real or perceived, of the chosen programming language and programming environment, shape the programming habits and keep limiting the programmer for a long time unless he/she invests additional effort in overcoming them. The choice of a "good" or "powerful" programming language does not necessarily mean that the language is well suited for beginners [5].

II. SMALL BASIC AND C#

In our opinion, the language that gets chosen as a first programming language for students of Mathematics should have the following properties:

1. Simple, so that the students can start programming immediately;

2. Powerful enough, so it can be used in solving real-world problems;
3. Support for procedural and object-oriented programming styles;
4. Consistent syntax and semantic rules;
5. Provide documentation and hints to programmers as they work;
6. Provide enough information in error messages during compilation and debugging;
7. Widely known, accessible, well supported with abundant literature and examples;

Obviously the first and second properties are opposed to each other. The third property stems from our experience that the procedural programming style, and some aspects of object-oriented programming are also easily adopted. Most algorithms for scientific computation are also presented in this programming style. Consistent language rules and a *friendly programming environment* which actively assists the programmer (properties 4, 5 and 6) are a natural choice.

An important property we placed before our programming language is that the knowledge the students gain in our course doesn't stay an "isolated island". In other words, our aim is to provide concrete and useful knowledge to the students, which they will use during their studies and professionally. It should be noted that, from today's perspective, this usually implies an industry-standard, object-oriented language. Finally, it is extremely important that the development environment is free of charge, i.e. that the students do not have to pay for it.

We also believe that there is no need to teach the students all the specifics of any programming language, for two main reasons:

- Any modern features by today's standards may not be modern or even important five to ten years from now, which is when our students will be using their programming skills at work;
- The number of keywords, data types, built-in classes and additional libraries and frameworks is vast. Trying to present it all to the students can be counterproductive.

Therefore we limited the scope of the course to only those topics which are, in our opinion, most useful to the students.

Object-oriented languages are often cited in discussions about first programming languages. Their virtues and shortcomings are well known and discussed. C++ and Java are widely used, and Java is often taught as a first programming language, as it has a number of virtues [6]. On the other hand, teaching Java may be more difficult than we would like [7]. Some teachers have a different opinion and advocate the use of Pascal [8]. This point of view can be extended to all languages deriving from Pascal, such as Delphi and Modula.

It is also important to mention that Programming 2 may be the only course on general programming for students of Mathematics, depending on their choice of subjects in later years of study. Therefore we felt that it would be beneficial to the students if we teach them an industry standard language.

Having all this in mind, we decided to use C# as the programming language and Visual C# Express Edition [15] as the development environment. For students using Linux, we recommend MonoDevelop [16]. This is in line with the requirement that the software we use be free of charge.

We are aware that the same difficulties, which are encountered by students learning Java, will also appear here. Therefore, we tried to find out whether it would be beneficial for the learning process to start with a simpler programming language, such as Small Basic, and later transition to C#. We split the students into two groups, and taught one of them in the aforementioned way. The other group was taught in C# only.

Small Basic was developed as a programming language "that puts the fun back into programming" [17]. It is very simple with only 15 keywords and a friendly development environment, that actively assists the user with Intellisense (command completion) and context-sensitive help. Small Basic contains built-in classes for easy manipulation of graphics, sound and animation, and the syntax follows the usual object-oriented notation, but without the "clutter" typical for C#.

The most important difference between C# and Small Basic is that in Small Basic, programs are much simpler than in C#:

```
TextWindow.Write("Enter n:")
n = TextWindow.ReadNumber()
For i = 1 To n
  TextWindow.WriteLine(i + "^2 = "
              + Math.Power(i, 2))
EndFor
```

Figure 1. Example code in Small Basic

The same code in C# is significantly longer and with more statements (Figure 2).

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;

namespace ConsoleApplication1
{
   class Program
   {
      static void Main(string[] args)
      {
          Console.Write("Enter n:");
          int n = int.Parse(
                          Console.ReadLine());
          for (int i = 1; i <= n; i++)
          {
              Console.WriteLine("{0}^2 = {1}",
                           i, Math.Pow(i, 2));
          }
      }
   }
}
```

Figure 2. Example code in C#

It is easy to observe that while the examples in both programming languages perform the same operations, the code in Small Basic contains only the essential keywords and statements and is much easier to read and understand.

III. THE COURSE

The course Programming 2 is optional. This course is aimed towards developing general programming skills and building a foundation for scientific applications of programming, such as numerical algorithms, processing of experimental data, control of external programs and code libraries of scientific functions. Therefore, the curriculum for this course differs significantly from the curriculum of the similarly named course for the students of Computer Science.

The course covers the following topics:

1. Data types and variables
2. Sequential program flow
3. Mathematical functions
4. Branching and loops
5. Arrays
6. Subroutines (with and without return values)
7. Collections (List, Dictionary)
8. Classes
9. File input/output
10. Control of external programs
11. Writing and using function libraries

The course is taught in the second semester (2+2 classes per week). The course is realized through:

- Theoretical classes – covers theoretical topics through regular teaching classes;
- Work in computer laboratory.

The teaching team consists of a teaching professor and a teaching assistant. The professor has an extensive experience in teaching a wide range of programming topics, as well as in object-oriented software development. The assistant also has several years of experience in teaching and software development. The professor delivered the course materials through lectures. The teaching assistant worked closely with the students in the laboratory and during contact hours.

Introductory curriculum topics are based on the book [13], and the Serbian translation [14]. Additional materials and lecture notes are handed out to the students through our website during the semester. For Small Basic, additional tutorials from the website [17] were used.

IV. THE EXPERIMENT

During school year 2010/2011, a total of 110 students of Mathematics attended the course. The students were divided into two groups:

- Group 1, that was taught in C# exclusively (52 students);
- Group 2, that started with Small Basic, covering topics 1-6 in the curriculum, and then transitioned to C# (58 students).

During the first 7 weeks of the semester, both groups were taught topics 1 through 6, but in different programming languages. The topics that were covered up to that point are essentially a basic course in procedural programming, which was taught in C# to Group 1 and in Small Basic to Group 2.

In order to ensure similar program structure in both languages, we implemented all C# programs in a single class. In both programming languages static methods were used, such as Console.WriteLine in C# and TextWindows.WriteLine in Small Basic, and also static properties, such as Console.Title in C# and TextWindow.Title in Small Basic, but these were taught to the students without delving too deep in object-oriented terminology. The Math class was also covered in both programming languages. The topic on subroutines (methods) was covered using static methods in C#. The only time we used the "new" keyword in C# was to create arrays. Special attention was devoted to demonstrating to the students how development environments for both languages actively help by offering command completion and context-sensitive help (IntelliSense).

The first questionnaire (Figure 3) was given to the students in the fourth week. The purpose of this questionnaire was to determine knowledge level the students brought from the secondary school. For the sake of brevity, the first questionnaire is presented together with the results. It should be noted that the first questionnaire was given four weeks into the course, immediately after the lecture on branching and loops (Topic 4). It is therefore alarming that only 32% of the students had solved the problem given in question 4.

1. Self-assessment of your programming skills:
   a. None..25%
   b. Beginner..................................63%
   c. Good...9%
   d. Advanced 3%
2. Which programming languages can you use:
   a. Basic...*5%*
   b. Fortran......................................*0%*
   c. Pascal/Modula.........................*38%*
   d. C or C++ *7%*
   e. Java *1%*
   f. C#...*0%*
   g. Matlab *48%*
   h. Other *1%*
3. Write a program that will read three numbers and display the largest of them.

   40% solved the problem
4. Write a program that will read numbers from the keyboard until zero is entered.

   32% solved the *problem*

Figure 3. The first questionnaire with results

The first quiz (Figure 4) was given in the eighth week to both groups. The purpose of this quiz was to measure students' progress during the first half of the course.

During weeks 9-10, Group 2 was taught the differences between C# and Small Basic. The students from Group 2 were instructed how to create a Console Application project, declare variables and create arrays, use static methods from the Console and Math classes and write static methods. Since the fundamentals of procedural programming apply to both C# and Small Basic, we considered two lectures of two hours each to be enough to make the transition from Small Basic to C#.

In week 11, a second quiz was given to Group 2. It contained the same number of exercises at the same level of difficulty, but this time in C# instead of Small Basic. Our goal was to determine whether the students can successfully transition from Small Basic to C#.

1. Write a program that will read numbers *a* and *b* and display *a* to the power of *b*.
2. Write a method (subroutine) that will accept one numeric parameter and test whether it is positive.
3. Write a program that will read an array of numbers and display how many of them are positive and negative. Input stops when zero is entered. Use the program from Exercise 2 to test the numbers.

Figure 4. The first quiz

We considered scores from 0 to 3 points as failure, and above 7 points as good. First we compared the results from Quiz 1 between groups (Figure 5). More than 30% of the students from Group 1 failed the first quiz, and about 42% scored more than 7 points. The students from Group 2 fared significantly better, with less than 10% failing and about 67% scoring more than 7 points. This demonstrates that Small Basic is well suited for beginners, as students from Group 1 have had problems coping with C# syntax and debugging.

Figure 6 shows the comparison of results after Group 2 transitioned to C#. This time it is evident that more students from Group 2 (about 25%) have failed the test, with the majority of the rest scoring either lower or higher than in the previous quiz. Those students who scored lower obviously encountered the same problems with the more complex syntax of C#. Also they failed to recognize the need for additional study between the quizzes. The students that scored higher (about 32% with score of 14 and above) have successfully transitioned from Small Basic, but this clearly required additional effort on their part.

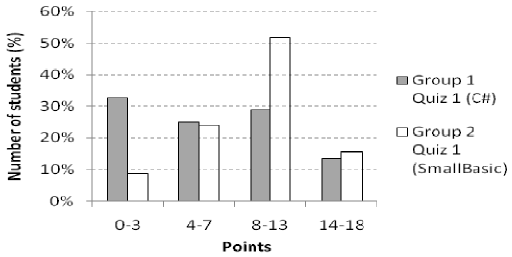

Figure 5. Quiz results for both groups (C# and Small Basic)

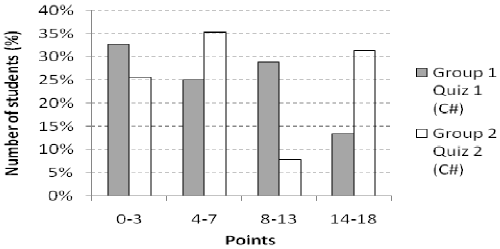

Figure 6. Quiz results for both groups (C#)

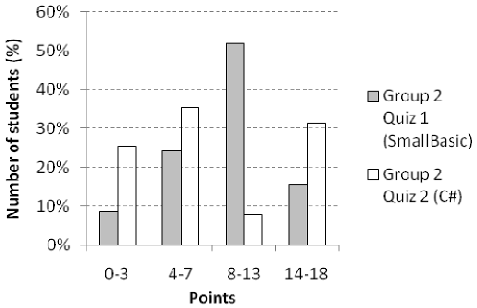

Figure 6. Quiz results for Group 2 (Small Basic and C#)

V. STUDENTS' OPINIONS

We were interested in the students' opinions about the programming languages they were taught to, and also in their work habits. The second questionnaire was given to Group 2 after the quizzes (Figure 7).

1. Which programming language do you prefer: C# or Small Basic?
2. Your reasons for choosing a particular programming language?
3. Was the transition from Small Basic to C# difficult?
4. Why was the transition from Small Basic to C# difficult?
5. Things you like in the Small Basic development environment?
6. Things you like in the Visual C# Express development environment?
7. Did you use the book "C# Step by Step"?
8. Did you use Microsoft's website to learn how to program?
9. Did you use independent websites to learn how to program?
10. Did you use examples and lecture notes provided by the professor and the assistant?

Figure 7. The second questionnaire

91.4% of all students responded that they prefer Small Basic to C#, with the following explanations:

- Small Basic is easier to program in
- The syntax of Small Basic is simpler
- No strict type checking
- All variables are global
- The development environment is simple and uncluttered
- The development environment helps with writing correct syntax

It is therefore expected that 79.4% of the students consider the transition to C# difficult. The more complex syntax of C# conforms to opinions found in the literature. Small Basic was designed with ease of learning in mind, while C# was not. The students' weaker results in C# can partly be attributed to the complexity of C#, and partly to lack of effort on their part.

Another significant problem is students' poor knowledge of English. Because of that, most students do not understand error messages displayed by the compiler. They then try to guess the causes of the errors, thereby making the programming and debugging a tedious process, in which programs either work or refuse to work "for no obvious reason".

An unpleasant surprise was that only 5.7% of the students have been using the recommended book for study. Some of the students complained that the book is only available in English, which shows lack of attention on students' part, as both versions of the book, Serbian and English, had been recommended to them in the introductory lecture and also mentioned several times during the semester. Exactly the same percentage of the students (5.7%) had been using Microsoft's and independent websites for learning. All of the students (100%) had been using examples and lecture notes.

The questionnaire showed that the majority of the students limit their attention mostly to the examples which have been demonstrated in the computer laboratory, and are unwilling to invest additional effort into studying the recommended literature and websites. The curriculum was criticized as being too difficult by the students. Some of the additional comments given by the students are:

- The students would like to learn only Small Basic, without having to learn C#;
- Programming 2 is an optional course, therefore it should be easier;
- The curriculum should be cut or revised to be less difficult.

Only a small percent of the students expressed the interest in learning advanced topics. Those were the same students that have been using the literature, and that scored best in the quizzes.

VI. CONCLUSIONS

Several conclusions can be drawn from the experiment. As Programming 2 is an optional course, the students should be able to determine whether it is suited to their interests, needs and knowledge level. However, first year students are not always able to make a competent evaluation. Moreover, some students do not even understand the differences between compulsory and optional courses. These students expect the optional courses to be easier than compulsory ones. Furthermore, it was shown that the students' work habits are not satisfactory, as most of them did not use any additional materials for study, besides the examples and notes from the classes. Also, a very small number of students used the allocated student hours.

The students preferred Small Basic to C#, which was expected, because it is simpler and easier to learn. However, Small Basic is much more limited in real-world applications than C#, which is an industry standard programming language. Learning C# is thus inevitable. The only question that remains is whether it is more efficient to start learning with Small Basic and later transition to C#, versus starting with C#.

The answers to questionnaires point to several new directions our investigation may take. For example, a more in-depth study of programming skills brought from the secondary schools should be conveyed.

Considering that a significant number of our students scored lower than we expected, and that they were passive and unmotivated, we came to a conclusion that many students chose Programming 2 only because they expected to pass the exam without too much effort. On the other hand, a small number of students worked hard during the semester and, as a result, their grades improved in the second quiz. This shows that low grades obtained in the quizzes stem rather from the passivity and lack of effort on students' part, than from the difficult curriculum.

In regard to the choice of the first programming language, it was confirmed that Small Basic indeed is easier to learn than C#, but it was also shown that the low grades in C# stem at least partly from the students' lack of effort and not from the complexity of the language.

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COMPUTER SIMULATIONS IN SCIENTIFIC METHOD-BASED INQUIRY IN LEARNING CHEMISTRY: AN EXAMPLE OF A LESSON SCENARIO

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Abstract – This paper illustrates the possibility to conduct computer simulations during application of scientific method based inquiry in teaching and learning chemistry. A 20-steps scenario for the lesson "Electrochemical series of metals is presented" which includes application of several computer simulations. In this case, using simulations has benefits over conducting real-time chemical experiments such as: time planning, lower price, lower danger for students due to toxicity of some substances, possibility of visualization of abstract and submicroscopic phenomena and higher motivation of students to study chemistry.

I. INTRODUCTION

Occurring on a molecular level in many chemical phenomena makes learning chemistry difficult [1]. For this reason, students develop scientifically unacceptable conceptions about many subjects or concepts in chemistry. Their knowledge of chemistry is therefore incomplete and incoherent [2]. Many students, in fact, merely memorize chemistry concepts without actually learning them [3]. This situation is an indication of why some students never come to like chemistry.

Advances in technology and science have drawn attention to technological tools that appeal to the sense organs and require interaction with the learner in educational environments. Alternative learning methods such as animation, simulation, video, multimedia and other similar technological tools have become more important in chemistry education. A computer simulation (or "sim") is an attempt to model a real-life or hypothetical situation on a computer so that it can be studied to see how the system works. By changing variables, predictions may be made about the behaviour of the system. Multimedia computer-based simulated laboratory experiments can give students the opportunity to design and carry out many experiments in chemistry in a short period of time.

Computer simulations can also contribute to implementation of scientific method in the process of learning. The scientists, in an attempt to find the most accurate answers to questions about the nature of things and events in their surroundings, adopt a systematic method of enquiry known as the scientific method. The scientific method is a process for experimentation that is used to explore observations and answer questions. Scientists use the scientific method to search for cause-and-effect relationships in nature.

Scientific method refers to a body of techniques for investigating phenomena, acquiring new knowledge, or correcting and integrating previous knowledge [4]. When performing scientific method-based inquiry, one should follow the pattern which involves several stages (Fig. 1):

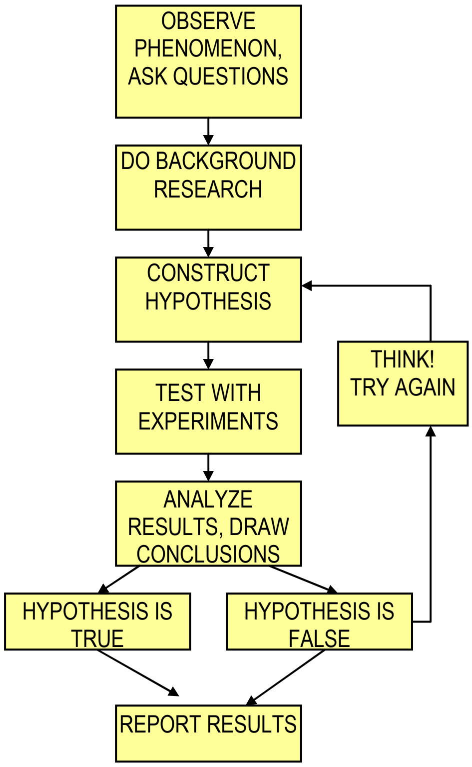

Fig. 1. Stages in scientific method-based inquiry

II METHODOLOGY

The aim of this work was to illustrate the possibility of conducting computer simulations when applying the scientific method-based inquiries in teaching and learning chemistry in secondary education. Many students in secondary school and in the universities have a lot of difficulties in understanding chemistry [5], such as topics related to redox potential of different metals and their reactivity, so the simulations were selected to illustrate reactions of metals with acids and with

Fig.2. Reaction of zinc with hydrochloric acid

compounds of other metals. The simulations used were downloaded from the University of Iowa website [6]; they were interactive open-source materials distributed free of charge for educational purposes. The lesson scenario given below is designed to cover educational content for the secondary-school general chemistry lesson “Electrochemical series of metals”.

III LESSON SCENARIO: ELECTROCHEMICAL SERIES OF METALS

1) *Phenomenon observation and background research:* a teacher conducts an experiment (or plays a movie for the experiment, Fig. 2) in which zinc metal reacts with hydrochloric acid (HCl) in a test tube.

Metal reacts vigorously with the acid and gas is produced. Students write the equation of this reaction ($Zn + 2\ HCl \rightarrow H_2 + ZnCl_2$) and conclude that hydrogen is produced in a redox reaction in which hydrogen ions are reduced to hydrogen gas, and metal is oxidized.

2) *Hypothesis (1)*: All metals produce hydrogen gas in reaction with hydrochloric acid.

3) *Planning experiments (1)*: The same experiment should be repeated with different metals (iron, magnesium, tin, lead, nickel, silver, copper).

4) *Experiments (1):* Computer simulation (redox_grp2.swf, Activity 4, [6]) is applied to simulate chemical reactions of zinc, iron, magnesium, tin, lead, nickel, silver and copper with HCl (Fig. 3). Students observe that copper and silver do not react with hydrochloric acid.

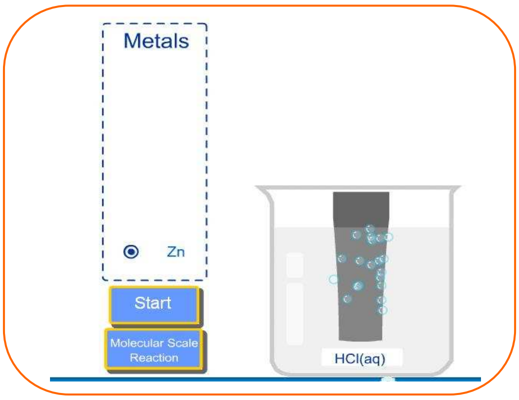

Fig. 3. Sumulated reaction of zinc with hydrochlorid acid

5. *Hypothesis (1) is rejected.*

6. *Hypothesis (2):* Some metals have the ability to reduce hydrogen ions from HCl, and some don’t.

7. *Planning experiments (2):* Observe submicroscopic representations of reactions between hydrogen ions and metals (listed under step 4).

8. *Experiments (2):* Computer simulations (Zn-H.swf, Ag-H.swf, Cu-H.swf, Pb.swf, Fe-H.swf, Mg-H.swf, Ni-H.swf, and Sn-H.swf [6]) are performed. Students notice that hydrogen molecules are formed in redox reactions between all metals and H^+ ions, except in case of copper and silver (Fig. 4).

9. *Hypothesis (2) is justified*.

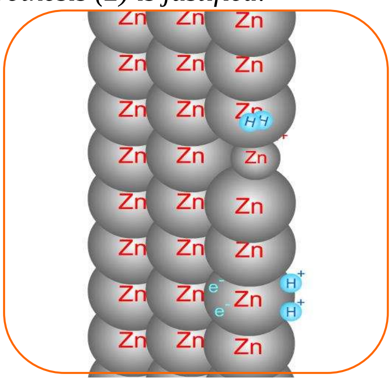

Fig. 4. Submicroscopic view of reaction between hydrogen ions and zinc

10. *Conclusion (1):* Some metals can reduce H^+ ions from acids, which means that they have more negative redox potential than hydrogen. Metals with negative potential can replace hydrogen ions from acids and produce salts. Metals with more positive redox potential than hydrogen cannot replace hydrogen ions in acids.

11. *Hypothesis (3):* Metals have different redox potentials. Some metals are more reactive than others. More reactive metals can displace other metal ions from their compounds.

12. *Planning experiments (3):* Observe macroscopic and submictroscopic representations of reactions between metals (zinc, iron, magnesium, tin, lead, nickel, silver and copper) and salts of these metals in different combinations. A piece of metal (Cu, Zn, Ag, Pb) is placed in an aqueous solution of a metal ion (Cu^{2+}, Zn^{2+}, Ag^{+}, or Pb^{2+}). This set of experiments may be used to rank the metal ions in order of reduction potential.

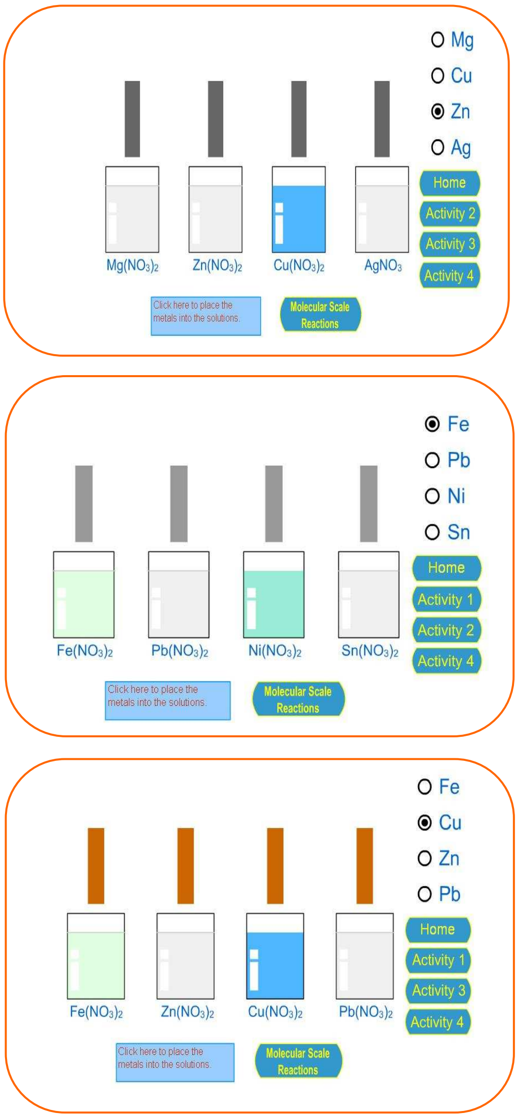

Fig. 5. Macroscopic simulation of reaction between metals and some metallic salts

13. *Experiments (3):* a) Use computer simulations (redox_grp1.swf, redox_grp2.swf, redox_grp3.swf, redox_grp4.swf, [6]) in which metals zinc, iron, magnesium, tin, lead, nickel, silver and copper are dipped into solutions of their salts (as shown in Fig 5). Observe in which cases reaction occurs.

b) Show simulations of experiments on the molecular scale to illustrate redox processes between atoms of the one metal and ions of the other metal in a solution (Fig. 5). The following simulations [6] are used, with option "View molecular scale reactions":

- redox_grp1.swf,
- redox_grp2.swf,
- redox_grp3.swf,
- redox_grp4.swf.

Students notice that more reactive metals can displace less reactive metals from their solutions,

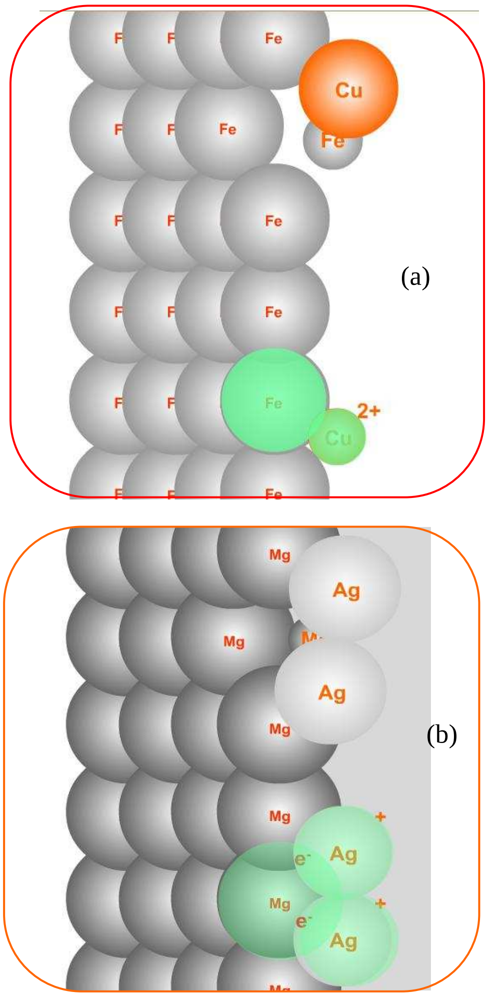

Fig. 6. Submicroscopic simulation of reaction between:
a) copper ions and iron metal
b) silver ions and magnesium metal

and the opposite reaction does not happen.

14. *Hypothesis (3) is justified.*

15. *Results and conclusion (2)*: Students notice that reactions occur in certain combinations of metals/metal ions, as shown in Table 1.:

TABLE I. RESULTS OF OBSERVATION OF MACROSCOPIC SIMULATIONS OF EXPERIMENTS

EXPERIMENT 3.1.			EXPERIMENT 3.2			EXPERIMENT 3.3		
metal	salt	reaction occurs	metal	salt	reaction occurs	metal	salt	reaction occurs
Mg	$Zn(NO_3)_2$	YES	Fe	$Zn(NO_3)_2$	NO	Fe	$Pb(NO_3)_2$	YES
	$Cu(NO_3)_2$	YES		$Cu(NO_3)_2$	YES		$Ni(NO_3)_2$	YES
	$AgNO_3$	YES		$Pb(NO_3)_2$	YES		$Sn(NO_3)_2$	YES
Cu	$Mg(NO_3)_2$	NO	Cu	$Fe(NO_3)_2$	NO	Pb	$Fe(NO_3)_2$	NO
	$Zn(NO_3)_2$	NO		$Zn(NO_3)_2$	NO		$Ni(NO_3)_2$	NO
	$AgNO_3$	YES		$Pb(NO_3)_2$	NO		$Sn(NO_3)_2$	NO
Zn	$Mg(NO_3)_2$	NO	Zn	$Fe(NO_3)_2$	YES	Ni	$Fe(NO_3)_2$	NO
	$Cu(NO_3)_2$	YES		$Cu(NO_3)_2$	YES		$Pb(NO_3)_2$	YES
	$AgNO_3$	YES		$Pb(NO_3)_2$	YES		$Sn(NO_3)_2$	YES
Ag	$Mg(NO_3)_2$	NO	Pb	$Fe(NO_3)_2$	NO	Sn	$Fe(NO_3)_2$	NO
	$Zn(NO_3)_2$	NO		$Zn(NO_3)_2$	NO		$Pb(NO_3)_2$	YES
	$Cu(NO_3)_2$	NO		$Cu(NO_3)_2$	YES		$Ni(NO_3)_2$	NO

16. *Hypothesis (4):* Metals (and hydrogen) can be arranged into a series according to their decreasing reactivity.

17. *Planning and conducting experiments (4):* On the basis of the results obtained in *Experiment (3)* solve the tasks given in computer simulations (rank1.swf, rank2.swf, rank3.swf, [6]), Fig. 7. Use your solutions to form a series.

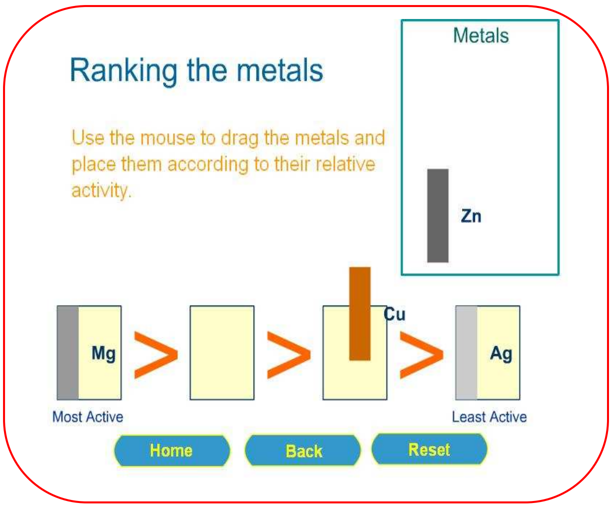

Figure 7. Problem 1: Arrange the given four metals into a series according to their decreased reactivity

18. *Hypothesis (4) is justified.*

19. *Conclusion (3):* Metals used in the experiments can be arranged into a series as follows:

Mg > Zn > Fe > Ni > Sn > Pb > H > Cu >Ag

20. *Generalization:* Teacher explains that the obtained series a part of a more complex series, which is called "Electrochemical series of metals". Teacher produces a list of redox potentials of most common metals and compares it with the students' results.

IV CONCLUSION

The twenty-steps-scenario presented in this paper can be used to effectively conduct a scientific method-based inquiry during the lesson "Electrochemical series of metals". Computer simulations have a number of advantages over conducting laboratory experiments in ths particular lesson:

1) Real-time laboratory experiments between metals and metallic salts are time-consuming – each experiment takes several hours to several days. This they cannot be conducted during a single, 45-minute class;

2) Some of the compounds used in this scenario are not available in all school laboratories, due to their price (e.g. silver nitrate) or their toxicity (e.g. lead and lead compounds);

3) Experiments can be simulated not only at the mactroscopic scale, but also at the submicroscopic level, which enables students

to get an insight into the processes that happen between atoms, ions and molecules. With the benefits discussed above, another advantage of educational computer simulation becomes quite apparent - computer simulation is highly motivating to learners. Students in a learning environment integrated with computer simulation have higher motivation towards learning, because computer simulation is not only more interesting, but it offers them a unique way to access, interact with and understand the otherwise inaccessible or complex phenomena

AKNOWLEDGEMENTS

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THE ARTIFICIAL INTELLIGENCE ELECTRONIC ALMANAC

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Abstract - The Artificial Intelligence Electronic Almanac project has the aim to ensure free, legal, regulated copy righted access to high quality, checked and developed technical informatics materials for a wide range of users and target groups from the topic of artificial intelligence.

I. INTRODUCTION

The Artificial Intelligence Electronic Almanac is a project running through the Social Renewal Operative Program in Hungary which offers grants for development of teaching materials and contents with special regards to mathematical, natural science, technical and informatics training. The project is supported by the European Union, co-financed by the European Social Fund. The project started at June 2010., and the almanac will be ready to use at October 2011. The free access will be guarantied till 2014. for all users.

The realization includes a survey with the aim of mapping the needs of the target groups, the informatics network design, incrementing implementation (digitalization and multimedia development), as well as control in co-operation with the target groups, further, continuous thematic, expert and reader updates.

When realizing the project the aim is that through technological operation we create, operate, and maintain the necessary digitalization environment and the experimental version of the product, as well as the server containing the developed materials. The technological activities are the responsibility of the Panem Ltd. The technological backup and the experimental environment are provided by the Budapest University of Technology and Economics. Teaching materials, research presentations, informative and community building materials are prepared by content development activities to a form that is ready for digitalization, and these materials offer more than just the materials of textbooks to be digitalized. Content development is the responsibility of the university partners (Budapest University of Technology and Economics, Óbuda University, Semmelweis University). Logistics ensures efficient project management, communication (which is the responsibility of each partner), as well as the purchase national or international copy rights (which is the responsibility of Panem Ltd.).

Quality control is applied throughout the development phase as the partially finished product has limited user experience but even that is than included in further development. The final product is subject to an independent proof reading check, and finally, the finished product will be checked independently and randomly as part of the maintenance strategy.

This project is suported by TAMOP-4.1.2-08/2/A/KMR-2009-0026

II. REASONS FOR THE PROPOSED PROJECT

The project product has the aim to ensure free, legal, regulated copy righted access to high quality, checked and developed technical informatics materials for a wide range of users and target groups. It is vital to make sure that the users may than test these and become convinced of the importance of learning supported by high-quality materials. It must be ensured that the products are packaged in electronic packaging that will increase its value, portraying on the one hand the research results and interests, while on the other hand, creating an ever greater cohesion among the various target groups in terms of information exchange, making new contacts, keeping in touch). Further aims of the project are:

- Introducing international, well-known learning materials to a wide range of users (this is the Russels' book)
- Development of learning materials in modules

- Inclusion of current mathematical, natural science, technical and informatics research results into the learning materials and trainings
- Representation of off-line contents on-line
- Creating on-line access of traditional knowledge and information-based fields of science
- Further development of own interfaces serving contents associated with the above-mentioned development of research materials
- Transition from printed contents to digital contents.

A. The projects' aims, target groups and domains of impact

The aim of the project is to portray the outstanding results of artificial intelligence so that those interested in informatics can have access to valuable help aiding their own professional development. It is vital that the presentation of artificial intelligence will make young informatics-oriented people consider artificial intelligence as a possible professional orientation for them. Also for teachers who make a significant pedagogical contribution to the professional development of college and university students studying informatics, as well as of PhD students as a backdrop to their research, further, working professionals, and finally, for non-IT and interdisciplinary scholars for whom this is a (at least partially) comprehensible accessible source of information.

By connecting to the internet the aim is the creation of an expandable information system based on electronic learning material called Electronic Almanac uploaded on a public ally accessible (HIK) server. The professional spine of this learning material is one of the most well-known textbooks in the field of artificial intelligence translated into Hungarian [1] accompanied by an acclaimed Hungarian university course book in the field of neural networks [2], both enhanced with multimedia materials. This is further expanded with a system of knowledge included in Hungarian education, with useful tools for students and teachers alike, an overview of study possibilities within Hungary, a trove of national research results, and a collection of sources and information that may prove useful for the readers.

III. PLANNED ACTIVITIES AND PARTICIPANTS

The Electronic Almanac proposed in this project offers a unique possibility to make knowledge related to artificial intelligence readily available to a wide range of readers, mainly due to its professional actuality, thematic versatility, and free online accessibility.

A. Project manager and partners, their connection to the partner and absorbability

The project manager is the Budapest University of Technology and Economics (BME), Department of Measuring Technology and Information Systems. The Intelligent Systems Group also dealing with the project has its core competences in the field of intelligent systems, as well as the basic and applied research of these.

Project partners are the Panem Ltd. Publisher, Óbuda University and the Semmelweis University.

The Panem Publisher is an acclaimed publisher in the Hungarian book market due to its publishing activities in the fields of informatics, economics, and textbooks related to learning and teaching. The primary aim of the publisher is to introduce and establish acclaimed foreign editions in Hungarian suitable for the use in Hungarian higher education, as well as introduce Hungarian books to the international book market.

Within Óbuda University, John von Neumann Faculty of Informatics (NIK) the Institute of Intelligent Engineering Systems (IMRI) was founded in 2003. The aim of this institute is work in the fields of interdisciplinary engineering applied informatics, computer modeling, intelligent computation and applied computer sciences.

Semmelweis University (SE) is one of the most acclaimed universities in the country. It has three tasks: education, research and medical attendance. The section responsible for the project is the General Medical Faculty, Development and Training Institute of Medical Informatics (Általános Orvostudományi Kar Egészségügyi Informatikai Fejlesztő és Továbbképző Intézete). Apart from the education of students of organizing commerce they also carry out the education of medical informatics for general physicians and dentists, further, medical informatics for students of pharmacy.

B. Professional content and aim of project

The professional aim of the project is to present artificial intelligence as one of the basic fields of technical informatics but also serve and to draw attention of curious target groups to this field. The tool of this realization is the professionally well-defined, high-quality Electronic Almanac, which we are planning to expand and update regularly.

The typical short term goals are serving the training needs of both teachers and students (guided learning, knowledge enhancing exercises, preparations for exams, material for vocational training, etc). The long term goals include a creating a social network group around the almanac and a repository freely accessible (source of ideas, cross referencing scientific relationships, continually updated events calendar, professional forums, etc).

C. Expected results and impacts of the project

The project outcome is the electronic almanac, public, accessible, suitably documented and introduced in several forums. The starting point are the two digitalized multimedia illustrated textbooks, further containing teaching, training, literature, research news materials. The knowledge base of the Almanac may be useful regarding specific realization of industrial projects (source of information, expert base, Q&A, "best practice"-type case studies, etc). The almanac provides a whole different perspective of obtaining information in the field of artificial intelligence for the listed target groups. Instead of passive reading there are interactive contents which novel services that are enabled by current technical advancements. With the realization of the Almanac these services appear in a professionally controlled environment so that they ensure a popular and high-quality alternative to traditional materials.

D. Presentation of the preparation, execution, operational limits and maintenance of the project

As there is a great degree of similarity between the activities of the project and the consortium's (universities, publisher) routine activities, the hardware and software devices necessary for the realization of the project are available for the entire length of duration. The conceptual questions of the learning material development are decided by the leading lecturers of the participating partners, while the details are worked out by paid student work. Technological steps are the responsibility of the expert publisher using conceptually guided paid labor.

The information content of the Almanac is continuously maintained. This will happen on three levels. In the case of basic electronic materials, as the majority of them are stored locally (HIK server) maintenance mainly means the correction of indicated errors and updating addresses of internet references. This will take the development of a service that automatically scans almanac's materials stored as backup on the BME's server. The differences will be stored as a material to be uploaded to the HIK server, as it is also regularly updated. The next step is the regular updating of the learning and teaching materials. The expansion of the learning materials (expansion of subject materials, exam tasks, practice tasks, interesting works, e.g. works created for student conferences, diploma works, etc) takes place approximately every six months. The natural time for updates coincides with the end of the exam periods. The updating of additional scientific information also happens every six months. The mode of updating is the same as previously described. The backup system is refreshed on the BME server. The third refresh level is that of the 'social' contents based on the active interests of the audience (GYIK, new links, literatures, tasks, etc) in a selected and edited form to be embedded in the Almanac DocBook format "Who-knows-what" (Ki-mit-tud) component. This refreshing is also planned in a two-month interval and technology of that is the same as with the other parts.

Considering that (1) the learning and research material presented by the Almanac is the organic part of the map of competences of the tenderer, and (2), the transfer to online learning material is in the interest of the tenderer (the target groups are made up to a large degree of the tenderer's students), and finally (3), the tenderer maintains similar informatics devices on a routine basis which are similar to those requested in the tender (educational server, research group server, etc.), the personnel and object conditions of the maintenance of the project are given even from the initial phase of the preparation phase of the tender. Thus there is no need for additional devices, there is no additional financial or HR load included.

IV. PROFESSIONAL ESSENCE AND CONTENTS OF THE PROJECT

The professional essence of the project is the presentation of artificial intelligence as one of the major fields of informatics education. The representation has to serve the various levels of interests and IT expertise, and the interests of the target groups are taken into consideration. The realization tool centers around a professionally well-defined, high-quality material of the Electronic

Almanac that will later be expanded and regularly actualized.

The basic activities of the realization includes mapping the target groups' needs, informatics network design, incremental implementation (digitalization of multimedia development) as well as control with partial co-operation of target groups, further, regular thematic and expert actualization.

The main indicator of the result is the number of adapted and prepared modular learning materials and the number of students (and other users) using these informatics products.

A. Analysis of the expert field

The informatics tool described in the tender has the aim to find a constructive answer within a rapidly developing and changing informatics paradigm regarding how to present the topic of artificial intelligence and its latest research results most efficiently first to an expert audience, then to wider audience.

Currently the artificial information intelligent system is not the main goal of the informatics development, but only one of the tools. However interesting it may seem to create machines that imitate human behavior, this is not the primary aim of today's IT. Much rather, the aim is to create informatics services created to support various individual and group activities and by this, alleviate the physical, economic and cognitive load on the human user.

B. The content

The aim of this project is to create an Electronic Almanac introducing artificial intelligence to a wide range of audience, possibly raising interest of young people who are looking for a challenging field of informatics. The primary goal is not to create an e-learning tool with topics that are readily convertible credit points, nor a thematic lexicon, but an almanac-like collection of knowledge with various subjects to be regularly updated and refreshed.

The focal points of the Almanac are two digitalized multimedia textbooks in the field of artificial intelligence. The textbooks are the following:

- Artificial Intelligence: A Modern Approach [1]
- Neurális hálózatok, [2]

The core of the proposed system are the mentioned books along with the electronic, multimedia materials and annotated versions, further, the necessary rights for proper visualization of the electronic content (for the duration of the project Prentice Hall Publisher has agreed to the presentation of the translated material in turn for a fee).

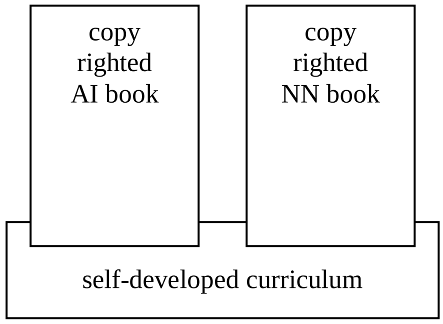

Fig 1: Module components of the learning material

C. Conceptual structure of the solution

The project is planning for the creation of two digitalized learning materials and electronically enriched module units, as previously described. Figure 1 presents the relationship of free copy right parts and parts that have been developed by us.

The concept of the results will be tracked from the point of view of a user. When sitting down to the book-like Almanac (Figure 2.), they can choose from the "Artificial Intelligence" e-book, the "Neural Networks" e-book, i.e. self-study, further information (GYIK), "Ki-mit-tud" (Who-knows-what) manual aiding creating connections between electronic components. All three components are amply illustrated with cross references, the "Neural Network" book can also be reached from the chapter dealing with neural network of the book "Artificial Intelligence". The underlined words, typical products, famous projects, i.e. experts are amply illustrated and stored either locally, or are available on the web. Certain references of concepts, products or experts will link the user to further references at the Artificial Intelligence social network portal, providing insight into discussions, fresh news, miscellanea and other features not coded in the general material. The underlying idea is that users interested in similar topics will find it easy to get in contact with each other or with the monitoring expert team.

The gist of the general interest provides the continuously maintained GYÍK system. Access rights and discussion rights are gained by logging into the social network portal.

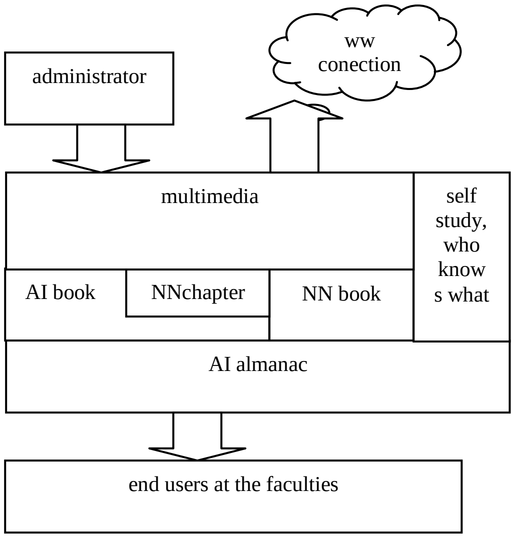

Fig. 2: Conceptual structure of the solution

A vital aspect of the Almanac is the valuable pedagogical input of the consortium partners gained through years of educational and research experience. This appears in the Almanac in the form of (tests, exam tasks and their solutions, practice exercises, demos, typical misconceptions, a list of national experts and their contact information, list of subjects taught at higher education facilities, interesting domestic research results, list of companies associated with artificial intelligence methods both with the country and with Hungarian interests, etc.).

V. CONCLUSION

This project is the results of a successful tender to the Social Renewal Operative Program in Hungary which offers grants for development of teaching materials and contents with special regards to mathematical, natural science, technical and informatics training. In various forms it is financed by the European Union. The goal of the project is to create a multifunctional Electronic Almanac that centers around two digitalized multimedia textbooks in the field of Artificial Intelligence. What the participants of the project set out to do was to create a tool that will serve as a learning material, an elaborate source of resources and information on various levels of informatics expertise – ranging from the highly professional user to the user who is simply interested in the topic. It is especially designed with regard to young people who have not yet clearly defined what fields of informatics they wish to be more involved with, to make them interested in artificial intelligence. It must be pointed out that legal issues such as copy right or free access to online materials have been sorted out. The authors hope that the finished tool will be made available to the public by 2012., thus enriching the scope of available expert online material.

A. System architecture of the solution

All components of the Almanac including the material of the digitalized books (along with the cross references and multimedia illustrations) are in DocBook form, and located on the HIK server of the Kempelen Farkas Digital Collection of Textbooks (HIK Kempelen Farkas Digitális Tankönyvtár server (http://www.tankonyvtar.hu/), as required by the tender. The materials stemming from educational experience are fused into the Almanac’s chapters. The social network portal is operated on the server of the consortium leader (http://home.mit.bme.hu/) with the use of social network technologies that offer much more then the possibilities of the DocBook (social network content share, making contacts, e-learning, etc.). The relationship between the two systems is solved by cross references, so the user may reach all available information simply setting out from the two digitalized textbooks.

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APPLICATION OF NEW TEACHING METHODS IN DETERMINING WOOD INCREMENT

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Abstract - In the teaching practice of the study on materials and their characteristics, wood as a renewable natural material, is studied in many study disciplines and in many directions of technical faculty. Researches on the properties and characteristics of wood requires special labaratory conditions and equipment. In the absence of metering and special microscopes and accompanying equipment, methods of scanning quality and structure of wood with scanners that are connected to a network computer may be applied, then by the implementation of appropriate programs analysis and data processing can be carried out. This paper presents a new method for determining the method of measuring the width of annual rings of growth and zone of late wood.

I. INTRODUCTION

Thousands of tree species are created from nature that differ in botanical, histological and technological characteristics. All kinds of trees provides unlimited opportunities for scientific and technical research in all practical and scientific and educational fields. However, despite the lack of funds and lack of economic interest to do with anatomy, and partly by the technology, far more processed just over 265 species of trees, including an economic impact has about 70 species of trees.

At technical universities, the wood is a renewable natural material and material for use in a variety of purposes, is studied in more studying disciplines, in many directions, both as a teaching material appears in several of the courses, both at primary and at the master's and doctoral studies. During graduation, master's and doctoral theses, for more detailed information and research materials, properties, industrial applicability and some aspects of qualities require a specialized laboratory equipment, machine shop, information technology and other conditions of work.

In addition, to explore the properties of wood there should be some assumptions in order to reach a proper conclusion for the determination of this target, which will largely be dependent on the folowing moments:

- Whether or not there are certain assumptions,
- Whether the preparatory work correctly,
- Is the selection of proper materials for research and testing,
- Is made the right choice of methods for testing the set goal, and after everything is properly done if the final report.

Bearing in mind that wood is anisotropic and heterogeneous materials, it was found that the intensity of the annual increment of wood is influenced by particular weather conditions during the growing period, which occurs fluctuation Growth ring width and late wood zone, and his participation in the ring.

Year width rings has a large effect on the physical and mechanical properties of wood, however, ring width is not the only factor affecting the weight of wood, and therefore the other properties of wood. On the properties of wood is influenced by many other factors such as climate, exposure, terrain, soil composition, tree species, forest types and complex and others. With the research that was done at home and abroad, it was found out that there is a correlation between the ring thickness, weight of wood and its strength. Coniferous and broadleaf tree is very different in its structure and therefore vary with the influence of ring thickness on the properties of wood.

In coniferous wood species, with decreasing ring thickness to the optimum, the weight of wood is increasing, and after the optimal ring thickness of the wood decreases. This is explained by the fact that the coniferous wood species share zones of the late wood is the same for wide with tight growth rings. According to this statement leads to the conclusion that wood with narrow annual rings has a higher percentage of late wood zone, with the greater weight and greater strength of the rings with a larger width.

With hardwood timber species, the ring-porous species (oak, chestnut, ash, etc..), With increasing ring thickness, increases the gravity of wood, and therefore the strength of wood.

In diffuse porous species (beech, maple, alder and others.), Ring width does not play a major role in the gravity of wood and sturdy wood.

II. MATERIAL AND METHODS

In research year width rings, especially, it is necessary to provide materials and recommendations to the standard required. Depending on the nature of research, it may be approximate or detailed. Today, the most commonly used by large numbers of samples, in order to be more realistic conclusions. When setting goals and scope of the study shows, when we have a need for detailed and thorough examination, which will be used for scientific purposes, the material should be taken from the forest or from a predefined test districts. On the basis of this choice of materials, among other things, studying the complex and the properties of a botanical species. This choice should be able to perform professional, who should know the following topics: the choice of wood species, choose an area where the species is present, determining the sample size, selection of model trees in these areas and the positioning of the part of the tree will then be taken copies. In Figure 1 provides a schematic view of the place of timber that is taken from the coils.

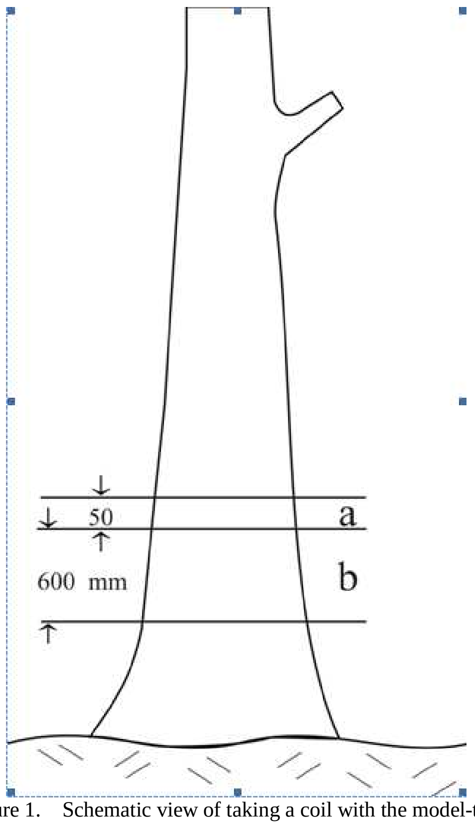

Figure 1. Schematic view of taking a coil with the model-tree

Figure 2. Prepared for the rings of the tree survey

Material for research must meet all the requirements that were previously placed. In figure 2, presents the coils seem to have cut out a certain amount of timber trees, they may, after preparing and processing to serve the goals of research. Coils are first dried to a certain percentage of moisture, then the same is Planes, gradually grinding to a certain fineness of the cross section. Since it is still on the ground before the chainsaw wood described north side, the transverse and surface is marked with pencil the other side of the world. Before the scan rings, should be previously prepared and the scanner.

Figure 3. The appearance of a scanner ti scan the prepared wood hoops

Preparing the scanner is done for better positioning of the wooden rings, which must be placed in a north-south or east-west. For this purpose, previous to the surface scanner marks the mid-latitude, which is done with a thin marker. Then, through the marked scanner set up pre-prepared paper, from which he cut the gap (opening) width 9cm and which is also a marker marked environment in length. The prepared paper is placed over the scanner and fixed with adhesive tape. Paper is fixed through the scanner so that they must cover the previous marked lines on it and lines on the scanner. Display positioning paper on the scanner is shown in Figure 4.

The opening of 9 cm that was made on paper, is used to scan only one segment of the cross section of wood, which would later explore.

Prepared on the scanner, through the paper, there is a wooden hoop and positioned for scanning. To position itself rings were in a north-south or east-west, it must be the same pre-marked with a marker at the periphery of its outer side.Marked rings in his foreign side, it is now easy to position in the given direction, one need only lines that are on a reel to match the line to set the paper, this must be done throughout the length and the two final part of the surface to be scanned, front and rear of the scanner.

.

Figure 4. Positioning paper prepared and marked

Figure 5. Set the prepared wooden spools for scanning

On a wooden spool that is set to scan, before the scan, the previous ruler or other measurement tool, mark two lines at a distance of 100mm, and a longitudinal line that passes through the center of the cross section, and is celebrated around the world, koa in Figure 6, where marked north:

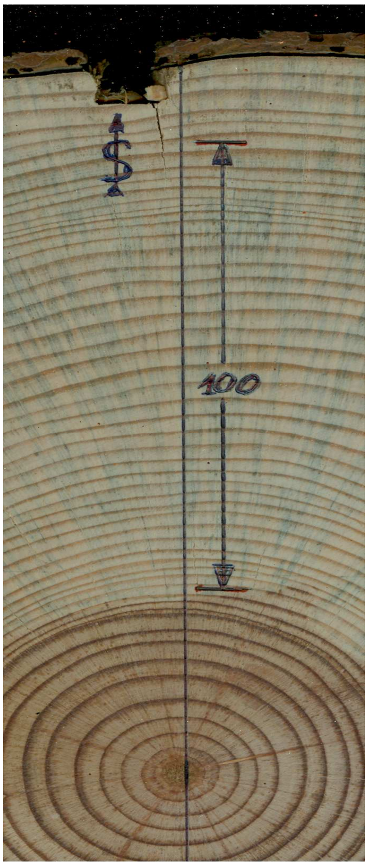

Figure 6. Prepared scans of wooden spools

Scan rings are made using Adobe Photoshop 7, in our case, the scanner HP Scanjet G3010, with the selected high resolution of 900 dots / inch. Photo scanning is transferred to the computer in a file. Later, a scanned photo of tree switches and opens in Corel Draw 12, where the first is "clean" image of the rim of blackness and excess clutter. The first thing to do at the intersection of wood, in a north-south, is to set one straight vertical line, the line that we have as possible use the program itself tolbaru Corel Draw 12th The aforementioned line should pass through the core of the wood. Transverse to this line to set up short and thin lines, which are set an the border annual rings, both on the borders of the late wood.

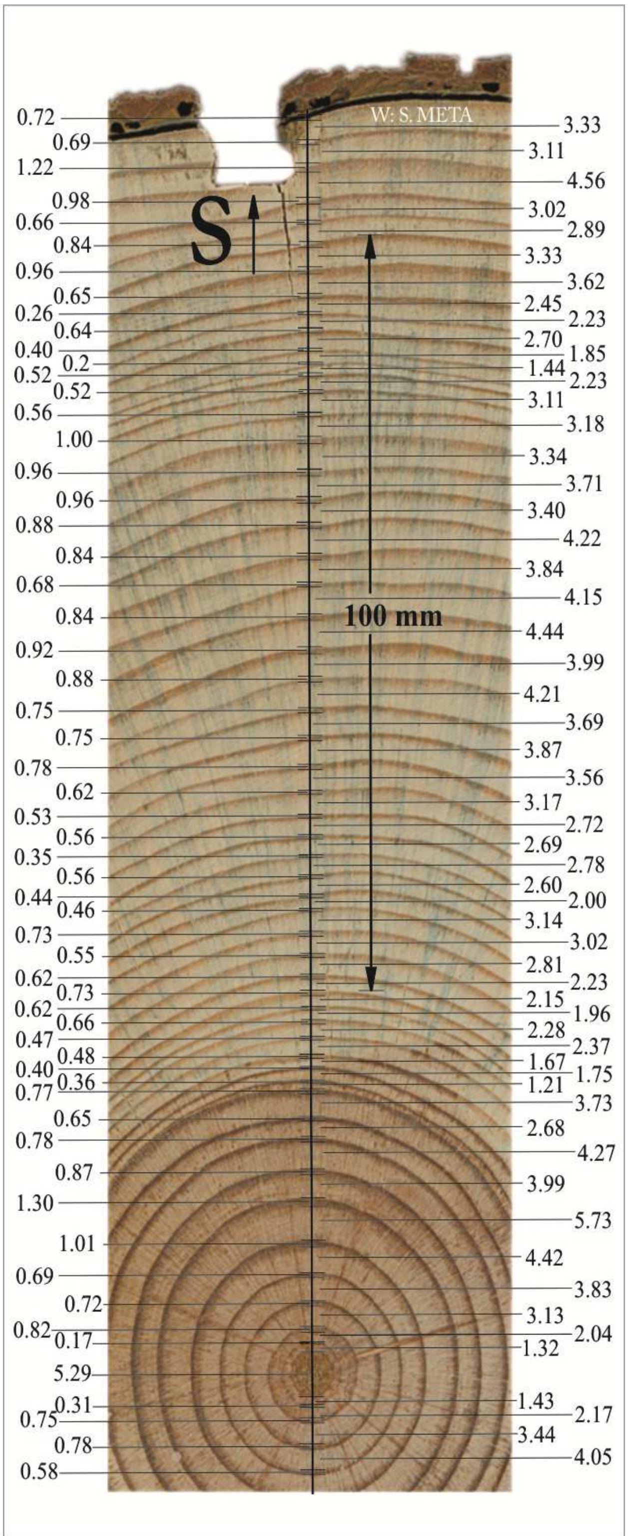

Figure 7. Appearance of treated wood and display of measured elements of annual rings in the ratio 1:1

The image that was obtained, in their own control line length, which in our case has a length of 100mm (shown in Figure 6). Tolbara taken with a vertical line that is pulls out next line preview of 100mm, uniques with its and then in the upper part of the program entered its length as 100mm. This operation we have achieved that the measurement data is in the scale of 1:1.

At the pre-prepared picture on which are marked by elements of research, approaches to measuring the width of annual growth ring width and late wood. For this operation, it is considered a short and straight line with tolbara the program, the left side, and with this line we measure these dairies annual rings.

When measuring the width and breadth year ring late wood, the program Corel Draw 12 gives a numerical representation in more decimal places, however, are sufficient only two decimals. Measurement data are recorded in addition to measured tree rings and the right shall be the width of the year rings , while the left side shall be the width of late wood, as shown in Figure 7.

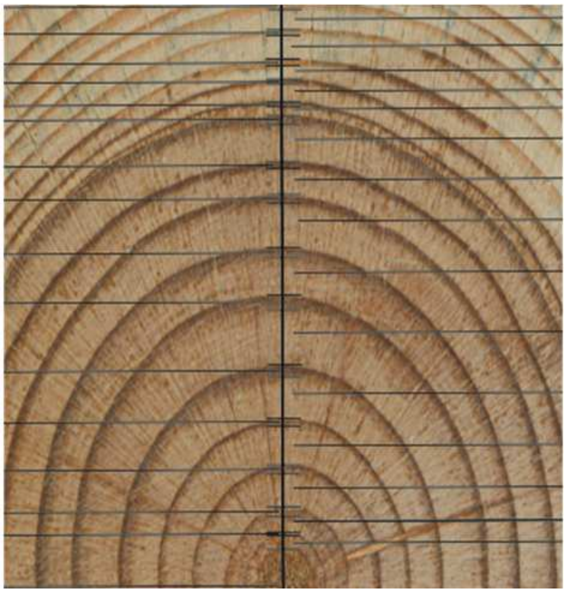

Figure 8. Marked part and enlarge the scale of growth rings in 2:1

Program Corel Draw 12, gives the opportunity to take a picture or some parts increase, with the easy to spot all the necessary elements of the display is allowed to mark corrections, and other operations. The increased part of the picture with marked parts of the annual rings in the ratio 2:1, shown in Figure 8.

If you have a large diameter wood, it must scan done so that some parts of the scanned cross-section itself, that all these parts are in sequence and previously marked their limits on the treated wood. When these procedures must be taken to rings that are on from one to the other part, that must be taken into account in the marking of the tests. All this can be avoided using scanner larger dimensions, such as A3 or A2, if there is such a possibility.

For larger and heavier hoops is no risk of blocking the work of scanners, in this case is to do a frame of wood or other material, which will be set up around the scanner. This framework should have a height greater for 1-2mm height of the scanner. When setting up the wooden rings on the scanner, it will lie on the edges of the frame and will put pressure on the glass.

III. RESULTS AND DISCUSSION

All research carried out by that is described, and all results and data which were obtained by measuring the year width rings and wide zone of late wood, should be included in a specially prepared tables and give the final report.

In order to obtain more realistic information about the study, all results should be treated mathematical-statistics, shown in tables and graphs give.
The method presented gives only accurate measurement data, they are credible and applicable in circumstances where there is no special equipment for such purposes.

The method of measuring the annual rings, applicable to all undergraduate, graduate and doctoral studies, where necessary conduct more detailed research.

IV. CONCLUSION

From the above presentation, as well as the techniques of measuring the width of tree year rings, measuring the width of late wood anniversary, we can conclude that the presented method is well suited for use in teaching, especially for graduation, master and doctoral theses. The level and scope of examining primarily depends on the requirements of the research.

The presented method can be applied in practice in determining the quality of timber.

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E-MATERIAL FOR LEARNING WORD-FORMATION IN SERBIAN

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Abstract – This work presents specifically implementation of information technologies achievements on content of word-formation in Serbian. E-material for learning word-formation in primary and secondary schools is created in accordance with program requirements. Designed e-material represents model for programmed teaching of grammar and, in that form, it can be used for methodical shaping of contents for other linguistic disciplines and more.

I. Introduction

Nowadays, to talk about the use of information technology[1] (IT) in different areas of people's life and living is superfluous. IT has its application in education as well, in wide range too. For example, like general information source (Internet), for communication (between teachers, pupils and parents), for presentation and promotion of educational institutions, for curriculum and other educational material preview etc.

One of the useful IT applications in education is creation of learning material, i.e. material for rehearsal and systematization of lessons and knowledge testing. Such material is in accordance with certain psychological learning theories, as well as didactical theories and IT, and satisfies modern programmed learning requirements in the highest level.[2]

According to the concept of programmed teaching shaping and structuring of learning material into electronic form, represent its fullest realization, as well as representation of learning process based on this didactically-methodical system.

This work represents: basic learning elements in programmed learning system, features of developed e-material for learning word-formation in Serbian in primary and secondary schools and possibilities for further work.

II. About Programmed Teaching

One of the modern learning forms is certainly programmed teaching. Necessary elements for complete implementation of programmed teaching are: computer and specially shaped learning material. For implementation of this teaching method schools must have technical equipment and teachers should be capable of contemporary working condition.

Programmed teaching provides high level of individualization, as well as differentiation of teaching, which are important demands of modern methodic. One of its methods is self-learning with specially structured material, and technology as well. Basic nature of individualized method is primarily concerned about teaching content. Namely, teaching content is divided into small units with clearly defined learning goals. The rest is concerned about rehearsal and knowledge verification, which is enabled by frequent testing and other impartial tasks.

Essence of programmed learning is dialogue that, in this case, exists between computer and pupil who answers on asked questions. Teaching material is divided into determinate size steps. Every step gives new information and sets task about them. Next step depends on the solution that pupil gives in the previous one. All the steps are connected into program. Programmed material is divided into sequences and one sequence consists of articles. The article is composed of: information for the pupil, task (stimulus S), pupil, activity (reaction R) and feedback information.

Basic characteristics of the programmed learning are:

1. precise defined program task,
2. systematically elaborated material that is expressed in elementary "doses",

[1] Further in this paper Information Technology will be replaced with IT.

[2] "Theoretical basis of programmed learning is in Skiner's psychological theories: theory of corroboration (consciousness about something that is done well positively influences on further activities flow) and theory of staged forming of mentally activities." [1]

3. pupil's activity is provided by tasks for every new part of the material, and the feedback information about correct answer is given right after,
4. pupil's progression through program depends on previously accepted knowledge in the program,
5. individualization of the working speed is provided, as well as of the method of knowledge acceptance.

In that way, individual work of the pupil, more activity, availability of the feedback information about learning success as well as individualization of the work, are encouraged. [2]

E-material for learning word-formation in primary and secondary schools in some level represents modified programmed learning in the area of the structure and the organization of the material (sequences are not separated particularly and next step in new material is not physically blocked).

According to Adamov and Segedinac, the significant features of good educational material are those that enable independent work, motivate pupils, encourage active and in depth learning as well. [3] By creating e-material for word-formation learning, those high level educational demands should be achieved.

III. About E –material for Primary School

Proposed e-material is prepared in HTML format. This format is chosen because it is commonly known and it has user friendly data preview. Visual preview is defined in accordance with principles of simple and clear data structure. Figure 1 shows first page of programmed material for learning particularly content that is required for primary school.

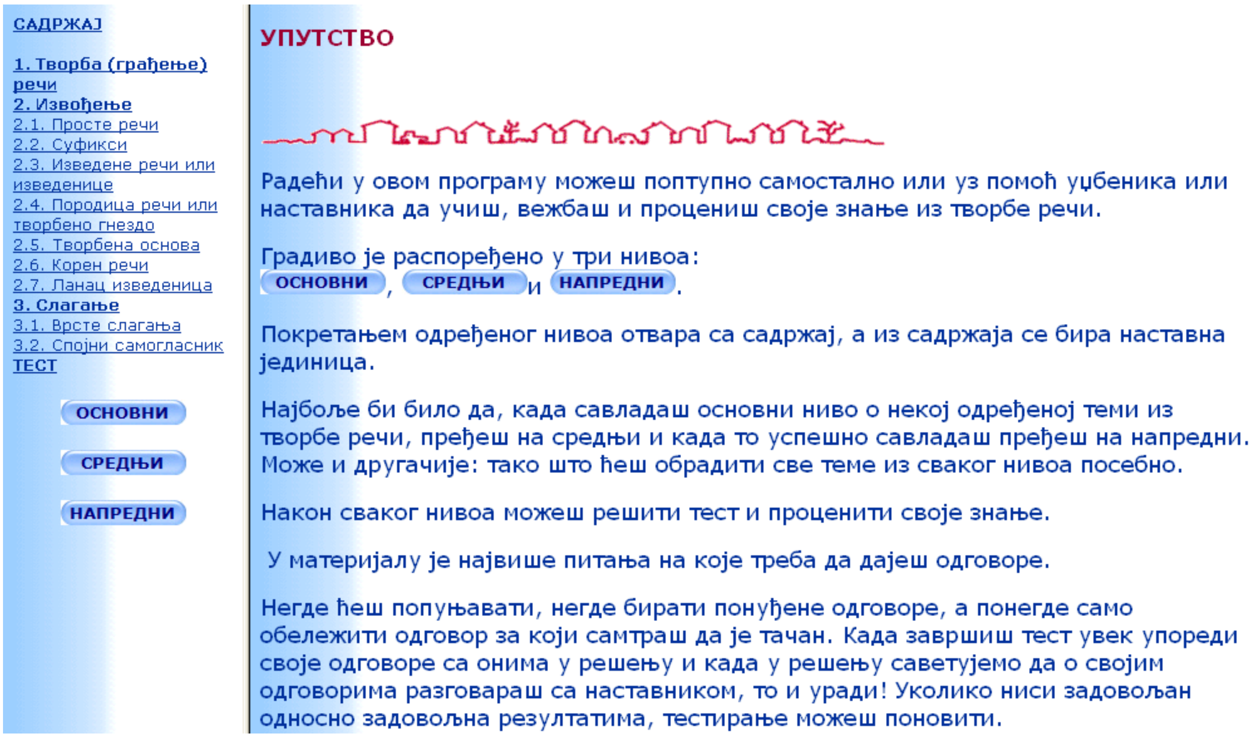

Figure 1. First page of e-material for primary school

Word-formation material for the primary school pupils is organized into three levels: beginner, intermediate and advanced level. Every teaching unit is processed by levels and it is recommended to go through all the levels for each unit. Different kind of application is also possible, and pupil can finish all teaching units from the beginner level, then from the intermediate one and, at the end from the advanced level.

At the end of every level, there is a test. The test has very important and multiple role. Based on feedback information and by solving test, a pupil acquires real insight in his own knowledge about word-formation. Furthermore, the test is a self-evaluation tool, because according to the point-scale, level of the adopted knowledge can be easily determined. Besides different type of questions, the test contains the following information for pupils: next to the ordinal number of question there is a number of points for correct answer in brackets. Test solution contains point-scale with respectively range of points that are equal to the knowledge grade as well as its level. If pupil is not satisfied with accomplished result he can repeat the test.

E-material contains user manual, table of contents and teaching units. Besides basic information about chosen topic, every teaching unit contains different type of tasks: essay, construction and selection. (Figure 2). Feedback information is contained in the solution that pupil should compare with its own. There are other information in solution, for example instructions about further discussion with teacher, because of topics specificity, or about reading grammar text in relation with those topics.

Methodical-didactical way of material processing for primary as well as for secondary schools has form of learning through discovery and solving problems in combination with the elements of programmed teaching. Teaching material created like this is suitable, not only for learning new lessons, but for rehearsal, practicing and testing as well. E-material is especially efficient in combination with existing textbooks and, in that case, it can be considered as a textbook supplement and it can be used for individual work and progress as well. Namely, it is considered that the combination of classical learning with e-learning is very suitable for efficient way of teaching process advancement in general. [4]

III. About E-material for Secondary School

Word-formation material for secondary school is in accordance with program requirements but, it has different design in contents area and in area of methodical processing in relation to current textbook which authors are Z. Stanojcic and Lj. Popovic. [5]

Teaching material that is represented in form of e-material can be used like information source such as textbook or like working material for rehearsal as well as knowledge testing, according to the fact that it has solution (feedback information) for every task in every lesion.

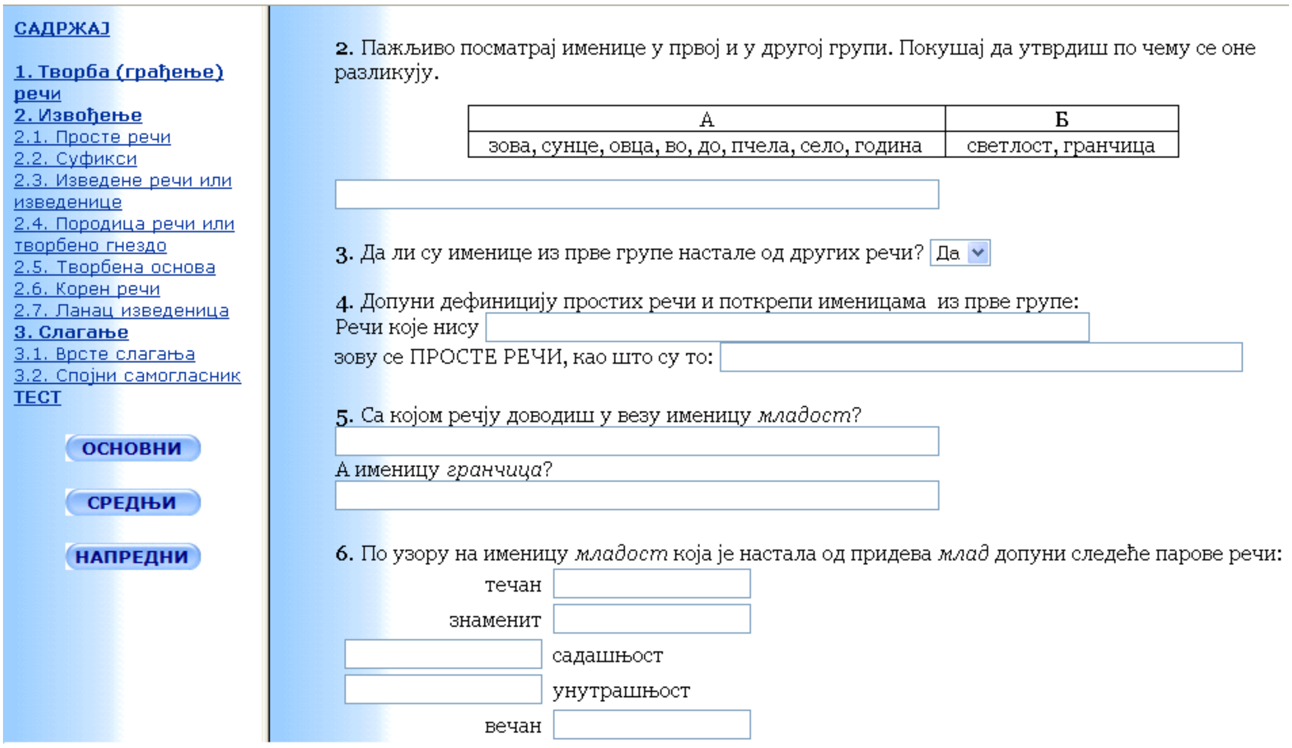

Figure 2. Basic types of tasks in designed e-material

E-material for learning word-formation in secondary school has clearly defined lessons, as well as the content that belongs to them. In the textbook, mentioned above, the whole content about word-formation is divided into three thematic units.

Textbook has concentrated, and with terms satiated text, which is relatively short with sentences that are too long. It has different types of letters for examples and, terms and important parts of definitions have no color distinction. Textbook does not have schematic preview, neither graphs or tables.

Structure and methodical processing of word-derivation content is partially organized based on deduction, it goes from more general term, i.e. derivation, to the lower range terms such as suffixes and formation basis, as well as to the new words, in order to make turnover towards motivation as highest level term, with a form and semantic review of the link between motive and motivated word.

The left column of the following table includes a content structure according to the textbook, and the right column contains our proposition for content restructuring, which is used for e-material creation. [2]

TABLE I. TEXTBOOK CONTENT STRUCTURE AND PROPOSED CONTENT STRUCTURE

Textbook	**Proposition**
Derivation	Motivation Motive word and Motivated word
Suffix and formation basis	Formation basis and suffix
New word	Derivation
Motive word and Motivated word	Derivate

E-material lessons have order that follows nature and logic of the derivation processes in Serbian and they start with explaining basic terms and go to the more complex ones. Besides that, tabular and graphic preview show systematic and classified formation units (Figure 3). Pupils should not use data in tables mechanically only to memorize them but, to use them functionally for solving different tasks in accordance to formation segmentation and explanation of the formation meaning of the derivates.

СИСТЕМАТИЗАЦИЈА СУФИКСА ПРЕМА ТВОРБЕНОЈ ОСНОВИ

ИМЕНИЧКИ СУФИКСИ		
За вршиоца радње	-(а)ц -л(а)ц -ā ч -тељ -ник -ар	писац носилац певач учитељ саветник кувар
Само за жене као вршиоце радње	-љa -ара	ткаља врачара
Суфикси за занимања	-ар -ник -āш -ција -ист(а)	месар наставник кошаркаш јорганџија економист(а)

Figure 3. Example of the tabular preview

Content of the lesson mainly includes:

- cognition type of information,
- tasks for gradually addressing of pupils towards individual data discovery, as well as the facts that are important for term's definition,
- definitions of key terms with specially pointing on the information that are important for fully understanding of interpreted phenomena, as well as for understanding of the new material and connecting data and facts into the system (Figure 4).

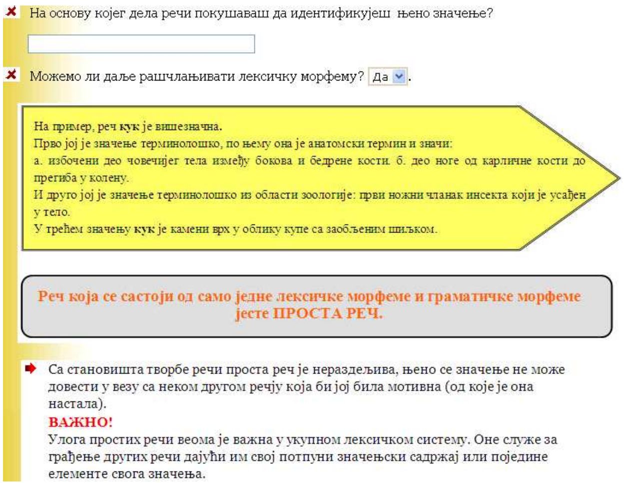

Figure 4. Example of the definitions

IV. EXPERIMENTAL IMPLEMENTATION OF E-MATERIAL

E-material is shown and implemented in different situations, such as seminars for teacher's professionally improvement, as well as for individual work and for preparation of pupils for school contest in Serbian.

Teachers who were included in seminars distributed e-material in approximately twenty primary and secondary schools in Vojvodina and implemented it in real teaching conditions.

Implementation of e-material in individual work came out very useful. A pupil was able to significantly improve its own knowledge about word-formation and to achieve good score in contest. Contents organized by levels especially contribute to self-esteem and self-confidence. Feedback information about success in tasks solving confirms personal capabilities of the pupil and contribute to the development of its competence. It came out that pupils who completed all three levels completely mastered word-formation in accordance with programs requirements.

V. CONCLUSION

IT is positively used for contribution in learning word-formation in Serbian. Chosen format reflects high-quality material which is suitable for every platform. In technical area, requirements for e-material implementation are minimal. They include basic configuration which can run any Internet browser. Result of the IT component of the e-material shows its functionality, simplicity in use and high-quality. [6, 7]

Chosen teaching material corresponds with this way of learning, according to the nature of the derivation processes whose preview can be breakdown and written in symbols, as well as shown by graphs and tables etc.

Efficiency of e-material in teaching is proved by:

- Positive reaction of Serbian teachers in professional seminars;
- Pupil’s interest in work with e-material;
- Pupil’s high scores in contest;
- This model for e-material can be implemented for material processing in every linguistic discipline and wider;
- E-material can be used for distance learning as well.

This paper proves importance of the team work and shows that interdisciplinary gathering in science is necessary.

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CORRUPTION, TRANSPARENCY AND EDUCATION MANAGEMENT

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Abstract – Corruption is considered a universal phenomenon because it is present in all countries and in all systems; all countries are fighting against it more or less successfully. When Serbia is in question, corruption is not only present in all spheres of social life but it is so widespread that Serbia is counted within countries with high corruption rate. Economic damage from corruption is enormous; considering limited budget there is a clear need for greater efficiency in using public recourses. The authors of this paper are advocating the opinion that the problems caused by corruption (in educational sector) have been mostly neglected and that they are more the subject of daily-political than serious systemic activities. A considerable part of the paper is dedicated to the review of practical results arisen from PER projects related to these themes.

I. INTRODUCTION

In the most general sense corruption means abuse (usually) of public service with the aim of achieving personal benefit [1]. The notion "corruption " originates from a Latin word and means : "badness, disintegration, bribery, forgery..."[2, p.363]. Corruption is considered a pathological phenomenon, immoral and harmful for the society. In juridical meaning corruption is defined in various ways and through different crimes (giving and accepting bribe, illegal mediation, abuse of official position, etc.). There are lots of definitions of corruption in literature and one of them defines corruption as "deviant behaviour connected with specific motif – in order to gain private benefit on account of public authority"[3, p.271].

Several studies carried out during the last decade has clearly distinguished negative influence of corruption on economic, political and social development. It was noticed that corruption increased costs of transactions, reduced efficiency and quality of services, it influenced the process of decision making and subverted social values. Therefore, the carried out researches on the influence of corruption on giving social services – including education- showed that, for example, illegal payoff for school enrolment and other concealed expenses can partially explain the rates of enrolling and leaving school in developing countries and that bribing on the occasion of employment and promotion of teachers results in decreased quality of teaching staff in state schools, [4].

Among the basic factors which are leading towards corruptive behaviour can be mentioned poverty and low salaries of the employed in state administration. Therefore, the poorer the state the greater the rate of small corruption; in very poor countries small corruption is sometimes considered normal behaviour or a norm for buying services (it is not the case with big, «systemic» corruption which may be found everywhere and which is made and kept at high decision- making positions within political power structure of different countries). But the existing literature dealing with this theme shows that corruption is connected with stability of political systems, the current legal framework, transparency of public information, the level of responsibility of individuals and institutions, efficiency of the existing management mechanisms, the importance and characteristics of foreign aid, etc. [4].

The review of literature points at the fact that there are not sufficient available documents which deal with different aspects of corruption in education systematically and comprehensively. Nevertheless, it is clear that a struggle against corruption in so specific sphere of education should be considered a priority because it influences not only the volume of educational services, including their quality and efficiency, but also equality in education and public trust in educational system.

II. Anti-corruption measures and corruption in Serbia [according to 1, 5, 6, 7]

During the last decade considerable measures have been taken in Serbia for suppressing corruption:

- Establishing Committeee for suppressing corruption.
- Certain researches on corruption were carried out (mainly by polling citizens).
- Criminal Law of Republic of Serbia (amendments from 2002) was supplemented by a new chapter under the title "Criminal acts of corruption". A series of new laws were passed: Law on criminal procedure (it introdices new possibilities in discovering criminal acts from the field of organized crime including corruption); Law on organization and jurisdiction of state authorities in suppressing organized crime; Criminal code; Code on criminal procedure and the others.

The list of further activities seems to be even longer.Perhaps, it would be more efficient if attention was paid to preventive measures: Reforms of Public Administration, Administration of Justice, police, education, and the others, training of the employed in public services, continual campaign on building consciousness of citizens about corruption and the suppressive measures against it.

Is everything as we want it to be? A partial answer to this question give the results of the research on corruption published by Transparency International. According to the report about perception of corruption TI for 2008, only 6% of population believe in Government's efficiency concerning their struggle against corruption and 2% of the interviewed believe that administration of justice is not corrupted. According to the average value of Corruption Perceptions Index (CPI includes ranking of totally 180 countries;in the analysis the results of 13 different sources carried out by 11 independent institutions were used, published during the previous 12 months), used for ranking countries according to the opinions of businessmen and analysts about corruption in public institutions and politics, Serbia is on 91st place (CPI: 3,4). The only country from the region which is behind Serbia is Bosnia and Herzegovina (93rd place - CPI: 3,2). The most favourable value of the average CPI has Danmark (9,3) and the least favourable has Somalia (1,0)

The reports for 2009 – Has anything been changed? Yes it has, but for worse. According to TI report for 2009 Serbia remained one of the most corrupted countries in the Region, this time, from the territory of ex Yugoslavia only Kosovo was in the same group (Group 3: Between 13 and 22% of those who reported corruption during the period of 12 months). Political parties are most involved in corruption concerning institutions. The comparison of the results was performed according to services and the income – education and services were the fourth activity in the list of most corrupted activities, and this was more valid for poor than rich population.

III. Corruption research in education

As it was mentioned before both literature and relevant corruption research are very rare. More rare are researches related to education and those which deal with transitional countries and the countries of the third world are exceptionally rare. “Ethics and corruption in education” is a many-year-project of International Institute of Educational Planning (IIEP). The project offers an overall review of researching the reasons for corruption but it also gives directions of strategic acting on this field in solving the problem. The main project's aim was: to improve decision-making and managing educational systems by integration of the issues of management and corruption into educational planning and administrative methodology. The results that are mentioned here are related to those given by Hallak and Poisson [4], although some interesting and applicable results originated from the same project were later published by other authors [8, 9, 10, 11].

Monopoly and its power as well as the lack of accountability mechanisms contribute to development of corruption in educational service. Klitgaard, Maclean-Abaroa and Parris [12] illustrate corruption in their formula: Corruption (C) = M (power of Monopoly) + D (Discretion of officials) – A (Accountability). Although there is a tendency for ignoring the problems of corruption in education there are clear indications that this formula can be applicable in this sector, too. Educational sector is characterized by the lack of competition of services givers (power of monopoly of state administration), complex systems of regulation, lack of appropriate mechanisms of control and sanctions, limited approach to information, low salaries of state officers (including teachers) and a weak system of stimulation.

Behavior of active participants (impalpable inputs) has a significant influence on the problems of approach, quality and equality in education. Making easier an access to information and promotion of "the voice of citizens“ is crucial for better transparency and accountability in using educational resources.

Corruption in education is a very complex and delicate issue. Exceptionally interesting are parts of the project’s assumption [4] which serve for:

- Mapping possibilities which educational sector gives to corruption as a framework, determining the state and creating activities;
- Giving a priority to identification and documentation of successful strategies which can be adopted in order to improve transparency and accountability in education (positive approach).

A. Identification of possibilities for corruption in educational sector

Typology of the basic planning and management fields which offers possibilities for corruption in education is presented in tables I to IV.

TABLE I. REFORM OF CONTENTS IN TRANSITION

Fields	Possibilities for corruption (examples)	Influence on education
Reform of teaching plans and programs	• Low corruption	• ---
Teachers’ training	• Avoidance of criteria • Bribe	• Less qualified teachers with less approach to training
Making and distributio n of textbooks	• Avoiding the Law on copyright protection • Public tender cheating • Fraud • Illegal payment	• Lack of consistency between textbooks and programs • Textbooks are not available in classrooms
Grading students	• Selling information • Favoring nepotism • Bribe • Academic fraud	• Unearned grades available to those students who can pay bribe • Enrolment on higher levels of education on the grounds of subjective criteria

TABLE II. DEMOGRAPHIC FALL AND FINANCIAL LIMITS

Fields	Possibilities for corruption (examples)	Influence on education
Building, maintenance, repairing schools	• Public tender cheating • Avoiding legalization in schools • Data manipulating	• Bad location of schools • Too big or too small use of schools • Bad ambience for learning • Schools are opened and closed on the basis of false statistics
Equipment, furniture and materials (including textbooks)	• Public tender cheating (transport, accommodation, food) • Fraud • Data manipulating	• School meals available only to rich students • Textbooks are charged and they should be free
Salaries and stimulation of teachers	• Teachers “ghosts” • Absence • Illegal payment • Private teaching	• Total number of lessons is considerably reduced • Teaching and other staff do not respect behavior code

TABLE III. DECENTRALIZATION OF EDUCATIONAL RESOURCES

Fields	Possibilities for corruption (examples)	Influence on education
The way of financing	• Breaking procedures/rules • Data manipulating • Avoiding criteria	• Unrealistic presentation of enrolment rates in order to increase monetary resources • Disparity of available resources • Fewer resources available in priority fields
Managing teaching staff	• Favoring • Nepotism • Bribe	• Disparity in school staff
School management	• Favoring, nepotism • Breaking rules/procedure • Flow of resources	• Fewer resources available to schools

TABLE IV. NEW TEACHING METHODS

Fields	Possibilities for corruption (examples)	Influence on education
Increased use of new technologies (informatics and distance learning)	• Academic cheating	• False diplomas (non-accredited organizations which offer diplomas, paper workout)
Development of private sector	• Bribe • Fraud in the process of accreditation	• Accreditation of institutions regardless their quality and results • Parents misled concerning the quality of teaching

B. Analysis of successful strategies for better transparency and accountability

Codes of teachers’ behavior. Their basic aims are: to improve obligations, commitment and efficiency of services by formulating a set of recognized ethical standards which have to be respected by all profession members; to secure guidelines for self-discipline of profession members by creating norms of professional behavior; and to secure that the society supports and believes in profession by stressing social responsibility of the profession towards the society. Respecting ethical standards and codes of behavior can contribute a lot to establishing more appropriate educational surroundings and in this way directly influence on quality of education. Successful bringing into effect the code requires: (1) clear definition of their aims (they are not limited only to professional development); (2) wide code availability; (3) establishing both social and professional control of their implementation; (4) strict responsibility share among different parties of interest that ate involved in their monitoring; and (5) training of educational staff. In order to secure codex credibility they should be conveyed through process of participation which involves teacher's profession. Minimum aims that should be achieved are: sensibility, exchange of information, building capacity and efforts directed towards participation.

Management reformation of teaching staff. Greater transparency in managing teaching staff implies setting clear and objective criteria and creating and implementing well defined and transparent procedures for employing and transferring the staff. Automation of staff functions derogates traditional schemes of services and replaces them by determined and public procedures in which the only condition for employment and transfer is to satisfy the requirements. Involving unions in combination with easier approach to information within the system as the answer to citizens' requirements together with communication strategy whose aim is precise and prompt informing of wider publicity can contribute to transparent management system and help in building ethical culture among different levels of educational administration.

Regulation of private education. Activities for strengthening transparency of private education should include setting basic norms which regulate this sector by determining conditions for using school buildings, calculated compensations, expected services, teaching procedures, establishing and maintaining systems of certification both for centers and teachers, etc. Governments do not always solve the problems of private teaching: some of them do not intervene and expect the market to regulate these problems; the others undertake direct activities in order to control and monitor (occasionally they finance) with certain success. It is the only way to secure that private education supplements formal schooling and not to become its replacement. Private education can be (more-less) successfully self-regulated by educational profession; informing parents (publicity) may serve as useful means.

C. Strategic axis for improving transparency and responsibility in managing educational sector

Three great strategic axis for improving transparency and responsibility in managing educational sector are identified in conclusions of the project (figure 1).

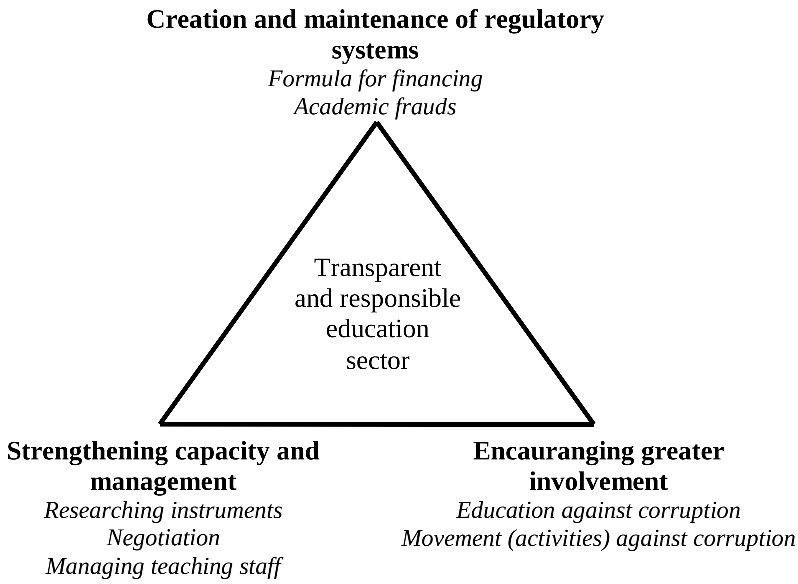

Figure 1. Strategic axis for improving transparency and responsibility in managing educational sector

IV. Conclusions

Corruption as a social evil is deeply rooted in Serbia which is supported by the fact that Serbia is considered as a state with high corruption rate. Corruption endangers legal rule, trust in state institutions, justice, equality and equal rights of citizens, loose morals, decreases state income, etc. For all these reasons, struggle against corruption must be Serbian national interest considering the fact that reducing corruption to socially acceptable level represents one of the preconditions for European integration, especially for membership in European Union. One of the most important tasks of all social powers in their struggle against corruption is strengthening social morals and developing citizens' consciousness concerning harmful effects of corruption and the necessity of their involvement in this struggle. Therefore, it is necessary that appropriate education about corruption should be introduced in programs of educational institutions. The role of media and their significant influence on publicity should be used, too. In the struggle against corruption, especially concerning preventive measures, we have to rely on scientific experience in this field and to use different experiences of other countries which have solved these problems successfully.

Education involves a significant segment of social activities so the struggle against corruption is of great importance. The results of this paper should not be considered separately but as a part of extensive integrated strategy whose aim is reducing corruption in education. Long- term success of this strategy depends on a range of factors such as strong political will, strengthening people within this profession (status, salaries), supporting freedom of the press to report about these issues, etc.

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INFORMATION LITERACY AS A KEY COMPETENCE OF CONTINUING EDUCATION

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Abstract - Trends in countries shows that education and the creation of human resources are among the top priorities of national strategies and policies of social, economic and technological progress. Continued socio-economic changes, rapid scientific and technological development require a population that is able to effectively participate in social processes and uses available technology.
It requires that students and teachers become more intimate with information technology, preparing for solving technical problems that thirst to experience, trained in the new mode of communication that thirst be used, and to play an active role in learning and taking responsibility for their own learning.
That is, it is necessary to enable students and teachers to recognize and use information. The paper presents research whether teachers possess information literacy. Also determine whether the implementation of certain standards in teacher training programs can be achieved by raising the level of computer literacy.

I INTRODUCTION

Strategy and the concept of learning has become a major determinant of social, civil and educational policies in the world. Its feasibility depends on the competence of an individual to navigate in the information environment, possessing skills of finding, selecting, evaluating and timely use of information, word, depends on information literacy.

"Information literacy is the recognition of the need for information and possessing knowledge of how to find, evaluate and use the best and latest information available to solve a specific problem or issued a decision. Sources of information may be different: books, magazines, computer, TV, movies or anything else. Today a special role as a source of information is the Internet."

The concept of information literacy has grown parallel with advances in information and communication technology in the early 70's, and Paul Zurowski first used the term 1974th year.[1]

American Library Association: (ALA), says: "To be information literate, a person must be able to recognize that this is the information needed and then have the ability to locate, evaluate and effectively use the information. "[2]

Finally, 1989 year the report was published in the American Presidential Committee on information literacy which has further emphasized its importance by defining it as "the ability to recognize important information and the ability of its finding, evaluation and effective use" and reiterated that the information literacy skills necessary for lifelong learning life and to form an informed and prosperous citizenship. [2]

Information literacy comprises the following components as part of the educational scheme:

- Clarification and understanding of the requirements problem, or task for which information is search.
- Identifying sources of information and finding them.
- Determining whether the information was useful or not in solving the problem.
- The selected information is organized and processed so that it can develop the knowledge and solutions to problems.
- Info155rmation or a solution to present the appropriate audience in an appropriate way.
- Critical evaluation after completing a task and a new understanding of the concept.

From presented conceptual definitions of information literacy, it can be seen that it is a key competence required for continuing education and subsequently incorporated into the starting point of modern national educational policies and international instruments in the field of education as one of the various forms of literacy for the 21st century. In this context, education becomes a strategically important activity that causes the massification of education, and therefore the change in relation to the issue of who teaches what, how and when to learn.

II LIFELONG EDUCATION

Life Long Learning, or the concept of lifelong education, refers to the idea of learning that lasts a lifetime. These two terms, lifelong education and lifelong learning include one another, as a lifelong education means a system of organizational, administrative, methodological and procedural measures to promote lifelong learning. The basic idea is that there should be an educational system, which shall at all times, every individual, regardless of age or professional status, provide an opportunity to master a new, different and useful knowledge. Also, formal and informal education in this sense considered complementary elements of the same whole. Lifelong education, as well as intensive human resource development, has become a necessary condition for increasing the efficiency of modern society.

Elements underlying the concept of lifelong learning:

- upgrading of all available educational system, including formal educational institutions for primary, secondary and higher education
- exceeding the achievements of formal education, bringing together all relevant institutions, individuals and groups about the learning process
- connecting the components of formal and informal education, creating an "educational system for all" made widely available for all generations of users
- each person can find and recognize the true value of engaging in lifelong education

III COMPUTERISATION OF THE SCHOOL

Computerisation of the school means more efficient organization of the overall educational activities in schools, more rational use of energy all the factors of teaching, extension and education resources more quickly, more efficiently get to the progress of relevant information about students in the learning process.

"Computerisation means static distortion of the current school, which is by nature a conservative institution, and retaining some of the educational models that are long outdated. The school is entering a new practice hard, and when it is accepted, then slowly release it, although this practice is long outdated."[3]

Computerisation of the school is large and very important social and economic task. Students and teachers are training to use all possible resources, and above all, information, and to have adequate computer literacy. Applying information technology to modernize the teaching process is realized through the teacher as the organizer of educational work in schools.

IV TYPES OF LITERACY

Information literacy as an umbrella model is:

A. *Library Literacy*

Competence to use the library or library literacy is a precursor to computer literacy. It is realized by reference and teaching on the use of a specific library, its services and resources. Today, the educational activities in the library developing more and more toward computer literacy in order to enable adoption of skills to access and use resources regardless of where they are.

B. *Media Literacy*

Media literacy refers to the ability of "consumption" and thinks critically about the information obtained through the mass media, and today the Internet.

C. *Digital literacy*

Digital literacy is the ability to locate, organize, understand, evaluate and create information using digital technology. In other words, refers to the ability of reading and understanding of hypertext and multimedia texts, and includes an understanding of images, sounds and text nesekvencijalnog dynamic hypertext.

D. *Multimedia Literacy*

Multimedia Literacy is a new form of literacy, which was created by the emergence of new forms of communication among people. Multimedia is media that uses several different types of content while presenting some information. Several of these are already part of a global communication: text, sound, animation, video and interactivity.

Multiliteracy person is defined as someone who is flexible and can understand and use literacy and literacy practice in a wide range of texts and technology in a socially responsible manner, in a world that is socially, culturally and linguistically distinct, and who can fully participate in life as an active and informed citizen.

E. *Computer literacy*

Computer literacy is defined as the knowledge and ability to effective use of computers and technology in general. It also refers to the degree of skill that one has when using computer programs and other applications that are connected to a computer. Another important component of literacy and knowledge of the computer. Possession of basic computer skills is an important prerequisite for an individual may have in developed countries.

Often is equated with information literacy, however, the fact is that these are two fundamentally different phenomena. While the content deals with information literacy, information relating to technology, infrastructure and technological know-how.

V MODELS AND STANDARDS INFORMATION LITERACY

A. *Model of information literacy*

Models are the theoretical framework, often based on scientific research activities, and standards form a link to the practical implementation of models of information literacy.

Standards are usually aimed at defining the characteristics of the individual written information, the exhaustive listing of properties, attributes, processes, knowledge, skills, attitudes or beliefs that an individual needs to build.

The models most often mentioned in literature are:

1. Metamodels: model of information retrieval, model-driven research, gathering blueberries model, relational model
2. Contextualized models: the model of six major skills, SCONUL model of information literacy model TFPL Workplace

B. *Information Literacy Standards*

Three categories, nine standards and twenty-nine indicators are used to describe a person who is IT literate. The first three standards relating to services related to information literacy, and the other two categories are related to independent learning.

Standards related to information literacy - a student who is information literate:

- effective and efficient access to information,
- evaluate information critically and competently,
- use information accurately and creatively.

Standards related to independent learning - the student who knows how to independently learn, is information literate and:

- request information that satisfy their personal interests,
- means to evaluate the literature and information,
- difficult to find quality information.

Standards related to social responsibility - the child who contributes to the educational community and society is information literate and:

- recognizes the importance of information,
- ethics refers to information,
- participate effectively in groups to find and generate information.

VI ECDL STANDARD

Early 1990 was dominated by independent and individual definition, form large businesses or other institutions about what constitutes computer literacy. The European Commission launched in 1995. initiative to increase the level of IT literacy in Europe. Part of this initiative was the proposal to establish a trusteeship that would examine how to achieve and that is derived from the ECDL (European Computer Driving Licence) as standard. Very soon ECDL has been accepted in many countries of Europe and other countries outside Europe and spread as the standard and method for the adoption of information literacy.

ECDL Basic program consists of seven modules:

- Concepts of Information Technology,
- Use of computers and work with files,
- Word Processing
- Tablelarni calculations,
- Databases,
- Presentations,
- Work on the network and the Internet.

VII ORGANISATION OF RESEARCH

The experiment was conducted in the primary school “ Jovan Popovic”; in Novi Sad, Primary School “The First Brigade of Vojvodina” in Novi

Sad and the primary school “Milos Crnjanski” in Žabalj the school 2009/2010 year.

The study sample included personnel management, professional services and teaching staff in these schools.

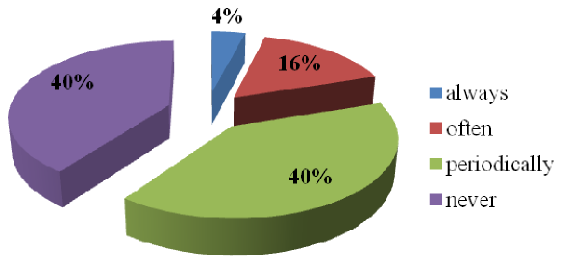

Figure 1. How often use computer during the lessons?

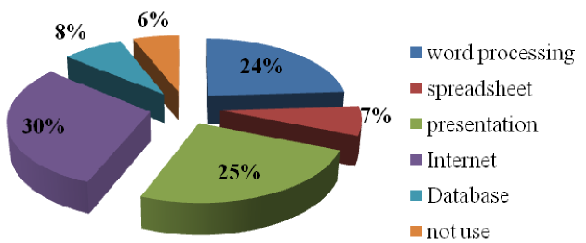

Figure 2. What tools do you use for learning and preparation for teaching?

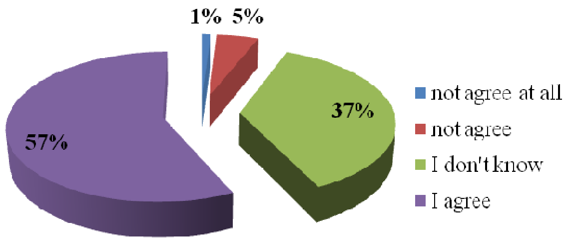

Figure 3. Does use computers in teaching casn raises the level of motivation and student achievement?

VIII Elaboration and Results of Research

In accordance with the general methodological approach, this study empirical character. As basic research, techniques in collecting data used to test and interview, and for processing and interpretation of results used statistical methods. The paper presents the research level of computer literacy of teachers in primary schools.

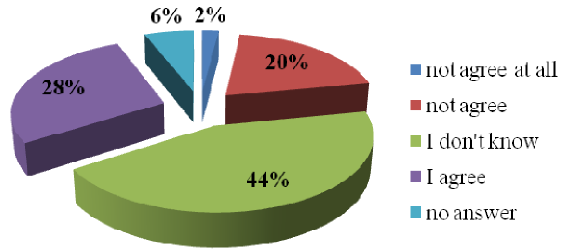

Figure 4. Does ECDL modules set the standard of computer literacy?

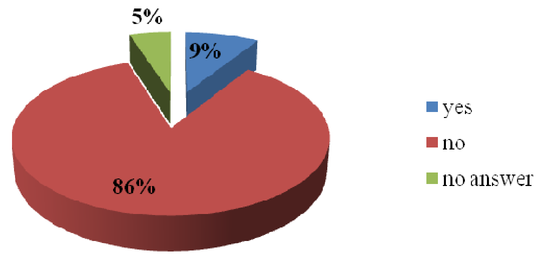

Figure 5. Do you have a certificate of attainment ECDL modules?

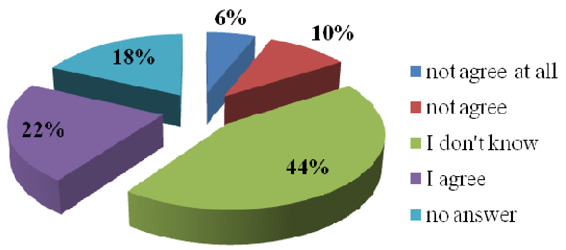

Figure 6. Do you master ECDL modules are used in preparing and executing instruction?

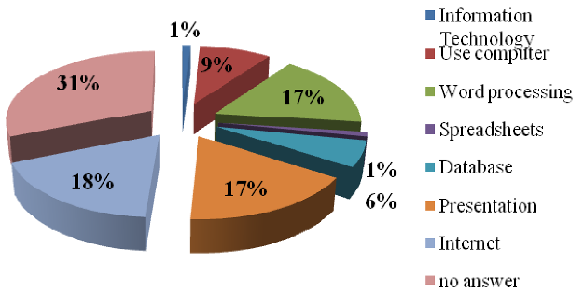

Figure 7. Which of master ECDL module you most use an opportunity of preparing and executing teaching?

IX RESULTS OF RESEARCH

After conducting a survey among management personnel, professional services and teaching staff in primary schools it can be conclude:

- 92% of respondents use a computer
- Only 32% of the respondents have been taught to use a computer at one of the professional courses under the supervision
- 69% of respondents the motive for training to work on a computer found in the modernization of teaching and acquiring new knowledge, while the rest of 31% motivation was to accumulate a sufficient number of hours required for training and other
- 45% of respondents e-mail is not used or used less frequently than once a week
- 89% of respondents do not use email to communicate with students
- 50% of respondents do not use or rarely use the Internet for personal professional development
- 70% of respondents disagree or not decisive in the assertion that it is well informed about the possibilities of information and communication technologies
- 59% of respondents never or occasionally used a computer to prepare class
- 80% of respondents never or occasionally used the computer during lessons
- 43% of respondents considered, or is reluctant to priimena computer raises the level of motivation and student achievement
- 72% of respondents did not agree, not determined or did not answer to the claim that the ECDL modules set the standard of computer literacy

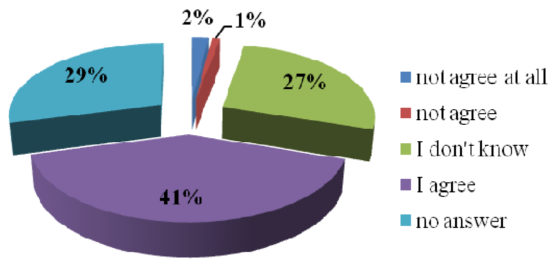

Figure 8. The implementation of the ECDL modules in Computer Science programs would increase the level of computer literacy?

- 86% of respondents do not have a certificate of attainment ECDL modules and 5% of respondents did not answer this question
- 9% of respondents have a certificate of attainment ECDL modules

Based on the above mentioned facts it is safe to say that the level of computer literacy, from senior management, professional services and teaching staff in primary schools is not a satisfactory.

After creating the test related to the knowledge of information and communication technologies in general, where it was possible to win 24 points by 21 teachers of IT in primary schools, the following results: 1 teacher has won 22 points, five teachers 23 points and 15 teachers maximum points 24 points.

On this basis it can be argued that teachers of Informatics and Computing in primary school have been sufficiently computer literacy, although most do not possess the ECDL certificate.

X CONCLUSION

One of the most important objectives of modern educational practices in the world today is the release of students from learning unnecessary content, except irrational spending time and energy in the final outcome of this process, do not have any positive effect or in any way affect the expansion of their knowledge, skills and skills. This applies especially to the end of compulsory primary education, which for a number of features (along with growth, mental and physical abilities of students...) requires not only attention and sensitivity of an arrangement of the basic legislative framework but, above all, and carefully selected content should are studied in different subjects prescribed by the Curriculum. As regards the Republic of Serbia and educational practice at this level, the first step has been made very encouraging developing educational standards for the end of compulsory primary education.

It is a known fact that formal education is not able to give young people a full and comprehensive body of knowledge before they start their career. How are learning constantly renew and innovate, the education system constantly has to change. Knowledge transfer became learning and it includes the entire life of the individual and society with its educational, social and economic components.

In the empirical part of this study showed that the level of computer literacy, from senior management, professional services and teaching staff in primary schools is not satisfactory and that the implementation of the ECDL standards in teaching Informatics Program in the school possible.

Computer science and Informatics in the school has the status of an elective subject from the list of V, that is, not even the status of compulsory optional subject.

One of the aims of this study was the one that proves that the teaching of Computer science and informatics in primary school is low and that itself subject to Computer science and Informatics has a well-deserved treatment in the hierarchy of compulsory and optional subjects.

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LEARNING IN ICT ENVIRONMENT

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Abstract – What kind of knowledge is necessary and how should educational system look like in the world characterized by fast technological changes that scientific revolution brings? The machines which can remember, "think" and work more efficiently than people are coming. High technologies ruled by scientific way of work are pushing from historic scene simple and traditional electromechanical technologies of industrial society's physical systems, they are suppressing social manufacturing of classical technologies based on social and technical labour division. High technologies, in work and production, are pushing politechnical educational system whose aim was to give certain knowledge in the function of its application.

The aim of this paper is to try to point at a new ambience which influences the educational system, advantages and disadvantages of uncritical attitude but also at the need that pedagy should offer new solutions.

I. INTRODUCTION

Combination of information and communication technologies has enabled great knowledge improvement.Information are becoming instantenuous and available to all. The gap between possibilities of new technologies and their use in educational process is becoming bigger and bigger. Development of new technologies will go on no metter what benefits will be used in education. It is obvious that current educational system is not aimed to new, the so called Net-generation matured by computers and the Internet.

Inert by its nature, educational system cannot cope with the phenomenon of enormous knowledge increase, requirements of new generations, fast knowledge obsolescence, inadequate technological (digital) literacy of teachers as well as professionals who manage the system. Although technology is present in almost all spheres some researches show that the use of technology in education, among teachers, is far from being the universal phenomenon. Some examples show that there are still teachers who claim that they do not have time to spend in encountering new possibilities they are being offered. Estimating the facts that have contributed to the gap between educational technological means and their usage, *Sharon Kopyc* says that institutions must adopt versatile, flexible strategies in order to encourage more expanded use of technologies in the work of teaching staff. Beside teachers' workshops and technological committees, Kopyc represents further strategies which should be considered by institutions: teachers' educational forums, technological postgraduate programs which offer inaction time and structural support to teachers, as well as other well-timed educational possibilities including time limits, individual needs and personal priorities of teaching staffs' members within the whole institution. *Kopyc* claims that institutions will achieve greater success and use their educational potentials and technological infrastructure by avoiding the universal "one for all" approach to teaching development.

The researches related to the role of technologies in changing and shaping the today's way of learning, tell us about teachers' inadequate use of technologies. Precisely, according to these researches, students want more challenging, technologically oriented educational activities. Software for teaching management that teachers used least was exactly the software which could help students in greatest extent. Students said that their schools and teachers didn't recognize and respond to basic change which had happened to their students and and a learning community although they were responsible for their development.

Scientific society and a completely new civilization different from everything known before have come. In the production characterized by high technological and scientific way of work a new value is consisted of collecting, using, spreading and creating information and knowledge. Instead of economy based on producing goods the new economy, based on knowledge, is coming. Nations whose political elite rejects the old way of production and directs their societies towards building information scientific society are achieving great economic and other positive results.

II. NEW TECHNOLOGIES IN EDUCATIONAL SYSTEM

Basic information knowledge and skills which information literate person should have are constantly developing and improving because they should follow fast development of information and communication technologies (ICT).

Ten years ago that basic knowledge included: elementary knowledge about computers and the use of operation systems, basic use of program for text processing, table calculators and making presentations. Nowadays, elementary knowledge is consisted of: the use of the Internet and its services, the use of e-mail, the use and browsing of World Wide Web. Even publishing contents by creation of HTML presentations can be considered as basic information knowledge.

Involving new technologies in education has made a new approach to teaching which is called - CMC (Computer Mediated Communication) or communication by the help of computers. CMC can be used in many ways and some of them are the following:

- e-mail and interactive messages,
- discussion groups and forums,
- video conferences,
- on-line catalogs or knowledge bases,
- on-line learning, virtual classrooms and
- programmed archives of data stored on the web (including pictures, sounds, texts videos, etc.).

CMC promotes interaction which does not often find the use in traditional frontal ways of teaching. CMC enables students free searching of alternative ways and finding their own styles of learning. One of the greatest advantages of this way of teaching is that teaching content and everything that follows and supplements it can be available in different forms, at any place and at any time.

ICT helps professional educators to share with their students the tools which will serve as guidelines in the process of their own knowledge development.

However, CMC represents only the first step towards modern education in new technologies environment. It is obvious that innovations enter the teaching process under the influence of extremely fast development of science, technics and technologies as well as development of psychology, pedagogy and didactics. Innovations of educational system assume scientifically based changes in the whole structure of school system – this is where the need for development of modern information school system originated from. Modern, efficient organization and management of pedagogical processes cannot be understood without information system as their management nucleus. The task of school information system is to:

- provide selective and reliable information to its internal and external users, in time,
- contribute to efficiency of pedagogical-organizational school system by providing permanent, necessary information,
- enable improving quality of educational process by offering modern and complete base for teaching and other additional ways of work with students.

III. DIGITALIZATION AND ITS INFLUENCE ON EDUCATION

Knowledge society which is a final objective is based on permanent learning and achieving new skills. Learning is not connected only with educational institutions but independent, individual work in informal sphere of education is expected as well. Libraries are unique institutions available to all people in which accumulated knowledge is almost free of charge. Therefore, their role is becoming more and more important both for development of individuals and the society. Modern libraries must be adjusted to modern times and they should be transformed from silent places, in which books are kept to information centres and meeting places, which are adjusted to needs and wishes of potential customers.

Digital document, a product of information era, a challange of modern times that numerous archives, libraries and museums in the world couldn't resist, represents a new paradigm for current generations of users and researchers of archive material, a paradigm which will be normal and common for future generations. However, although many archives have started or even finished some digital project it must be said that permanent state of this information technologies module and its application cannot be defined precisely and that it is not treated by archives as a possible replacement for the original or a copy for permanent storage.

Modern information technologies provide easy availability of data in numerous digital formats – qualitative and rare music, books and journals in electronic form and the newest results of scientific researches. Digital archives are characterized by many advantages – some of them are: faster access, bigger capacity for storing information, etc. For all these reasons traditional systems of storing and transferring information are encouraged to change themselves according to new users' requirements and also because of increasing production of printed, audio and video materials. Libraries as institutions represent central places within this process whose objective is managing an enormous corpus of human knowledge, leading, creating and improving the process of presentation, availability and regeneration of information resources.

Although digital technologies have not been used long enough in order to pass the test of time considering permanent state of digital record they are the best solution for their low price, easy use and widespreading. It is sure that in the long run nobody could guarantee durability of CDs or hard discs, so it is necessary to make new copies every five years and even more often. Another limitation that often appears in discussions represents a need for outer devices necessary for using digital collections. Although it is true, the very essence of digital technologies assumes the using of such devices (computers, for example), so in this case we are talking about individual relations towards current trends. A separate chapter should be dedicated to copyrights and their easy misuse on the Internet. Intelectual property represents a base for encouraging creativity so the programs of digitalization must be performed with respect to copyright and similar rights as well.

Nowadays, all kinds of documents are to be found in digital form. “The ammount of information collected in books which have been written since the ancient time up today is enormous: 50 million MB. Digital contents: pictures, video, music, e-mail, web pages, instant messages, phone calls and other digital content which were created, kept and multiplied (three times as an average) in 2006 ammounted to 161 billion gigabyte. It is 24 000 MB information per head in the world or 6 tons of books in 2006 or 3 million times more than the information in all the books written until now. By the end of 2010, according to some analysts it should have been increased by six times - 988 billion GB“. [9]

Some data show that there is a great gap between collective and individual knowledge therefore there is a need for new solutions through new concepts of education.

IV. EDUCATION FOR NET - GENERATION

”Today’s pupils and students are generations grown-up side by side with new technologies. They have been surrounded by computers, video games, digital audio technology, video cameras, mobiles (there are 5 billion mobiles in the world today) and other toys and tools of digital era. An average student spends less than 5.000 hours in reading but more than 10.000 hours in playing video games (and about 20.000 hours in watching TV). Computer games, e-mail, the Internet, mobile phones and direct exchange of messages have become the integral part of their lives.” [7]

Members of the new generation think and process information in drastically different way from their forerunners. These differences are deeper and more serious than expected and even understood by many teachers. Various experiences lead towards different brain structure, says Dr Bruce D. Berry from Medical College Baylor. It is possible that their brain has been changed by the way of their growing-up. Whether it is true or not it is sure that the models of their thinking have been changed.

The members of Net-generation have been used to fast information reception. They process and work several jobs in the same time. They prefer pictures to texts. They are inclined to random approach as in hypertext. They work best in multimedia environment and enjoy in instant pleasures and frequent rewards. They prefer games to serious work.

All those who are not in digital world but they once found themselves there and became enchanted by new technologies and accepted some of their types will always be digital newcomers.

Comparison of characteristics of Net-generation and digital newcomers is presented in the picture 1.

Net-generation	*Digital newcomers*
whiplash speed	conventional speed
multi tasking	mono tasking
not linear approach	linear approach
discontinuous processing of information	processing of individual information
iconic skills	skills-based reading
connected	alone
collaborative	competitive
active	passive
learn to play	separating learning and play
current cost	patience
fantasy	realistic
technology is a friend	technology is the enemy

Figure 1: Comparison of the properties of two generations

The situation is pretty serious because the greatest problem in education is the fact that teachers, who are digital newcomers and speak the language of pre-digital era have to educate the population who speak a completely different language. Teachers, digital newcomers, assume that their students are like those in their time, so they use the same methods that were useful in the time when they were students. This assumption doesn't work any more. Therefore, if we want to educate Net-generation we should face the real problems and cope with them. The following methodology and contents must be considered:

- Methodology: Teachers should learn to communicate in the language and style of their students. It does not mean that they have to change the meaning of important issues or the way of thinking but they should go faster and make bigger steps, in fact they should harmonize their pace with that of their students.
- Contents: After digital wonder two types of contents have appeared: Inherited contents and future contents. Inherited contents involve reading, writing, mathematics, logical thinking, understanding old ideas and records, etc. The whole traditional teaching plan and program are still important but they belong to the past time. Some parts (like logical thinking) will stay important but the others (like Euclid's geometry) will become less important such as Latin and Old Greek. Future contents are mostly digital and technological. While they are involving software, hardware, robotics, nano-technology, genoms, etc., they are also involving ethics, politics, sociology, languages and other similar things. That future content is interesting to students.

In other words, it is necessary to be creative and imaginative but some old knowledge should be used as a base. There are some successful experiences concerning adjustment of materials to the language of net-generation and new solutions are finding out as well.

V. DISTANCE LEARNING AS TECHNOLOGICAL PLATFORM OF THE FUTURE EDUCATION

Distance learning represents establishing connections between people and resources by the help of communication technologies or it can be understood as a type of education in which learning and teaching are separated in time and space permanently or mostly. Improving media for supporting this type of learning as well as theoretical and practical knowledge influenced distance learning that has passed through several phases – from classical correspondent schools to distance learning aided by IT.

Distance learning concept assumes a great number of factors and they can be classified in several categories:

- elementary information about a school, teaching plan and program, staff, historic background, equipment…
- Teaching material: lessons available on web pages ans files for downloading. They are: presentations, animations, video and audio materials which can be presented in textual form. In addition, links with other Internet pages covering similar themes, similar courses, school media-library, can be offered, too.…
- Interaction with a teacher, as well as on-line access to consultations. They are: information about a suject and a teacher, time table of a teacher, information related to printed material, subject content, marks, teacher's e-mail, discussion groups for communication among students, form for reports about problems.
- system for knowledge validation.

The first group of factors related to distance learning concept is not of great importance for the process of learning but the second and the third group represent the elements of this concept. Final and the most important phase of distance learning concept is evaluation of students' knowledge by teachers. This is the only phase within distance learning concept which requires the presence of teachers and students at a certain location for proper and regular knowledge testing.

Contents which is sent to users in any type of distance learning is of greatest importance. This is the key factor, together with communication with a teacher, concerning learning on the Internet. The contents on Internet pages must be selected carefully and reviewed as well. Available material should include:

- theoretic part for each unit,
- solved tasks for each unit,
- links for pages containing similar material for the given theme,
- pictures and graphs with explanation of necessary steps
- multimedia content and explanations of software packages dealing with relevant themes
- examples of tests (solved tests as well as unsold ones to be solved by students)

All these contents have to be adjusted to concrete users and they also have to be available and appropriate to majority of users. IT technologies offer numerous possibilities to distance learning – they are especially useful to those students who are prevented from regular course attendance for various reasons, so they can continue their courses from home or from other places and in that way they can actively be involved in the learning process.

VI. THE FUTURE OF EDUCATION IN THE ERA OF GENERAL INFORMATION PROCESS

The future of schools in information era can be observed from several angles and two of them are most significant:

The first aspect is technological and schools must accept new technologies in the future which enable easier learning, distance learning, browsing encyclopedic base of knowledge , improving student-student communication, teacher - student communication and teacher - teacher communication by using the newest web and Internet technologies. There is still a danger of uncritical approach and acceptance of the newest technological achievements without any plan and program as well as their implementation in the system.

Numerous researches have showed that learning by the help of various multimedia contents (text, picture, sound) encourages interest and improves students' concentration in general. Schools as institutions which promote knowledge will have to accept the newest trends in data base development because it is the most prosperous and practical way of fast approach to requested information. It will not be possible to follow the trend related to science development without connecting educational institutions by modern communication technologies and backwardness will be bigger and bigger.

The second aspect is pedagogical and sociological. Technologies bring a lot of advantages but a great attention should be paid to implementation of such technologies in education. Implementaion of information process in education must not be transformed into mere trend and fashion following in the world of computers and IT in general. If this becomes the reality then the very idea of implementing IT and improving education loses its sense. The result of that can be nothing more than some new discovery by the help of a computer.

Therefore it is necessary to make a strategic plan and program for implementing IT in school system and the science because it is the only way for achieving the main objective – improving education by the help of computers.

VII. Conclusion

Because of fast development of science and frequent technological changes global society is being constituted as educational, scientific and production system with new educational aims which does not offer knowledge for the current technology but for the future as well, in other words, it gives a life-long knowledge which enables life-long learning and creating.

Within these fast changing conditions high technologies have caused the crisis of education and the society as well. High technologies have brought a new educational aim which can be reflected in offering general, permanent knowledge and the knowledge for scientific work in relation to making and implementing new knowledge. Here comes the society which is learning, working and creating. In such a light development of education should be seen because global society is being constituted as a new educational, scientific and production system.

The future of education in the era of general informatization should:

- improve communication between teachers and students,
- create educational system appropriate to the generation grown-up in digital era,
- invest more in information education of teachers,
- scientifically research from didactic aspect how and in what extent to use possibilities of new technologies in formal and in informal education.

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CONTEXTUAL CONDITIONS OF LEARNING AND TEACHING IN EARLY CHILDHOOD

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Abstract - This paper represents the analysis of personal theory of preschool teacher on the importance of the context of kindergarten in the construction and understanding of learning and teaching of preschool children. Subjective professional concepts of preschool teacher as the representative of institutional context of educational process were observed by the model of qualitative interview. The answers of preschool teachers were classified in the system of categories, whereas their connection was defined with X^2 independence test. The results of X^2 teste were obtained according to the analysis of the relations of the systems of categories at the sample of 35 preschool teachers. The results showed there was significant correlation of the answers to the set of questions typical for the observation of the context and implicit pedagogy of preschool teachers at the significance level p= 0,01. The interpretation of the results leads us to the conclusion that preschool teachers do not use context as means of restructuring of learning and teaching sequences. Therefore, they do not use developmental potentials of the context as the resource in the building of knowledge structures of children at an early age.

I. INTRODUCTION

Definition, structuring, redefinition and restructuring of working and educational conditions represent common concepts in the contemporary discourse of our society. The quality of learning and teaching from an early childhood should try to keep the pace with vast number of information which is multiplied extremely fast. (Parrot, 2002). Therefore, we have to find out the preconditions of efficient and effective educational process at the first level of educational system, in kindergarten, as well as to try to keep educational system up to date with progressive technical, technological and informational development in the 21st century. The greatest variance of this answer could be attributed to professional competencies of preschool teachers, although recent theories and reserch on learning (Barth, 2004., Kovač 1998., Pešić, 1998., Krnjaja 2008., Slunjski, 2006.) claim that learning and teaching are conditioned by the context. Therefore, the aim of this paper was to investigate preschool teachers' understanding of elements and efficency of the teaching process, as well as the understanding of institutional context of kindergarten as developmental potential for learning and teaching. Context as a set of circumstances in social and physical environment represents meaningful entirety of facts and events, which has particular meaning. Meaningful entirety is made by constant connection, mutual conditioning and interaction of elements which form particular meanings. The meaning is created and being changed in the process of interaction of all components. Therefore, each context is unique. This paper is based upon institutional context, as a micro context, which is defined by the structure and the means of space management, time management, relationships among children and the adults, openess of kindergarten to children's needs and to local community. If institutional context of kindergarten is defined in this way, then individual participants in specific environment, with their own needs and conditions to which they are exposed, represent its components. Therefore, institutional context of kindergarten is represented as an educational frame where specific meanings, which child structures as an educational sequence in cognitive, motor and social status, are constructed. Thus, context must be seen as a process, whereas teaching and learning of preschool children represent the construction of meaning.

II. METHOD

The sample included 35 preschool teachers who work in kindergarten „Pčelica“ in Sremska Mitrovica. Individual, qualitative interview was used in the investigation of preschool teachers' understanding of relationship between learning and teaching. Four questions were used as a frame for the interview: 1. What is the relationship between learning and teaching in your opinion? 2. What is „good method“ of teaching in your opinion? 3. What does represent difficulty to you in the choice of particular teaching method? 4. What does learning and teaching context mean to you? Two researchers interviewed preschool teachers, the author of the paper and doctor of pedagogy. The interview was noted and recorded. The answers of preschool teachers obtained during the qualitative interview were classified in the system of categories, which was structured after the realization of the interview. Descriptive statistical methods of frequency distribution, central tendency measurements and causal non-parametric procedure X^2 test were used for the analysis of the results.

III. Results and discssion

The results of qualitative interview obtained at the question 1. What is the relationship between learning and teaching in your opinion? show that the greatest number of preschool teachers' answers (39,14%) is related to understanding of the learning and teaching as separate processes, which can be accepted from the point of view which regards learning as internal process, and teaching as creation of external conditions. If frequencies of answers (Table 1) are compared, it can be noticed that interpretation which considers learning as an active, and teaching as a passvie process has highest frequency (9). The second difference which can be noticed in this category refers to the definition of difeerent areas of learning and teaching, whereas learning is associated with play and building of knowledge, and teaching is associated with giving information, problem solving, habits and skills development.

TABLE 1. What is the relationship between learning and teaching in prechool teachers' opinion?

categories	**preschool teachers' answers**	*f*	Σ *f*	%
A)they interpret learning and teaching as identical processes	there is no difference, they are the same	5	5	12,11
B) they interpret learning and teaching as interactive processes which complement each other	-they are dependant on each other, they complement each other -everyone learns through his or her own activity, -preschool teacher ensures conditions and encourages learning	6 2	8	19,51
C)they interpret learning and teaching as processes which are linked in some way	-teaching guides learning -learning is process and inborn need, whereas teaching preceeds learning and it is shorter -learning is basis and teaching is superstructure	6 4 2	12	29,22
D)they interpret them as separate processes	-learnig is active, and teaching is passive process -teaching leads to problem solution, whereas learning is connected with play -learning is active process, whereas teaching represents giving information	9 3 4	16	39,14

Eight preschool teachers of 35 preschool teachers who were interviewed (19,51%) interpret the relationship of learning and teaching as interactive relationship in which these processes complement each other. The answers which describe this interactive relationship as "complementary", "mutualy depending", "the one which creates conditions, encourages", are the most frequent. These descriptions can become basis for understanding of complementary nature of learning and teaching. Five preschool teachers equal learning with teaching and interpret them as idetnical processes. Teaching is understood and programmed as applied learning psychology, whereas practical implications which overcome frames of learning knowledge were not taken into consideration. The second implication of regarding learning and teaching as identical process can be neglection of psychological rules of learning whereas whole attention is paid to teaching solely.

Another important characteristic of relationship between learning and teaching can be functionality of teaching method for maintaining of certain quality of learning. In their interpretation of „good method", preschool teachers had several statements. Their frequency is presented in Table 2. The greatest percent of answers (46,15%) refers to the relationship between „good method" and enabling of quality of learning. The analysis of individual answers shows that preschool teachers use several dimensions in their interpretation of „good method", such as "independence, encouraging of inner motivation, interest, creativity, active realtionship of children in learning process, getting experience". These dimensions represent preschool teachers' assumptions on quality learning, which shows that significant number of preschool teachers is aware of it, but it could also explain their definition of good method which is based upon the quality of learning. From the point of view of practitioners they describe "good method" according to their understanding of quality learning. However, there is a dilemma why preschool teachers do not take the aspect of creation of conditions needed for quality learning into account while considering "good method".

TABLE 2 What is *"good method" in preschool teachers' opinion*?

categories	preschool teachers' answers	*f*	$\sum f$	%
1) it ensures learning achievement	-it ensures good results -it makes knowledge acqusition easier	3 7	10	25,64
2) it ensures the quality of learning process	-it makes children interested for the activity -it enables children to take active part -it enables children to show their creativity -it satisfies children's needs -it enables children to develop individual traits in the activity -it enables children to experiment -it enables children to get new experience -it ensures good communication with children -it offers choices -it encourages childrens' inner motivation	6 4 1 1 1 1 1 1 1 1	18	46,15
3) method which is good in itself	- play -it enables understanding of a content -it is suitable for particular area -it unites all elements of the method -it represents combination of different methods	4 4 1 1 1	11	28,36

Lower percent of answers (28,36%) refers to interpretation of the method as *"good"* in itself. In their interpretations preschool teachers mention play as the most common means of learning in preschool period. Other answers express connection between "good method" and learning content or they associate it with combination of several different methods.

More than 25% of the answers referred to comprehension of "good method" as the means of ensuring learning achievement. Even if we do not take the type of achievement into consideration, the importance which preschool teachers assign to achievement can have its basis in comprehension of learning as a process of production where "the product" has the greatest value, whereas "the means of production" are not important at all.

Environment has the highest frequency (41) in definition of difficulties in the choice of teaching method (Table 3). The lack of materials has the highest frequency (40) in individual comparison of parametres in categories. In additional questions preschool teachers confirmed that commonly used expression "unequipped environment" includes the lack of "furniture", as well as the lack of materials, so that they can be analyzed together. Preschool teachers tend to say there is "a lack of materials and equipment" when they express their attitude on working environment. These answers could lead us to the conclusion that preschool teachers define equipment and materials as significant "in themselves", and not in the relation to their purpose in stimulating different ways of interaction and different types of children's learning activities. According to these answers the following question could be asked: In what extent does the lack of equipment and materials represent technical problem in teaching or the problem of preschool teachers' reflection about the learning process?

Preschool teachers' answers considering the lack of materials could also show that they believe that only certain materials can help them achieve particular learning goal. Therefore, they associate the lack of materials nad equipment with the lack of learning possibilities, which prevents them from looking for different learning solutions.

TABLE 3 What does make difficulties to preschool teaacher in the choice of learning and teaching method

categories	preschool teachers' answers	*f*	∑ *f*	%
1)space,equipment, materials	-the lack of working materials -working environment is not well equiped - inadequate working environment	19 14 8	41	33,06
2)the number of children	-large number of children in the group	24	24	19,35
3)children's interests and needs	-different developmental level of children within a group -children of different age within the same group -different interests of children -making a child interested for activity -the lack of motivation -children whose behaviour is inappropriate -children's mood and health -constant recognition of children's needs -a child with special needs -the level of children's previous knowledge -there is no feedback	7 6 6 4 3 3 3 2 3 2 1	40	32,20
4) cooperation	-the lack of cooperation between preschool teachers and parents -environment -child's unwillingness to cooperate -theory does not keep pace with practice -mutual planning	6 5 2 1 1	15	12,10
5) there are no difficulties	there are no difficulties	4	4	3,22

Large number of children within a group occurs in 19,35% as an obstacle in the choice of teaching method. Preschool teachers' answers do not give us sufficient information on particular dificulties associated with the number of children, such as social environment organization, time and space menagement. The answers "child shoud be interested in the activity", "the lack of children's motivation", "children whose behaviour is inappropriate" could lead us to the conclusion that preschool teachers observe children's learning only from the standing point of teaching. Teaching position is illustrated with words "child should be more interested, the lack of motivation, inappropriate behaviour" which illustrate preschool teachers failure to make children more interested and motivated for particular activities. Therefore we can conclude that possible solutions should include reconsideration of preschool teachers' notions on interests and motivation of children in learning process. 21,14% of difficulties were associated with number of children in the group in preschool teachers' definition of difficulties in the choice of teaching method. Additional statements were "we cannot hear what each child has to say","we cannot pay more attention to children who did not comprehend well","we cannot deal with observation, and we are asked to do that for each child", "there are no enough chairs for all children", "we cannot present everything that children did, there is no enough space". These answers show that preschool teachers interpret the number of children in relation to environment such as play room and that they think that it is not suitable.

As far as the fourth question (What does learning and teaching context mean to you?) was considered, preschool teachers gave answers which were similar to the answers to the third question. Therefore, it was not difficult to classify parametres of the fourth question since they were almost identical with the parametres related to the previous question.

TABLE 4. WHAT DOES THE CONTEXTOF LEARNING AND TEACHING MEAN TO YOU

CATEGORIES	PRESHOOL TEACHERS' ANSWERS	*f*	∑ *f*	%
1) space, equipment, materials	- Kinderagarten and its surrounding - working materials - well-equiped working environment	18 10 5	33	40,74
4) cooperation	-cooperation between preschool teacher and parents -environment , local environment	17 10	27	33,33
3) children's interests and needs	-different developmental level of children within a group -children of diffferent age within the same group	10 3	13	16,05
2) the number of children	-the number of children in a group	8	8	9,87

Statisticaly significant correlation of the answers, i.e. systems of categories of the third and the fourth questions was defined by X^2 independence test. The results of X^2 independence test presented in Table 5 show statistical significance at the level 0,01, which leads us to the conclusion that preschool teachers' answers are almost identical when problems of teaching and learning methods and definition of conditions in which these processes take part, i..e. definition of institutional context, are discussed. Therefore, we can conclude that capacities of context for redefinition of learning and teaching conditions in kindergarten are not paid enough attention in initial education.

TABLE 5. RESULTS OF X^2 INDEPENEDENCE TEST

Number of degrees of freedom	12
X^2 value	25,47 п=0,01
Contingency coefficient	0,251

IV. CONSCULSION

The relation between "implicit theory on education" (Pešić, 1987) and preschool teacher's practice work is specific and difficult to investigate for other researchers. Preschool teachers analyze their implicit notions using reflexion and reconsideration. Thus, they make it available for self control and change, because "the wholeness of the unconscious cannot be raised to the level of the conscious if it is not changed" (Konig, Zedler, 2001). Institutional context, micro context with its elements such as: environment, time menagement, materials, social environment (cooperative learning, mutual teaching) concepts of those who teach, represents reverse process, insufficiently used resource in knowledge building in early childhood. Pilot investigation in this paper undoubtedly confirms the fact that preschool teachers do not have sufficient knowledge about developmental potentials of micro context as an area for (re)structuringof learning and teaching sequencies, as well as about the role of the context in creation of knowledge structures of children in early childhood.

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PEDAGOGIC DIAGNOSTICS AS DETERMINANT OF DIFFERENTIATION OF PROGRAMME MODELS IN KINDERGARTENS

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Abstract - Theoretical model of pedagogic diagnostics in educational work with children of preschool age is dealt in this paper. The aim of the research is application of principles and the choice of models and techniques of instruments of pedagogic diagnostics in A and B programme models according to developmental and age characteristics of preschool children. Therefore, the authors of this paper suggested guidelines in stages of diagnostics of the segments of anthropological status of individual children aged from 6 to 7. Practical implications and functionality of pedagogic diagnostics as diagnostics of educational elements represents important characteristic of preschool teacher competencies in the process of observation and evaluation of children's development, self-evaluation of their own work and perception of qualities and efficiency of unique results of educational theory and practice in kindergartens.

I. TRIAGE OF THE CONCEPT OF PEDAGOGIC DIAGNOSTICS

The equation of specification of educational system of our country is perception of quality and efficiency of all important components of educational process, the factors of success and failure, as well as of possibilities of efficient solution of existing problems and improvement of educational process at all levels of educational system. Pedagogic diagnostics represents the set of activities of identification, gathering and classification of necessary information and their interpretation in order that causes of particular developmental and learning condition and behaviour of a child could be identified and kindergartens or schools be able to fulfill their pedagogic goal, whereas it is recognized as possible factor model of educational process at all levels of education as related to creating conditions for optimal development of a child and improvement of the main activity of kindergarten/school. (Stanojlović, B., 2008, Knottnerus J.A, 2003, Mower W.R., 1999)

As far as educational process is concerned, diagnostics includes:

- **Pedagogic diagnostic** (educational elements and levels of functioning diagnostics
- **Psychological diagnostics** (diagnostics of conditions of basic psychological functions; abilities, emotional and social maturity, motivation, personal traits)
- **Special education diagnostics** (diagnostics of basic motor functions and developmental disorders)
- **Medical diagnostics** (diagnostics of physical and psychological potentials and health levels)
- **Social diagnostics** (diagnostics of basic social conditions in which the child lives and which influence child's development)

This research paper is focused on pedagogic diagnostics whose quality, efficiency and efficacy in the models A and B of preschool education depend on the triage of diagnostics which consists of:

- preschool teacher's competencies (professional development)
- structure, frequency of model of pedagogic diagnostics in educational sequences
- validity of applied model in the process of planning and programming of educational process;

Appropriate diagnostics triage depends on developmental level, i.e. the level of functioning of each of three elements. Mutual correlation of these elements causes the changes in implicit pedagogies (Pešić, 1996) of preschool teachers and therefore causes the differentiation of programme and educational contents in educational fields, which causes the changes in the approach and leads a child to the “zone of advanced development“

II. DYNAMICS OF PEDAGOGIC DIAGNOSTICS

Road sign to the stages of pedagogic diagnostics and their dynamics is based on following priciples of integrity and unity, principle of appropriate application, the principle of orientation to positive aspects, the principle of respect of dignity of individual and family (Stanojlović, 2008, Ćordić A., Bojanin S., 1992), methods (investigation of pedagogic documentation, descriptive method, method of observation of individual case), techniques (observation, interview, questionairre, sociogram, testing), instruments (check-list, evaluation scale, protocol of event samples, protocol of time samples, questionairre, protocol of interview, testing, sociometric matrix). Initial education enables students, future preschool teachers for observation and diagnostics of educational process. However, knowledge and abilities quantum of future preschool teacher is not correlated to the demands of educational practice. Pedagogic diagnostics in educational process is primarily directed to the identification of problems and difficulties of the segments of anthropological status of a child/pupil, even though they can be projected to complete menagemnet of school or kindergarten. Universal guidelines for diagnosis of factors of educational process at all levels of educational system can be taxatively defined as follows (Stanojlović, 2008, Maksimov,2002):

1. Notificaton and definition of the status (state) of observed situation – setting is scope and the character which can be done by: immediate observation, scaling, testing, interviewing, questionnaries

2. Gathering of information that can helpful in the definition of causes – personal experience, information on home environment and conditions, diaries, biography and autobiography, etc.

3. Identification and diagnostics of causal factors (description and analysis of factors – reflecting on factors and possible solutions)

4. The choice and application of pedagogic means and procedures in the process of removal of causes and situations which caused particular developmental, and learning condition or behaviour of a child/pupil

5. Observation and measurment of the effects of taken measures, the analysis of results (both positive and negative) – if there is no improvement, “diagnosis“ should be made once again, or the programme of stimulative/corrective work (therapy) should be applied.

This matrix can be used in the analysis of each pedagogic process, with certain competencies of understanding of method, techniques and instruments typical for application of particular pedagogic process.

III. STAGES OF DIAGNOSTIC PROCESS IN KINDERGARTEN

Situational diagnosis discussed in this paper is directed to the model of diagnostics of preschool group, i.e. the group diagnostics and model of diagnostics at the level of indivudal child. Diagnostics at the level of educational group refers to the analysis of the structure of educational group and developmental level of certain aspects of development (motor development, speech development, social and emotinal development, cognitive development) whereas particular attention is paid to techniqes and instruments of gathering of information. Hierarchical sequence of group diagnostics procedure implies:

1. General information on the structure of a group

   -the label of the group

   -the number of children

   -gender

   -age

   -family status

   -educational level of a family

   -status of employment of parents

2. the level of habit acqusition

   -hygienic level

   -cultural level

   -working level

3. the level of development of social relations

   -prevailing social atmoshere in the group

   -the level of cooperation (readiness to cooperate and help)

   -communication

   -social conflicts

-causes of unacceptance of an indivudual or a smaller group

4. the level of adaptation and development of emotional reactions

-emotional acceptance of being separated from the family

-emotional “devotion“ and “hostility”

-impulsiveness control

-dominant emotinal mood

-emotional reactions to success and failure

-emotional reactions in frustrating situations and conflicts

5. the level of knowledge, intelectual contents and operations development

-recognition of colours, shapes, relations, taste and smell

-time orientation

-finding differencies and similarities between the objects

-capability of classification, corresponding and serialization

-capability of causal thinking

-the level of speech development and possible existance of speech disorders

-attention (spam, duration, fluctuation)

-curiosity

-the level of knowledge about environment

-the level of basic mathematic concepts acquistion

-talented/gifted children

The model of daignostics at the level of individual child (Graph 1), i.e. individual diagnostics, is based on following principles of group diagnostics of educational group, as well as on identification of categories of special needs of individual child as follows:

I. Description of a child

-age, gender

-index(symtpoms) and identification of special needs

-diagnostics (difficulty, disorder, problem; giftedness...) as well as applied instruments and information sources

-child’s strong points

-child’s weaknesses

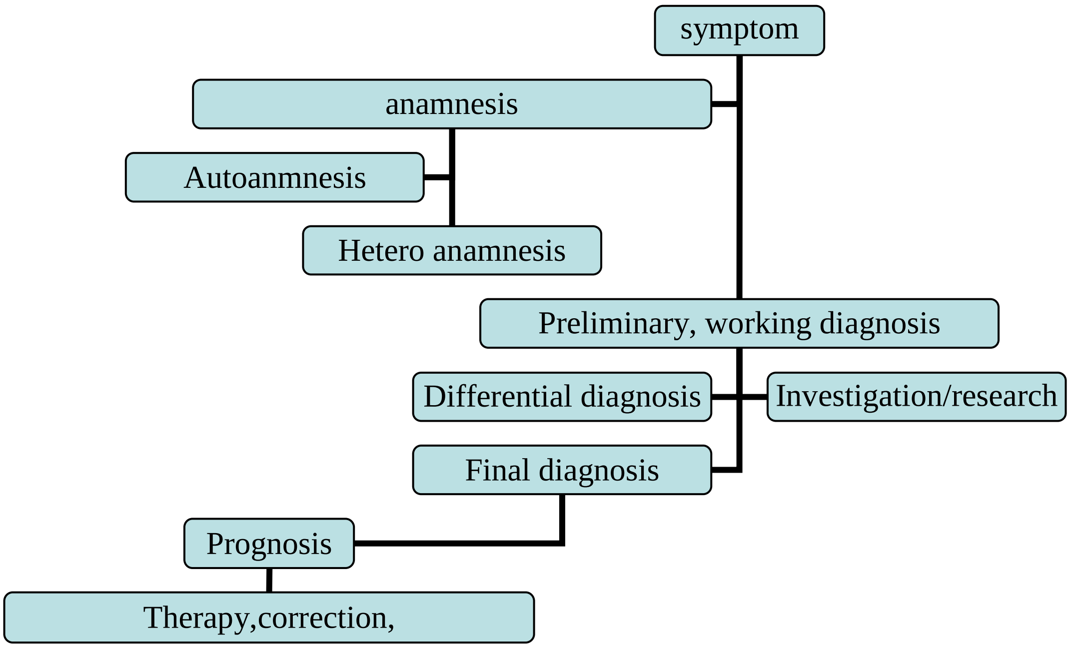
II. Description of actual situation (environmental, developmental, learning, play conditions etc.)

-relevant aspects of actual situation (the aspects of health, education, family and social status, educational aspect)

-strongholds of actual situation (existing support to a child– people, programmes,

-institutions, materials and social conditions)

-weaknesses of actual situation (obstacles and difficulties – the lack of support)



Graph 1. Model of diagnostics at the level of individual child

IV. CONCLUSION AND OR/IMPLICATION FOR EDUCATIONAL PRACTICE

Validity of diagnostics of problems as well as normal – typical developmental level of children of preschool age represent starting point and important assumption of more efficent and high quality educational work during preschool period, as well as of efficient way of introducing school teaching to children. Since there is no developed theoretical and methodological approach in the initial education of preschool teachers, or if it is not scientifically based, this can lead to improvization or late or premature peadgogic reaction to developmental turning points in early childhood. The necessity of application of the model of pedagogic diagnostics in both existing models of preschool education programme is based on the basic postulate of preschool education which claims that "child learns what it experiences" (Basis of preschool education programme, 2006) as well as on the belief that each child has indiviudal developmental stages, needs and interests. Therefore, practical implications and functionality of pedagogic diagnostics as diagnostics of educational elements represent important characteristics of preschool teacher competency of observation and evaluation of child's development, self-evaluation and perception of qualities and efficency of unique results of educational theory and practice in kindergartens. Suggested model of pedagogic diagnostics as a theoretical frame represents the starting point for practitioners and its practical implications would show its weaknesses, faults, advantages and positive aspects, but diagnostics based on theoretical laws and practical experience will become the paradigm of contemporary approach to education of children in early childhood.

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TEACHERS' INTERCULTURAL COMPETENCES

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Abstract - During last years one can notice the tendency of changes in the education system of Serbia. On all levels, from pre – school upbringing to university education systemic and structural changes in teaching process and school – work organization take place. One can observe the development of standards for achieving applicable knowledge, competences and skills. Instruments for objective evaluation of the whole quality of education are gradually introduced. The topics of this paper are the problems of intercultural connections and intercultural competences of teachers. Thus, this paper will present the main problems, objectives and tasks necessary for better understanding of mutual cultural connections and interactivities. In the paper there are the answers on these key questions: how can people of different cultures understand one another if they do not have the same cultural experience, and how teachers can help in that inter – cultural process?

I. INTRODUCTION

The concept of culture is defined in different manners. Some people describe it as "whole set of signs by means of which members of a given society recognise one another, and which differ them from the people that do not belong to that society". Culture can as well be designated as a set of distinctive spiritual, material, intelectual and emotional patterns of a society or a group of people, together with their art, literature, life styles, ways of common life, system of values, tradition and belief. Culture is in centre of individual and social identity, and it is main component in understanding of group identities considered from the standpoint of social cohesion. Meditation on culture always leads to consideration of relation, interaction among cultures. Cultural distinctions which we notice among people, enable us to be aware of culture existence, in other words it is impossible to understand culture as an idea in singular, on the contrary, it is always spoken about cultures. (www.most.org.rs)

When one speaks about interculturism, it presents a conception used in majority of European countries. It designates recognition of values, life styles of individuals and society, acknowledgement of distinctness and interaction among cultures.

II. UPBRINGING AND EDUCATION FOR INTERCULTURE ACTIVITIES (INTERACTION OF CULTURES)

There are three basic attitudes first, that education is everyone's right, second, that it increases personal liberties, and third, that it contributes to the development of person (ality). Very important and undisputed fact is that it ought to be inclusive, without segregation referring to (one's) language, ethnicity, capabilities, sex, or regarding any other criterium. Promotion of tolerance and esteem through curriculum has little impact, if it is (being) realized within educational institutions which are essentially intolerant. In accordance with it, it is necessary to execute structural changes in system itself, as well in its parts. The objective of education ought to be realizing of full potentials of every child at school whose climate is distinguished by understanding and respecting varieties. Contemporary, and first of all appropriate education, directed to complete development of every individual, has to exceed the level of transferring the accomplished knowledges, and is focused on accepting the skill "how to learn" and developing capacity how to create new knowledges (Oljača, 2007/2:133).

Cultural differences and their role in every day life inevitably reflect also on the behaviour of pupils and teachers in school. Raising attitudes, capabilities, feelings, manners of existing and behaving towards a person of different culture, diverse than we is particular feature of intercultural upbringing. To be interculturally educated means that a person communicates, but it also listens to "another" person. Therefore the intercultural training should not be considered as training for culture transfer, but as the training that will enrich culture, and approve practical acknowledgement of universal value – value of an individual, a person respectively.

Intercultural education tends towards overcoming of passive coexistence and realizing a developed and sustainable way of common life in multicultural society. It can be achieved creating understanding, mutual respecting ang and dialogue among groups of different cultures, as well through ensuring equal possibilities and struggle against discrimination. Intercultural education is a process which demands from every person to know him / her self in order to understand the other people's culture. This is a very provocative process, and it comprises work on profoundly ingrained beliefs of good and bad affairs, reconsidering one's own views of world and his / her own life. All that we take for granted in intercultural learning is (being) investigated thoroughly and critically thought out. Intercultural learning is a challenge for personal indentity and it can become the way to enrich our qualities and attidudes. Inasmuch as that intercultural learning is a process through which we learn how to live together in the world of variety, it is with this also the starting point of creating common life in peace. Intercultural education contains *two key domensions*:

1. education that respects and supports distinctiveness in all fields of human life is considered intercultural education. It causes that pupils are sensitive to the idea that people have naturally developed different manners of life, customs and view of the world and that this diversification of human life enriches all of us;
2. simultaneously it is the education that promotes equality of human rights and resists to injustice and discrimination and advances the values on which is (being) built parity (www.most.org.rs).

Intercultural education ought to contribute the fulfillment of these *objectives*:

1. exceeding of social inequality and diversity in education;
2. developing of respect and tolerance towards cultural varieties among people;
3. to help pupils to adopt the knowledge about inter – ethnical relations and bases on which are founded various cultures; learning should not be based on emotional and class assumptions. (Koković, 2009:194).

III. INTERCULTURAL COMPETENCE

Intercultural competences as a dimension of school context are situated into wider reference frame, and it is Education for democratic citizenship. Namely, Education for democratic citizenship is established on several innovative approaches to:

- education for human rights;
- civic education;
- education for peace;
- intercultural education (Kostović,Đermanov, Đukić, 2007:19).

In available literature are present different classifications of intercultural competences. (The) first classification comprises competences which can be classified in:

1. **Cognitive competences** – they can be divided into many subgroups. The first subgroup contains the competences of legal and political nature, in other words knowledges regarding the rules of common co – life (growing close to) and democratic conditions of their establishing; knowledges about democratic public institutions and their role in the function of all citizens. In the second sub – group are the competences relating to the knowledges and capabilities of responsible decision making in democratic society. Then, into the third subgroup can be classified competences of procedural nature for which is characteristical transferability, in other words the possibility of using in different situations. And in the end, the fourth subgroup of cognitive competences belong the knowledges about principles and values of human and democratic civic rights.

2. **Ethical competences** – they present the second group of competences that are founded on the thesis that individuals develop their identities and relations with the others in accordance with certain values. The special importance for intercultural ethic competences have values of freedom, equality and solidarity. These values imply both self – esteem, but also the selves of others, the capability of listening to the others, recognition (identification) and the like. These competences suppose conscience and acceptance of differences and diversities.

3. **Social competences** – they have its complete expression in the context of every day personal and social life. They enlighten and strengthen the individual's need to live with other people, to cooperate with them, accept responsibility, delegate rights and commitments.(Kostović, 2008)

IV. TEACHER'S PERSONALITY AND KEY COMPETENCES IN INTERCULTURAL CONDITIONS

A teacher is a person designated for teaching profession, authorized and responsible to realize the objectives of education and upbringing, tasks and contents regulated by law.(www.zavod.edu.rs).

One has to cite the position according to which "the profession or occupation of a pedagogue by its nature is very complex, but always based on optimism, settled belief in values and in appropriateness of developmental – pedagogical activity" (Knežević-Florić, 2008:5).

There is no teaching good „just by itself". It is necessary to answer four questions (www.sajt.com.hr):

1. For whom the teaching should be good? The criteria of worthiness ought to be valid for all pupils attending comprehensive (general education) and vocational schools, consequently, for girls and boys, for higly talented and gifted, for those who learn quickly and for those who learn slowly, for hyper – active pupils and for quiet children praised because of their sweetness.

2. Which subjects need criteria for valuation? The criteria of worthiness in principle need to be valid for all school subjects, for all school grades (degrees) and for all kinds of school. Some additional criteria for certain subjects, grades and kinds of school need to be introduced.

3. For which objectives need they be valid? Those criteria ought to help to realize teaching and thus will be advanced cognitive, emotional and social learning of pupils.

4. What are these criteria for, i.e. what is their function in quality acquiring? They are of use in analyses and valuation of every day teaching. They can be used for individual reflection about good and bad characteristics of one's teaching. They can also serve in common valuation processes in teaching – pedagogical board, at workshops or at faculties (universities). They are not suitable in research purposes, because too non – operationalized elements are in them.

Successfulness of realization of intercultural education at schools depends very much on teachers' knowledge and cleverness. **Banks distinguishes four key kinds of teachers' competences:**

1. **Knowledge of pupils' characteristics –** Teacher ought to know specific learning style of every pupils and to sdapt his teaching style to each (one) of them. The researches show that the greater similarity between teaching style and pupil's learning style is, the greater will be pupil's attainment. Pupils ought to be given the possibilities that suit them.

2. **Detail and flexible knowledge of subjects and contents** – in order to be able to instill knowledge into all pupils, teachers ought to understand in which way are various contents connected within one subject linked with the other subjects contents, as well with pupil's every day life. A teacher ought to be able to design his lessons in the way which will enable every pupil to form a coherent and applicable "map of knowledge", and to connect different ideas as well to catch sight of illogicalities and errors.

3. **Cleverness of class managing** – A teacher ought to induce and maintain:

- Collaboration among pupils during the learning process (contents managing);
- Positive and responsible pupils' behavior using assertive communication, arrangement of essential rules, introduction of rewarding system and the like (behaviour managing);
- Various cultural patterns of group behaviour peculiar for school and surroundings in which reside pupils (managing class as a social system).

4. **Awareness of the ethics of one's own profession (pedagogy)** – Teacher ought to be able to reexamine the existing school practice and concept of knowledge learning on which that practice exists. In addition he proposes and introduces innovations for advancing both school and education (www.most.org.rs).

Teachers who have successfully included intercultural dimension in their teaching and work with pupils can be recognized according to these characteristics:

1. They know to pronounce absolutely correctly name and surname of every schoolboy or a school girl;

2. They comprehend how teachers' values, attitudes and expectations act on pupils' motivation for learning and attainments;

3. They are on the look – out for values, attitudes and opinions of parents or guardians on various aspects of pedagogical – educational work, and appreciate them;

4. They examine and get to know differences in learning atyles, i.e. prevailing styles of learning with pupils of different social and cultural origin;
5. They believe that, when right access to teaching materal and pupils is chosen, everybody can learn the most complicated curriculum. They concert their efforts that every pupil’s attainment would be best and highly valued. (www.most.org.rs).

V. CONCLUSION

Consequently, intercultural upbringing and education is an unavoidable factor in the process of mutual acquaintance and understanding of various culturaes, as well as the way of establishing positive relations. It is also the result of need to arrange multicultural societies according to the principles of cultural pluralism (mutual comprehension, tolerance and dialogue, experiencies and permeating proper, one’s own and dissimilar cultural features), universality (common interests, convictions and modes of life) and social dialogue (cultural special qualities and common elements).

In multicultural surroundings a new part has also a teacher, which is not only a good connoisseur of other cultures, "floodgate" against arising of stereotypes, lopsided attitudes and preconceptions, but an associate – creator of new relations according to real knowledge and successful intercultural relations.

Teachers are claimed to possess intercultural competence as well whole – life learning, connoisseurship of the international and transnational relations, as well to respect and accept the pupils who belong to other cultural identities. Teachers ought to be in interactive relations with the others. They are plain – spoken and communicative, creative and flexibile as well without prejudices and cliches.

Cultural diversity in school includes implicitly repeated meeting of disciples and teachers of various cultures as immigrants and ethnic minorities, that possess certain cultural models and pedagogical strategies, as well social, economical, historical and cultural characteristics.

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COOPERATION AND COMMUNICATION BETWEEN SCHOOL AND PARENTS

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Abstract - In the former school practical exprerience the cooperation between school and parents has been visibly deficient. It has been mainly reduced to the meetings with pupils' parents and the individual talks with teachers and principals. The common interest both the school and pupils' parents is exactly to solve some of the existing problems through close cooperation. So, many difficulties in pedagogical – educational process will be overcome. Parents are mainly interested in their children's marks. They know a little or hardly nothing about the other activites at school.

The research results of cooperation about the cooperation and communication of the principal, teachers and parents are presented in the paper. The aim is to explain what are the expectations of this cooperation both of parents and school, and first of all of the principals and teachers.

I. INTRODUCTION

The including of parents into their childern's schooling has positive effect on their school achievements, regular classes attending, more positive attitude of both pupils and parents towards education as well less rate of withdrawn pupils from school. All this is the fact that can not be denied. The next steps to be taken in order to enhance this cooperation, would be: asking parents' opinion of the curricula, their including into extracurricular activities of their children, their frequent inviting to be included into the pedagogical and education process, and their more active participation at the Parents' Council meetings. In such way the parents will be as well included into the process of decision – making, important for school work, and at the same time important for their childen's upbringing and education. The parents included in the Parents' Council work, should have regular communication with the other parents in school and they should inform them in time about all important proceedings related to the school work. The parents should be induced to make their suggestions and proposals on the school advance. Also, both the teachers and parents should stimulate their mutual communication through all its forms, not only by talkings, as they mostly do in school.

When we speak of the partnership between teachers and parents, there are three different models of the possible relations between them cited in the adequate literature. They are:

1. The experts' model – The teacher supervises and makes all decisions, giving little or no importance to parents' thoughts or feelings. This approach aspires only to take care of parents' dependence and the gap increasing between the professionals and them.

2. The displacement model – The teacher accepts the parents as the information source. He tries even to educate them for the access to the children, but he controls making decisions.

3. The user's model – The teacher accepts parents' right of selection and deciding of upbringing and education of his own child. This model is certainly the best form how to realize teachers' partnership with parents, although there still exists the impact of the two other models.

II. METHODOLOGICAL CONCEPT OF RESEARCH

A. *The object and aim of research*

The object of this research is the cooperation and communication of school and parents. According to the object of research, we can define as well the aim of research. It means that one must explain what both the parents and school expect of this cooperation, as well mutual strivings to improve the existing cooperation and the forms of communication among the parents, teachers and school principals.

B. *The research instrument*

For the needs of research were used the questinnaires for parents, teachers and prinicipals. The examinees filled in anonymously the questionnaries which had fifteen questions related to the problems of including parents into the school work and the quality of their communication with the school staff (teachers and school principal)

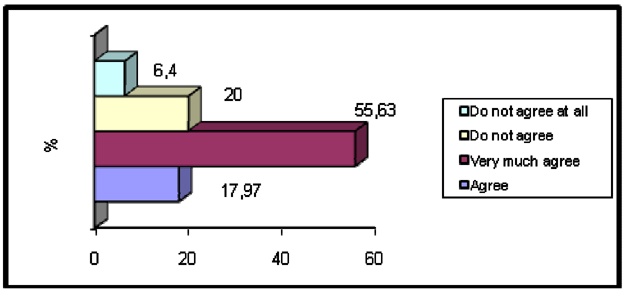
C. *The research model*

The parents' model was consisted of 1103 parents whose children attended the grades from the fifth to eighth class of the primary schools in the commune of Odžaci. 166 teachers took part in the research. By the model were surveyed 10 principals. The obtained results were displayed and treated by the program software for the statistical data treat ment SPSS.

III. THE RESULTS WITH DISCUSSION

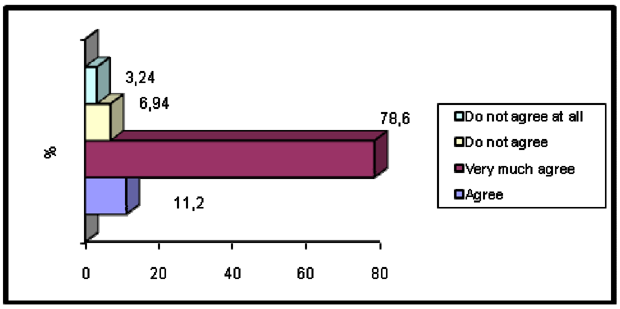
a) The results of the surveyed parents

Statement: *I find that school is responsible for the upbringing and education of my child.* 73,6% of the examinees think that school is responsible for the upbringing and education of their children (55,63% agree very much with the assertion, and 17,97% agree). From 26,4% of the examinees do not agree with the statement, and only 6,4% do not agree at all.



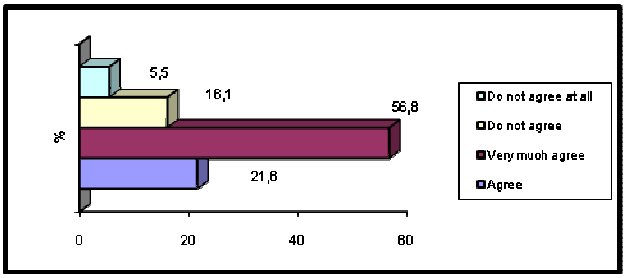
Statement: *I consider the school my child attends safe and secure.*

High percentage of the respondents (89,82%) find the school their children attend safe. 78,6% of them agree very much and 11,2% agree. From 10,18% of the testees that do not agree with the assertion, only 3,24% do not agree with the assertion at all.



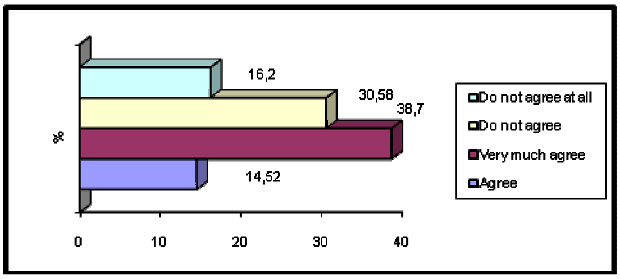
Statement: *I am satisfied with the way the teachers communicate with me.*

78,4% of the examinees is satisfied with the way the teachers communicate with them (56,8% agree very much with the assertion and 21,6% of the respondedents agree). From 21,6% of the testees which do not agree with the statement, only 5,5% do not agree at all.



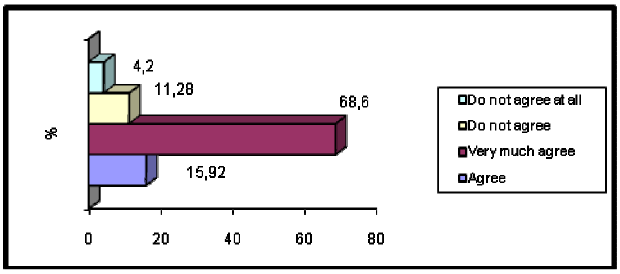
Statement: *I would like to have more information about my child's success.*

53,22% would like to have more information about their children's success (38,7% agree very much with the assertion and 14,52% of the examinees agree). From 46,78% of the respondents which do not agree with the statement, 16,2% do not agree at all.



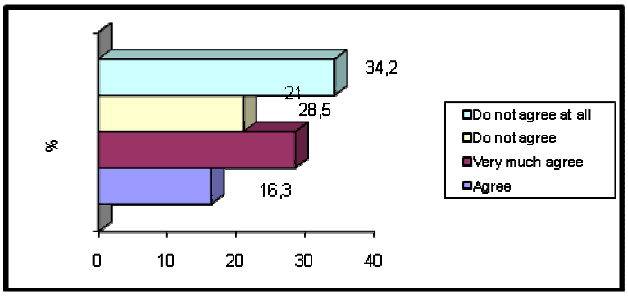
Statement: *I am proud that my child attends this school.*

84,52% of the testees are proud that their children attend just that school (68,6% agree very much with the assertion, 15,92% of the testees, agree). From 15,48% of the examined parents which do not agree with the statement only,4,2% do not agree at all.



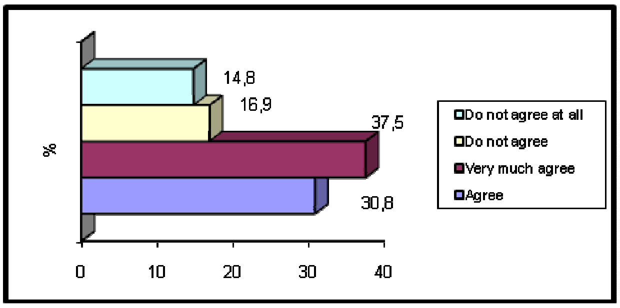
Statement: *The school wants the parents' opinion when the school goings – on are being organized.*

44,8% of the respondents agree with the assertion that the school wants to know the parents' opinion when the school proceedings are organized (28,5% agree very much with the assertion and 16,3% of the respondents agree). From 55,2% of the testees that disagree with the statement, 34,2% disagree at all.



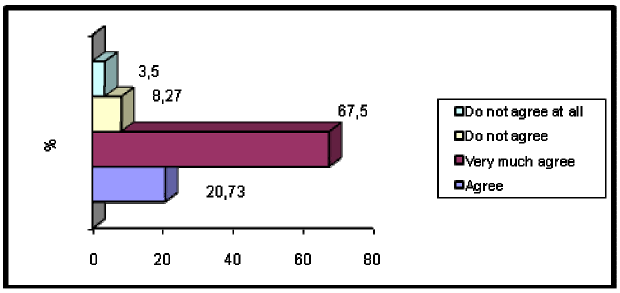
Statement: *The teachers communicate with the parents through every day, ordinary speech.*

They do not speak academically.68,3% of the examinees agree with the assertion that the teachers communicate with them speaking daily, not academically (37,5% agree very much with the assertion, 30,8% of the respondents agree). From 31,7% of the examinees that disagree with the statement, 14,8% disagree at all.



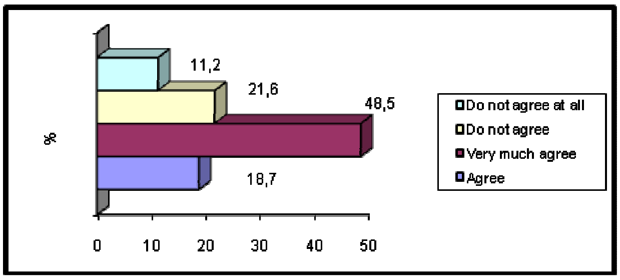
Statement: *The teachers and the head – master are always ready to speak with the parents.*

High percentage of the testees (88,23%) agreewith the assertion that the teachers and the head – master are always ready to speak with them(67,5% agree very much with the assertion and 20,73% of the examinees agree). From 11,77% of the examinees which disagree with the assertion, only 3,5% disagree at all.



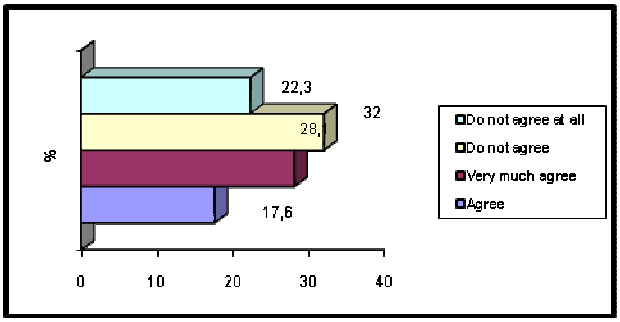
Statement: *I am interested in the communication with the teachers and the head – master of the school.*

67,2% of the examinees are interested to communicate with the teachers and principal of the school (48,5% agree very much with the assertion, 18,7% agree). From 32,8% which disagree with the assertion, 11,2% disagree at all.



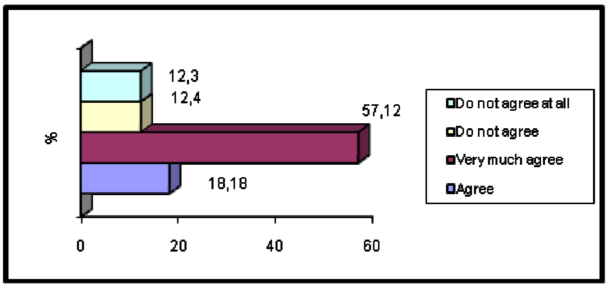
Statement: *The work of the Parents' Council hasimpact on the school daily life.*

45,7% of the respondents consider that the Parents' Council has effect on the school every day life. (28,1% agree very much with the assertion and 17,6% of the examinees agree). From 54,3% of the examinees that disagree with the statement, 22,3% disagree at all.



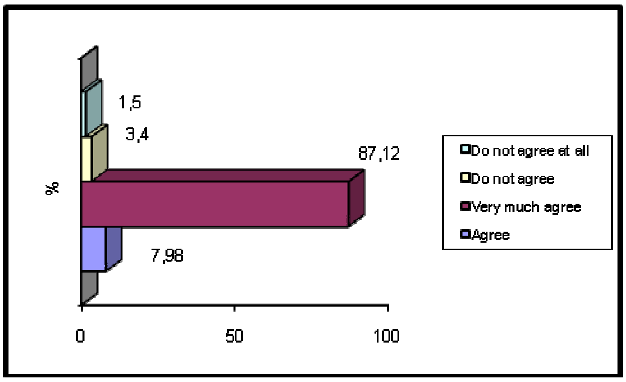
Statement: *I have good communication with my child's classmaster.*

75,3% of the testees has good communication with class – masters (57,12% agree very much with the assertion,18,18% of the examinees agree). From 24,7% of the examinees which disagree with the statement, 12,3% disagree at all.



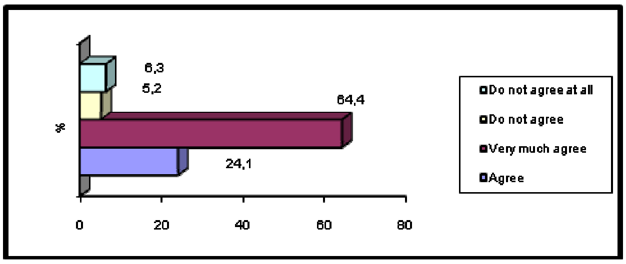
Statement: *I attend the parents' meetings regularly*.

95,1% of the respondents attend regularly the parents' meetings (87,12% agree very much with the assertion, and 7,98% of the examinees agree). From 4,9 % of the testees disagree with the statement, and only 1,5% disagree at all.



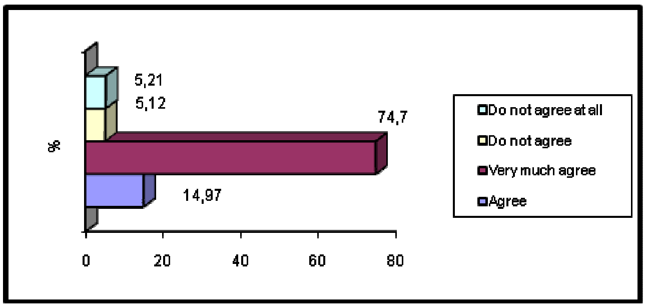
Statement: *I come to the school only when I attend parents' meetings.*

88,5% of the respondents come to the school only when they attend parents' meetings (64,4% agree very much with the assertion, and 24,1% of the examinees agree). From 11,5 % of the testees that disagree with the statement, only 6,3% disagree at all.



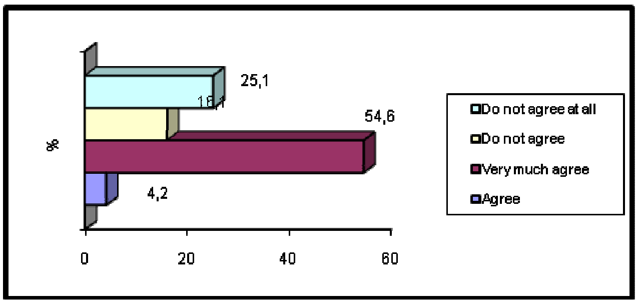
Statement: *The school asks the opinion and concordance of parents when are discussed and treated the activities that have to be financed by the parents.*

89,67% of the examinees think the school wants their opinion and accordance referring the activities that they finance (74,7% agree very much with the assertion, 14,97% of the surveyed parents agree). From 10,33 % of the examinees which disagree with the statement, only 5,21% disagree at all.



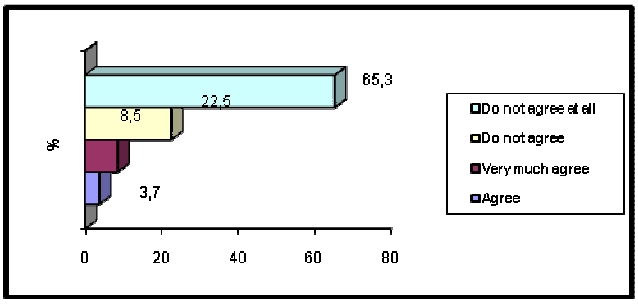
Statement: *I communicate by teleohone with my child's classmaster.*

58,8% of the examinees communicate with class – masters by telephone (54,6% agree very much with the assertion, 4,2% of the respondents agree). From 41,2% of the testees which disagree with the statement, only 25,1% disagree at all.



Statement: *I communicate with the class – master of my child by e – mail.*

12,2% of the respondents communicate with class – masters by e - mail (8,5% agree very much with the assertion, and 3,7% of the examinees agree). From 87,8% of the testees which disagree with the statement, only 65,3 % disagree at all.



In view of the obtained indicators, we can conclude the next: in the observed schools prevails positive social climate (current of feeling) and qualitative communication between the parents and school collectives. We can also notice that high percentage of parents regularly attend parents' meetings, but it is the only occasion when majority of people come to school at all. Thus, parents should be more frequently included into school work. Parents should be as much as possible be engaged when school proceedings are organized, because in these goings – on was registered a little lower percentage of concordance with the assertion. It is interesting that the parents communicate with class – masters verbally and by telephone, but only 12,2% use Internet, e – mail respectively for communication. One can comprehend this data as a lack of parents and their ignorance of such kind of communication.

IV. CONCLUDING CONSIDERATIONS

The partnership between parents and school is the relation into which enter both parents and teachers voluntarily and with mutual interests. These interesets are directed to the improvement of conditions and atmosphere in which their children attend classes. This partnership implies parents' regular visits to school, not only to attend the parents' meetings, but also they come individually and self – initiatively to ask for their children's progress.

Teachers and parents should communicate as well by telephone and e – mail, so that teachers would have more feed – back information from the parents of their pupils. In this way will be as well improved their relation with children. Parents should take part in various school activities, both teaching and extracurricular ones.

It depends of course of the school staff readinees (principal, pedagogue, teachers) to support such kind of cooperation and partnership. Parents need to be within the process of upbringing and education at school, so that children could have adequate development in primary school, because the family are the primary group from which children originate. Parents should be ready to learn about themselves and their children, as well about their needs in modern society and pedagogical – educational process.

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CONCEPT OF CURRICULUM IN OUR AND THE EUROPEAN PEDAGOGICAL THEORY AND PRACTICE

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Abstract - The author, in this paper, considers different approaches in understanding and determining the curriculum and its implementation in practice starting with the interpretation of the term curriculum. This is a concept that has started in the twentieth century. There are different understandings of this concept. Many authors, in our and foreign pedagogical practice, define it differently, what indicates different theoretical starting points in understanding the learning itself, and thus the determination of the term itself.

In the paper five different approaches to the curriculum theory and practice are presented: 1) curriculum as a syllabus which should be transferred, 2) curriculum as a product- the outcomes that students need to achieve, 3) curriculum as a process, 4) curriculum as a practice, 5) curriculum, in a context, that is introduced in the present time. From the understanding of the curriculum as a program to understanding the curriculum in the context, changed have not only definitions of the curriculum, but also the methodology of its development and the methods of the evaluation.

I. INTRODUCTION

The concept of curriculum is not new in European countries because it is a concept introduced in the twentieth century. Up to the second half of the twentieth century, the term curriculum[1], except for UK and USA, was used in a small numbers of European countries[2]. However, in most reforms, initiated in the last decades of last century, the term curriculum was introduced and is in use now, assuming that it represents a significant condition for a successful reform i.e. innovation that are introduced with the reform. Today, the affirmation of the concept of curriculum in European educational theory and practice, the curriculum is seen as a new approach in establishing the program, which actualize and starts many questions related to the education, the methodology of making syllabuses, as well as their structural content and practical performance.

In the theory, there is an opinion that the introduction of the curriculum system is the best approach in adapting the educational system to the demands of time and secures the space for constant improvement and development of the education system. Curriculum that provides a certain degree of autonomy is desirable for all schools and all subjects in education, where the autonomy should not mean the violation of the coherence of the educational system. The assumption is that every school has a curriculum for its degree, which leads to the destruction of the uniformity of the educational system and greater appreciation of sociocultural characteristics of the subjects in this process, and a respect for the local specifications in the educational needs and working conditions of every school. Therefore, every school and every education system in whole, must know its own situation for which the most appropriate solutions will be found. However, all entities involved in creating the curriculum take the responsibility for their work.

From the pedagogical - didactical point of view, the curriculum is one of the basic didactical concepts[3]. The concept is complex and requires an

[1] The term curriculum originates from the Latin word *currere*, which means the flow, the direction (a course of an action or the course of the education). According to some authors, the curriculum also means the flow of life - *curriculum vitae.* [1]

[2] Curriculum(*curriculum*) , the term is used differently, and the Council for the standardization of the Croatian language has made a decision that the word curriculum in the Croatian language can not be translated as the curriculum, but with Croatian names doctrinal basis or syllabus questionnaire. The name syllabus questionnaire, since 2005, has been used for a while in the documents of the Ministry (Guide through HNOS). Croatian national questionnaire within the HNOS from the year 2006. has involved all the key elements of European national curricula, new teaching methods, research teaching, interdisciplinary, pupils competencies, integrated planning, evaluation of the results.[2] [3]

[3] In the theory, it is emphasized that in the most European countries where the didactics has developed as a pedagogical discipline the term used was curriculum, which often featured equalization of the theory of the curriculum with the didactics and the curriculum itself with the syllabus.[1]

interdisciplinary examination. There are different approaches in understanding and determining the curriculum and its realization in practice. That intention and development of different approaches to the theory and practice of curriculum, different understandings and definitions / limitations of the curriculum points out on the continuous need of reviewing, reforming and improvement of the education and educational systems. In fact, the inevitable are changes in the conception of education itself, from the education as transmission of knowledge, to the understanding of education as the transmission of social and cultural values.

There are various definitions of curriculum, some of them define it as a syllabus, the others as a carefully planned teaching and learning, the third as a program for the attainment of the established results, the fourth as a learning process in the educational institution, the fifth as "life” school program, the dynamical system of activities [4] to the broadest definitions, in the U.S., that equals this term with the European understanding of the didactical content. [5] These different definitions of the curriculum show that the emphasis on certain elements of education: content, process, achievements and so on, which indicates on possible different approaches in its conception. On the contrary to this opinion, which gives that emphasis on some of the educational process, in our theory professor Ivić represents the opinion where he says that there is a need to understand the curriculum as a whole unit, which includes: a) defining the objectives of education, b) the content of the program, c) methods of teaching and learning, d) evaluation procedures .[6] While the international literature, Walker believes that the understanding of the curriculum must be taken into account as the whole educational process. This means that nonunified understanding of the curriculum leads not only to different definitions of curriculum, but also to directing it to the various aspects of the educational process.

Besides presenting the analysis of the concept of the curriculum, it should be noted that the essential structural elements of the curriculum according to author Smith are: pupils' perspective, teacher's view of the curriculum, planning and development of the curriculum, curriculum management, ideology of the curriculum etc. This author points out that it is important the way the concepts are grouped that are included in the category of the curriculum. [7] Piper, as well, presents the components of the curriculum, and by him they are: objectives, contents, methods, tools, organization and control.[8]

II. DEFINITIONS OF CURRICULUM

In our and foreign literature, various authors define the curriculum differently, what indicates different theoretical starting points in understanding the learning itself, and thus the determination of the term itself.

In foreign theory, it is emphasized the following definition, which is important for understanding the curriculum as a part of the educational process, by which: "The curriculum contains all the events around which teachers and pupils are gathered; events around which teachers, pupils and everyone interested in the educational process recognized as important for teaching and learning, which is particularly indicated when used as a base for assessing the success of the school and pupils, the way in which these events are organized one to another and to other events that are directly connected to the direct educational situation and space and time. by[9]

Mentioned idea that every school has a curriculum is determined in accordance with its specificity faces a great acclaim in pedagogical theory, which leads to the destruction of a uniform system of education and a greater appreciation of socio -cultural characteristics of pupils and local specificities of the educational needs and working conditions for every school individually.[1]. By the opinion of Jean-Michel Leclerc "the curriculum is a suit made by measures, which is hard to borrow" [10]. That’s why every educational system, and within it, every school has to face with its own needs in order to find the most appropriate solutions for those needs.

In educational theory it is considered that the different understandings of the curriculum do not lead only to different definitions of curriculum, but it also conducts to different aspects of the educational process. Pedagogical theorists believe that "that pluralism is partially due to the large complexity of the concept of the curriculum itself, and partially it is due to different traditions of understanding of the term" [11].

Author Jackson, P.W. defines the curriculum as a heterogeneous and multifact area, while the authors Tanner, D. and Tanner, J. determine six groups of the definition which cover about twenty-determinations of the curriculum.

By the author Knoll, J.H. (by Pastuovic, N.) the curriculum means an organized engagement of the learning process and content, and having the specific goals and objectives, with structured series of desired outcomes (knowledge, skills, abilities and behaviors).

One of the founders of the process curriculum model Lawrence Stenhouse defines curriculum as "an attempt to identify the basic principles and characteristics of any educational proposal which is opened for the critical examination and the successful transfer into the practice. " According to this author, curriculum is as a "recipe for a meal." "At the beginning", by him, "it is the imagined possibility, and after that the subject for testing." As the recipe can be altered depending on the taste, in such a manner the curriculum can be changed – it is built and developed in the concrete practice, points out Stenhouse.[12]

Some authors report that in the latest polls definitions are avoided, and instead of them, introduced are and are used key concepts and words - the objective, content, organization, methods, development, evaluation and similar.[13]. The same author states that the curriculum also involves "the establishment of scientific goals, objectives, content, syllabus, organization and technology implementation, and different forms of the evaluation of the effects" [13]. Also, there are studies of the curriculum (Marsh, 1994; Stenhouse, 1995), which mentions the key terms and words, categories and modules: the goal, purpose, objectives, content, organization, methods, development, evaluation, skills, relationships and similar.[12]

III. CONCEPTS AND APPROACHES TO CURRICULAR THEORY AND PRAKTICE

It is necessary to point out that there are different understandings and definitions of the curriculum. By the opinion of Smith there are in the understanding and determining of the curriculum four approaches: 1) curriculum as a program that needs to be transferred, 2) curriculum as a product – the results that pupils need to achieve, 3) curriculum as a process, 4) curriculum as a practice. [7] Besides these four approaches, today it is developed and introduced the curriculum in context. From the understanding of curriculum as a program to the understanding of the curriculum in the context, not only definitions of the curriculum have changed, but also the methodology of its development and methods of the evaluation.

1) Curriculum as a program that needs to be transferred - in the context of this approach the curriculum is equaled with the syllabus which has been regulated and which only needs to be realized in practice. In this way understood curriculum in the center of the educational activities puts the content defined with the syllabus, which was prooved by the experts outside the concrete school, and which only needs to be realized in practice. The syllabus specified in this way are mandatory for all schools of the same level and type, and for all teachers and pupils. This approach to the theory and practice of the curriculum is characteristic for the early period of the development of the theory of curriculum, but is present today. By the opinion of Smith equaling the curriculum with the syllabus restricts planning the teaching content and skills that are intendeded to be transferred to the pupils [7] A critical view on this concept have also our authors who state with keeping in mind that " the educational activity of the schools is wider than teaching by the syllabus, the syllabus as a structural educational content is part of the curriculum, its integral element and can not be identified with curriculum. [1]
2) Curriculum as a product [4]– in this opinion the curriculum is defined as a program teachers and pupils activities dedicated to fulfilling the aims and outcomes of education. [5] In the relation to the former view, the focus of the educational process shifts from content to outcomes of the education. On the contrery to the previous understanding of the curriculum, in which the emphasis is on the quantity of educational content, in the curriculum aimed at outcomes the focus is on the quality of the education. The basic thing, by this approach, is the definition of the educational outcomes, so that the contents and methods of work are compared to the results that should be applied. Where the focus of the educational process shifts from the content to the objectives and outcomes of the education.

[4] This approach, was at the beginning of the twentieth century, explained by one of its founders, an American, Franklin Bobbit. One of the followers of the ideas of Bobbit, an American, Ralph Tyler points out that "the attraction of such an approach to the theory and practice of the curriculum is that it takes what people need to know, whether at work or in life. [7]

[5] In the theory, it is considered that this is the dominant approach to the theory and practice of the curriculum, the curriculum is focused on the outcomes the pupils should achieve. Some authors suggest that this is a closed form[14], while others consider it a mixed transitional type of the curriculum [11] [13] which has the elements and open and closed concepts of the curriculum.

3) Curriculum as a process - the curriculum is interpreted as an active process, as a constant interaction of teachers, pupils and knowledge. Under this approach, the attention is focused on the learning process, and the activities are in the foreground. The two previous approaches in understanding and determining the curriculum starts from that the curriculum includes in advance pre-determined programs that should be applied in practice. As a reaction to this view of the curriculum a new approach was created for the theory and practice of the curriculum – the understanding of curriculum as a process.[7] Within this approach, the curriculum is considered a guideline or a framework for the work of the schools.
4) Curriculum as a practice - in the center of this approach is the practice. The emphasis is on a continuous reviewing and examining of the educational practice which is done through critical thinking in action. Permanent examination of the educational practice changes not only practice, but also the persons involved in this practice. In the opinion of Smith, in this way understood the practice enables not only the development of individuals (pupils, teachers), but also the development of the society in whole. [7]
5) Curriculum in context - curriculum is a contextually shaped by social relations that exist in the school.[6] This is a permanent social process that includes the interactions between pupils, teachers, knowledge and the environment. In an effort to link education with the everyday experience and life, with the demands of modern life, with social, economic and cultural needs, the question of context and socio-cultural community in which pupils live is very important. So the presentation of different approaches to the theory and practice of the curriculum, its different understandings and definitions, would not be complete in case we did not pay the attention to the social context in which it arises.

[6] Drawing the attention to the social context in which the curriculum is formed the outcome has in cultural-historical theory of Vygotsky, whose ideas were accepted and elaborated by numerous authors. Starting from his theory that the child is primarily a social being and that on the child exept its biological nature the influences are also coming from the social environment, the importance of the context is pointed out by many authors: Bruner, Cornblet, Alexander et al.

IV Conclusion

Today, the affirmation of the concept of curriculum in European educational theory and practice, the curriculum is seen as a new approach in establishing the program, which actualize and starts many questions related to the education, the methodology of making syllabuses, as well as their structural content and practical performance.

In our and foreign literature, various authors define the curriculum differently, what indicates different theoretical starting points in understanding the learning itself, and thus the determination of the term itself. These different definitions of the curriculum show that the emphasis on certain elements of education: content, process, achevements and so on, which indicates on possible different approaches in its conception. . This means that nonunified understanding of the curriculum leads not only to different definitions of curriculum, but also to directing it to the various aspects of the educational process.

In the theory ther are different understandings and definitions of curriculum such as: 1) curriculum as a program that needs to be transferred – within this approach the curriculum is identified with the syllabus that has been regulated and which needs only to be realized in practice, 2) curriculum as a product - according to this view curriculum is defined as a program of teachers and pupils activities dedicated to fulfilling the aims and outcomes of the education. Compared to the former view, the focus of the educational process shifts from content to the outcomes of the education, 3) curriculum as a process - the curriculum is interpreted as an active process, as a permanent interaction of teachers, pupils and knowledge. Within this approach, the attention is drawn on the learning process, and with this the activities are in the foreground, 4) curriculum as a practice - in the centre of this approach is practice. The emphasis is on a continuous reviewing and studying of the educational practice through critical thinking in action, 5) curriculum in the context - contextual curriculum is shaped by social relations that exist in school. That is a permanent social process that includes interactions of pupils, teachers, knowledge and the environment. From the understanding of the curriculum as a program to understanding the curriculum in the context, changed have not only definitions of the curriculum, but also the methodology of its development and the methods of the evaluation.

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CONTRIBUTION OF INFORMATION TECHNOLOGY IN IMPROVING OF THE EDUCATIONAL PROCESS

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Abstract – As new information tool, the computer is used to give students a valid, reliable and relevant information needed for their work and learning. Initially, it related primarily to the subject of Informatics and Computing and later it started to get other attributes, i.e. it has become a tool for learning and other subjects and disciplines. Information technologies have made great contribution to the development of different forms of education in both formal and informal sense. This paper wants to study in order to determine whether education is still slowly opens up to new technologies in relation to other activities. In conclusion, the paper gives an opinion of young people at home and out of school who live in a technologically rich environment, do they expect changes in education in accordance with the imperatives of education in the 21st century. In this sense they provide assessment of the dynamics and form the introduction of multimedia systems, distance learning, virtual schools and other technologies that lead to an increase in activities of students, qualitative evaluation of knowledge and progress of pupils according to their individual abilities and prior knowledge.

I. INTRODUCTION

Education is an important part of living and working segments of each man. Knowledge of each individual in a special way is also its capital, its investment in himself/herself that will result in success. Each generation always believed to participate in change and creating a new one. However, no changes were so fast and present in all areas of human activity such as these recent ones. Operations performed with the knowledge that was long ago collected or used to be taught, are more and more rare. Each individual must work independently on himself, and to educate through various forms of informal education.

Viewed today, education in the information-time, does not depend on and can not depend on the will of a person or a small number of people who would have the task of deciding, but it achieves and plans through actions of numerous participants, teachers, students, parents, employers and the state as a whole. Hence, it is urgent to develop a plan, so instructional materials for students can be formed in a pedagogical, methodological format, which will students and the older generation train for the present and the future based on informational-communication technology.

With utilization of information technology many authors noticed the need to process educational content from all other subjects, ie. other scientific disciplines with the help of computers and their resources. Based on the experiences of educational systems in other world countries we started with the innovation of educational technology, complement the teaching methods with students. With the help of professionally processed content, images, video and audio, students are offered with more interesting, obvious and rational presentation of material, which is part of education. In development of this idea the most helpful was Internet which teachers students and experts used to present their work and tasks in order to help other in studying or to get answers on some specific questions.

Education Technology and *Instructional technology* are often used terms in argues about the education. Education technology seems as a common need of technology in education, and Instructional technology is a direct implementation of technology in stydy process so it makes a subset of Education technology. The structure of educational technology contains two components:

The first component contains different teaching materials and teaching aids (computers, projectors, digital cameras etc.), while the second component is related to various processes that accompany education. Many authors (Kosakowski, 1988.; Schacter, 1999.; Wilmot, Jasen, 2001.; Jenson, Brayson, 2002.) argue that integration of contemporary technologies in study process and teaching presents:

- introduction of modern information technologies,
- introduction of multiple variable context and educational applications of information technology,
- testing of new models and approaches to learning, teaching in the context of the application of information technology.

Thus, the pupil today during its school time gets information from school, the actual environment in which it lives (people around it, nature, TV, radio ...) and from the so-called. virtual environment posed by the Internet and Web environment. Today the Web offers a rich educational content in various languages.

Picture 1. Studying a foreign language using modern technology

New Media as well as the Internet requires new skills and new knowledge, and only when an individual master these new skills he can use these media online. Educational portals serve as a special computer tools that were created from the need of individuals and communities for development and efficient use of the information hyperspace of learning on the Internet. In this paper we talk about the conditions of their existence, purpose, concept and possibilities of use in practice, and beyond.

II. THEORETICAL BACKGROUND ON THE USE OF INFORMATION TECHNOLOGIES IN TEACHING

Information technologies are new technologies that have become an integral part of many human activities and have implications in Education from preschool to higher education institutions. Technical and technological progress in the economy, after the proven productivity, reflects in teaching and therefore it is inevitably changing. Unfortunately, these changes in educational institutions are long overdue, because of the power of inertia effects at all levels of education. However, in the slow pace of the teaching process is getting modernized, as training of personnel in strategic educational activities, as well as the use of media and multimedia, where technically more modern teaching materials and teaching aids pushed out of date. If the school is equipped with the latest, media, IT and multimedia, this still does not guarantee its functional use in the system of teaching. Functional use of information resources, media and multimedia in teaching involves flow of new information that students will be able to use in their lives: " Now it is dangerous to give children the old information because they will not help them to live in the future, it will only hinder their growth. Now they need the intelligence to live with rapid change - it is happening now." (Osho, 2007:182) Teaching worker should create conditions for the development of students' actual and potential capabilities and its needs.

It is no longer enough to lifelong training of teaching staff in the didactic-methodical and technical-technological area: how, when, why and with whom to use teaching materials and new teaching technology. For these reasons we focus research on implicit progressivist (constructivist) pedagogy that, in contrast to traditionalism, emphasizes the importance of transactions in teaching and creating their own knowledge construction by students who do not adopt it a mechanically, but through its use in similar or different situations. That's why we believe that the epistemological views of teaching staff are key determinant in the design and implementation of teaching, but also in students' achievement.

III. INFORMATION TECHNOLOGIES AND NEW FORMS OF LEARNING

In this paper we want to draw attention to the implementation of new forms of education that enable implementation of information technology. On this occasion we will pursue the e-education and what are its benefits and explain some important concepts, development of distance education, what is life long learning and European programs that deal with it. E-learning is the performance of the educational process with the help of IT technology. This educational process is teaching at a distance in which the teacher and students are not physically at the same place, such as distance instruction via video conference system, which is transmitted to remote locations or online item made in the tool for distance education. E-learning can be called as an enrichment of classroom instruction, for example, visualization of a topic by using the projector, computer and projection screen. E-learning means using electronic applications in the learning process (*computer based training, web based training, virtual classrooms, digital collaboration*)

- **Computer Based Training** (CBT) is the application or application set with which you can deliver content for education through computers. It includes lessons, exercises, simulations and testing.
- **Web Based Training** (WBT) is the application or application set with which you can deliver educational content through the web browser Internet. **Virtual Classroom** is an online headquarters where instructors and students can communicate synchronously.

Benefits of E-education

- opportunities to participate in teaching at any time and from anywhere,
- individual approach of students and acceptance of different learning styles,
- better interactivity of speakers and listeners,
- higher quality of teaching and increased possibilities of material adoption, which include encouraging listeners to analytical thinking, sintetization of acquired knowledge and independently solving problems and decision making,
- inclusion of different profiles of students (employees, people with families, students from inaccessible areas, people with mobility problems, etc.),
- easier training and retraining - providing new opportunities for lifelong learning,
- simpler organization of lectures by international experts via video conference transmission;
- decreased need for mobility of teachers and students.

Lifelong learning is defined as the activity of learning throughout life to enhance the knowledge, skills and competencies within personal, civic, social and business perspective.

The idea of lifelong learning appeared in Plato's work »Republic«, but it was first fully articulated by Basil Yeaxlee (1883-1967), in cooperation with Eduard Lindemann (1885-1953) professor of Social work who was focused on adult education and who gave the intellectual foundation for understanding education as an ongoing aspect of everyday life. This was used for a discussion of variety of European traditions such as the French notion of education as a permanent and based on monitoring the development of adult education in Britain and North America.

Lifelong learning involves:

- The acquisition and modernization of all types of abilities, interests, knowledge and skills from preschool to retirement,
- The concept of developing knowledge and skills that will enable citizens to adapt the knowledge about society and active participation in all spheres of social and economic life and thus affect on their future.
- Respect for all forms of learning: formal education (eg. high school, college), informal education (eg. improving the skills needed in the workplace), and informal education, intergenerational learning (knowledge sharing in the family, among friends, etc..).

Among International programs dealing with lifelong learning programs we emphasize Leonardo Da Vinci program developed from the need to prepare Europeans for entering on the labor market in order to decrease unemployment. The companies have a need for trained workforce that can compete with the addition of rapid scientific and technological changes. In order to overcome these problems, the European Commission has developed a Leonardo Da Vinci program, which functions as an innovative laboratory in the field of lifelong learning. During the period 1995-1999 there was a realization of program of education and training for specific occupations.

The main objective of the Leonardo Da Vinci program is to help people to advance their skills throughout life.

Socrates program is also an European program for education which included around 30 European countries. Its main objective is to build a Europe of knowledge and thus give a better response to major changes in this century. It seeks to promote lifelong learning, encourage access to education for all and help people acquire the required qualifications and skills. Socrates program encourages mobility (moving through Europe) and innovations. Socrates program includes eight actions:

- Comenius – education at schools
- Erasmus – high education
- Grundtvig – education of adults
- Lingua – teaching and learning of European languages
- Minerva- informational and communication technologies in education
- Observation and innovation – educational system and politics.

Bearing in mind the data moving in the European conception of education, this paper wants to study in order to determine first of all developments in our understanding of this education, if education is still slowly opens up to new technologies in relation to other activities. The paper gives wants to hear the opinions of young people at home and out of school live in a technologically rich environment, do they expect changes in education in accordance with the imperatives of education for the 21st century. This work still wants to hear the opinions of young people who at home and out of school live in a technologically rich environment, do they expect changes in education in accordance with the imperatives of education for the 21st century

IV. Research organization

If a school is imagined as a resource for students, consider teaching as a 3D space, and the broader environment (natural and cultural) as a fourth dimension, then the virtual reality is a fifth dimension which goes through all other dimensions.

The school can ignore the existence and importance of environment and virtual reality, but it leads to reducing and limiting their educational and educational role and it can be confirmed as a closed system. The presence of school and all its components in the fourth and fifth dimension, make it more open, more modern and more relevant to practical life. In order to crate opportunity for schools in Serbia to introduce students with the fifth dimension of the school, it was necessary to equip them with computer equipment and teaching staff to introduce the information age. To show to what extent is all this present in our study, we tried a sample of 257 primary school students aged sixth and seventh grades, in the territory of Kolubara County. The research was conducted in schools in following towns: Valjevo, Lajkovac, Osečina, Mionica, Ub and Ljig. Second sample for this study were 24 teacher-implementers of informatics in elementary school. Data collection was made with survey sheet, whose completion was independent, voluntary and anonymous. Choosing schools for the questionnaire filling was based on a random basis, at the same time taking into account the proportional representation of schools in all municipalities on the territory of Kolubara County.

Basic characteristic of the sample of students is reflected in the uniformity of pupils in classes, the distribution of respondents in all districts. Representation of students per grades is 125 pupils from sixth grade or 48,7% and 132 pupils from seventh grade or 51,3% of total sample.

As for the sample of teachers who implemented the teaching of informatics in elementary school, there is also an equal representation in schools and municipalities. The sample is random and consists of 24 teachers.The sample for this study is significant given that these teachers are the main carriers of the application of ICT-Informational-communication technology in school. A number of them are responsible for the implementation of all activities at the school for the necessary use of information technology. In some schools, they are included in the implementation of certain educational lectures and assist other teachers interested in the decentralization of some content from their subjects. *The subject* of work is to investigate the role and efficiency of IT in education of students in elementary school. *Purpose* - The study aims to determine the level of presence and representation of ICT in teaching elementary school, the ratio of teachers familiar with IT in teaching and the level of material investments and management desire for innovation. *Duties* of investigation are focused on following questions: To what extent and how efficient is the use of Information Technology in the implementation of educational content in all teaching cases? Does the use of IT for the realization of educational content helps students to clarify the problem, how it helps them to learn more easily and efficiently?

Research hipothesis is the scientific assumption that scientific research must confirm or not. In our case we set the hypothesis that states:

In primary schools, in teaching computer science and in teaching other subjects, applying scientific and technological development is not monitored sufficiently, so teaching in primary schools is not likely to any time soon become more efficient and innovative.

In the main hypothesis there are subtheses:

1. The content of teaching in education does not sufficiently monitor current techniques and techn ology

2.Most students do not yet use ICT achievements.

3.Teachers are still reluctant to embrace the achievements of information technology, and few teachers integrate their teaching in IT.

V. Research results

The computer should be considered a teaching tool, and during the teaching it should be used when you can create a new specific teaching situation and offer new and useful approach to learning and teaching. Information technology-assisted education includes at least three basic components:

1) Computer Assisted Learning – CAL
2) Computer Assisted Research
3) Distance Learning - DL

We were interested in investigating the first component. Computer-aided learning is most often used and it is very suitable for the realization of interaction between students and computers to improve the existing technology of learning, teaching made more evident, more dynamic and interesting with the involvement of more students' senses in acquiring new knowledge. Computer-supported learning includes multimedia educational software, computer simulation, virtual reality, artificial intelligence and others. Using information technology provides the individual learning, constant feedback and monitoring progress of students as the teacher helps to realistically evaluate the knowledge of students and instructs them to other teaching media in order to successfully master the new knowledge. In this study, students are helped with their answers to find out how truly computer supported learning is (*Computer Assisted Learning – CAL).*

First question: Do you have a home computer and Internet?

TABLE I. OWNING A COMPUTER

Yes, I have my own computer	189	73,50%
Yes, we all use it in the house	27	10,50%
No, I use the other	41	15,9%
Do you have Internet?	219	85,5%
No, I don't have Internet	23	8,9%

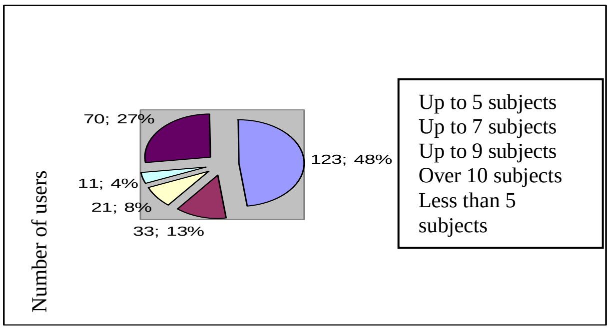
We see that there are still a number of families thus students who do not have computers at home - 15,9%. These are the consequences of economic developments in the world, and in our country.

Another question that students should answer was: How many subjects in class include teaching using the computer?

TABLE II USING COMPUTERS IN CLASSES

Up to 5 subjects	123	47%
Up to 7 subjects	33	12,8%
Up to 9 subjects	21	8,7%
Over 10 subjects	11	4,7%
Less than 5 subjects	70	27%

According this table we see that there is a very small percentage of subjects in schools where teaching is carried out with the help of computers. This shows that there is a very little use of other information technology , projectors, slides and presentation of certain content that students were more obvious and more interesting.



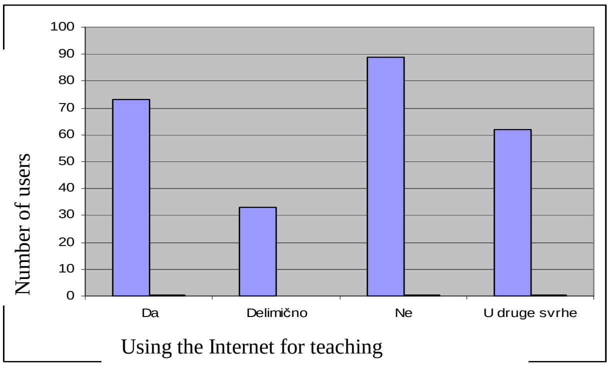
Graph 1.. The percentage of computer usage during teaching

The third question was aimed to determine how students use the Internet to supplement knowledge and make new content:

TABLE III.USING THE INTERNET FOR TEACHING

Yes	73	28,5%
Partially	33	12,9%
No	89	34,7%
Other purposes	62	24,1%

According to table 3 and graph 2 we can see that there is more examinees 34,7% who don't use Internet for teaching than thos who use it 28,5%. Specially important is to notice that 24% examinees use Internet for other purposes instead for school and teaching.



Graph 2. Using the Internet for teaching

How did you learn to use computer and Internet?

Using this issue we wanted to gain insight into how learning computer prevails among the students, and if that later played a role in a greater or lesser use of computers for teaching.From the results (table 4.) it is clear that there are students who still gain self-knowledge, and respond immediately followed by "with the help of a friend" at school

TABLE IV METHOD OF INFORMATION ACQUIRING KNOWLEDGE

Independently, with the help of literature	48	18,6%
At school	128	49,8%
With the help of friends	58	22,5%
Independently, with the help of literature	33	12,8%

Displayed results lead us to think about innovating the curriculum with more opportunities for using information technologies and their resources.

Research conducted by teachers was aimed to cover a population of teachers employed in primary schools in that territory, and evaluate the use of information communication technologies in the preparation of the teaching process, and in its performance. The questionnaire, which teachers have completed given the following indicators.

How many computers are used for the preparation classes, and how much during lessons? The data show that the computer is much more widely used in the preparation classes than during lessons (table5) This can be attributed to the equipment of schools with computers, not only in the computer classroom, but also in the classrooms with other subjects which could be implemented with the help of computer classes, but schools are still lacking with that equipment.

TABLE V COMPARATIVE REVIEW OF THE USE OF COMPUTERS TO TEACHING PREPARATION

Always		Often		Occasionally		Never		No answer
P	N	P	N	P	N	P	N	
11	7	6	3	3	2	4	12	

This study also contains the issue of whether teachers have a computer at home, or have the computer which "is" in school. Equipping teachers with computers and their use in private life is certainly in direct proportion with the use of computers in teaching (if the computer is becoming a daily tool, it is certainly more and more used in the teaching process). The fact that teachers really have the awareness of the need for computers in modern life, shows that 83% of them has a computer at home, while the average in the Republic of Serbia for the year 2008 is 40.8%.Regarding software packages that are commonly used, it is obviously that the most used software are those for word processing, and it can be concluded that the computer is still regarded as little more than a typewriter.

Do you follow the news in the field of computer applications in education? The possible answers were "yes" or "no." The results indicate that new developments in the field of application of computers in education are followed by 62.22% examinees, while 38.57% of examinees doesn't follow it.

VI. CONCLUSION

The future is in the computerization of school instruction. in our region it is achieving rather slowly, so that our generations go to workplaces and that are not sufficiently trained for the new challenges that carries the information society. Such a situation is influenced by many factors that can be viewed through two aspects:

First one is technological and there we think that in the future schools can accept new technologies which can provide utilized learning, Prvo tehnološki i tu smatramo da u budućnosti škole apsolutno moraju prihvatiti nove tehnologije koje omogućavaju olakšano učenje, distance learning, searching encyclopedic knowledge base, and improving communication student-student, student-teacher and teacher-teacher with the latest networking and internet technologies. Numerous studies have shown that learning through a variety of multimedia (text, picture, sound) contents encourages greater interest and enhances the concentration of students in general. Without linking educational institutions with modern communication technology it will not be possible to follow the development trend of science and slowly everything will fall further behind in scientific thought in the world.

Another aspect is pedagogically-sociological. As well as technology brings many benefits, we must pay and great caution in order to implement this technology in education. We should not allow the computerization of education into a mere monitoring of trends and latest fashion accessories in the world of computers and information technology in general. It won't have any connection with education. There is a need for a strategic plan and program for introduction of information technologies in education and science, for only in this way we can achieve the primary goal: improving education with the help of computers.

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SIGNIFICANCE OF PROFESSIONAL TRAINING OF TEACHERS SUBTITLE: (APPLICATION OF MODERN METHODS AND TEACHING)

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Abstract - Curricula of teachers colleges do not pay sufficient attention to methodical treatment of prevention and resolution of conflict situations, as well as the selection of methods and forms of work, having in mind the frequency and number of conflicts in everyday life. Thus, we have a situation that the teachers with long experience are found in the "blind alley" because they do not know how to properly access the resolution of conflicts due to numerous factors and a range of different reasons. Teachers-beginners get confused with abundance of conflicts that they face immediately after they enter school, from the part of the children, parents and colleagues. Education of teachers, improvement or training is of a great importance. As in other professions, the education is essential for a new, different approach to work that follows new technology, modern methods and forms of work. Our school has managed to avoid almost all impulses for the change in the way of work, managing to modernize the appearance of school buildings, or to have relatively modern general education programs at some levels or to fight for a basic norm of qualification structure of the teaching staff. The aim of this paper is to highlight the necessity of education of the teaching staff and employees in the field of education with emphasis on listing the methods and forms of work that are applied in practice and successful identification of conflicts (types), taking the right stand, as well as taking appropriate steps (measures) in order to prevent further escalation and growing into an open conflict.

I. CHAPTER: INTRODUCTION

Educational system has gone through many changes, reforms since its foundation until today due to political, economic and social movements, as well as under the influence of technical and technological achievements. Within school system, the very organization and dynamics of work, time structure of the class were changing, as well as: space, methods, techniques, forms of work, teaching aids and the role of the teacher. If the role of the teacher was reduced to the realization of teaching and blind accomplishment of pre-determined objectives and tasks of education in the past, today this role is largely changed. The need for modernization of methods and forms of pedagogical work is necessary and without it there is no serious step forward in raising the quality and efficiency of our education. Instead of school that only transfers body of knowledge from particular subjects, leaving the student who learns in the role of passive recipient of that knowledge, we need a new, active school that sees an active participant in a child who learns. In addition to teaching contents, the student, as an active participant, is also faced with numerous prejudices, dilemmas, stereotypes and conflicts. As each conflict is different and special, its participants, situations, time of occurrence, consequences, duration etc. are also different. However, common to all conflicts is a desire to come out from them unhurt, to solve them by open conversation (active speaking and active listening), without any blaming and potential (possible) extension, i.e. delay of conflicts. In order for the student to be able to find a module of overcoming the conflicts (whether it is about internal, hidden, latent, open or some similar conflict), he needs to have a role model in a teacher or parent trained for the implementation of modern methods and forms.

II. CHAPTER: SELECTION AND APPLICATION OF THE METHODS OF "ACTIVE LEARNING" AND "TRADITIONAL SCHOOL" FOR THE SAKE OF BETTER LEARNING AND OVERCOMING THE CONFLICTS

„Active learning“ requires qualified teaching staff as main resource, as well as well-organized system of further training of the staff. Active school is aimed at students, who are treated as integrated persons, and not only as subjects of adopting the material. Main characteristics of "active – new school" are: there is no pre-set curriculum, but there is a mandatory part of the program (educational standard) and a part that is flexible (depends on specific conditions); starting point are children's interests; each "new" learning is related to previous knowledge and personal experience; motivation for learning is internal (personal), and as dominant methods there are the methods of active teaching. On the other hand, “traditional school” is based on very old concept, which survives for an extremely long period. Main characteristics of such a form of teaching are: pre-defined curriculum; motivation for adopting the materials is external (grade, praise, punishment, reward); the aim of teaching is the adoption of programs; students’ task is to remember the mandatory part of the material; grading is performed orally or in writing; while the most frequently applied method is lecturing (oral transmission of knowledge). Today’s role of the teacher is greatly altered in relation to the role that the teacher has before, in traditional school. It is complex, multifaceted, multi-purpose and multimedia (the speaker reveals a board with current roles of a teacher) and those are: active participant in development of pedagogical science, organizer, coordinator, associate, helper, speaker, regulator of relations, assimilator, therapist, facilitator, democratic strategist, carrier of the new communication, mediator, researcher, peacemaker, interpreter, model of behavior, as well as multi-purpose and multimedia role, constructivism-committed teacher. Roles of teachers, such as: authoritarian teacher, arbitrator (judge), punishments executor, the one who gives orders, disseminator, grader… have long been overcome and suppressed by new roles. Regardless which one of the aforementioned roles is dominant and more present in relation to others, “conflicts” are occurrences which we are faced with every day, both in private life or in the workplace in relationships with colleagues, students, parents, principal or school’s support staff etc. Conflicts are the result of mismatches, rejections, misunderstandings, tension and poor relationships with persons in our reality. Usually out of ignorance, how to solve them properly, or how to face them in order to overcome them, the conflicts result in opposite effect from our expectations. In that way, we bring ourselves into a situation in which our own conflict with environment makes us helpless and miserable. Developed instinct and familiarity with own hierarchical status or position within collective, society, with students in a class, provides the reduction of the number of conflicts. In the adult world, the ability of group members that daily verify, evaluate and measure power and potentials with other members cannot remain unnoticed. The need for domination is seen in children’s collectives.

Therefore, regular training of teachers is inevitable. In order for today’s teacher to respond to the latest trends and challenges of teaching (taking the proper attitude towards conflicts and conflict persons is also included), it is important that he learns, explores and works on personal affirmation.

III. Chapter: Research and Results of the Application of Modern Methods and Forms of Work, Through Professional Training of Teachers

The study, which is at the same time the subject of this paper, was carried out in one elementary school in Novi Sad on a sample of 38 teachers/class teachers, it was aimed at pointing out to practical application of (implementation) of teaching method of active learning and to pint out to the necessity of training teachers, professors, pedagogues, psychologists; the change of child/student’s position in teaching process, as well as the evaluation of the results achieved and thus the durability of knowledge acquired in that way. Durability of the knowledge acquired, which the students reach independently and by active learning, facilitates the acquisition of new experiences for them and significantly easier handling of the conflicts.

The following statement was set as the main hypothesis: „It is assumed that choice and application of teaching methods influences the increase of quality and continuity of knowledge as a whole, as well as the reduced number of conflicts, which depends on professional training and education of the teacher.” After the definition of significant determinants and survey, the theoretical, descriptive and statistical methods were used for data processing. The following research results were found:

A. Gender and age structure of teachers:

Of 38 respondents, employed from I-VIII grade, who are employed full-time, 8 teachers (21.05%) are men, while 30 (78.95%) are women. If we take into account the age structure of respondents, the results are the following:

A) from 25 to 35 years: 10 teachers (26.32%);

B) from 35 to 45 years: 15 teachers (39.47%);

C) over 45 years: 13 teachers (34.21%).

B. Educational level and years of services

Of the total number of (38 surveyed) teachers, there are 6 of them that are college graduates

(15.79%), and 32 of them have a university degree (84.21%). As we can see, from the aforementioned results, it is about a younger collective, i.e. younger staff, and thus it seems logical to expect that the years of service are in proportion to the employees:

A) up to 10 years of service – 13 teachers (34.21%);

B) from 10 to 20 years of service – 13 teachers as well (34.21%),

C) while over 20 years of service, there are 12 teachers (31.58%).

Of the 30 female respondents, 25 (83.33%) have a university degree. 24 (96%) of them have applied the methods of "active learning", while only one (4%) female respondent didn't use the mentioned methods. The data show that out of five respondents (16.67%) who are college graduates, four of them (80%) have used the methods of modern teaching, while one of them (20%) of the total number of respondents, has never applied the methods of active learning.

When it comes to male teachers, 7 of them (87.5%) have university degree, and only one of them (12,5%) is college graduate and he has applied the methods of active learning. 4 of them (57.14%) were using methods of modern "active teaching", while 3 of them (42.86%) have never used methods by which they could bring novelties into the engagement of students and themselves.

From the presented, statistically processed data, it is concluded that education level-college or university, is not a precondition for an active application of modern methods and modernization of teaching. Female teachers show more flexibility and readiness to introduce novelties into teaching process as opposed to male teachers.

C. The most commonly used methods in teaching

To this survey question, 14 teachers (36.84%) responded that they have used all known methods equally. Two teachers (5.26%) condition the application and choice of methods by the type of material that is processed in class, while three teachers (7.90%) prefer traditional methods. Some teachers have pointed out the most fertile methods in their work:

- Individual work of students: 4 teachers or 10.53%,
- Dialogical method: 4 teachers or 10.53%,
- Work on a text: 2 teachers or 5.26 %,
- Oral presentation (lecture): 1 teacher or 2.63%,
- Demonstrative method: 1 teacher or 2.63%.

One teacher, or 2.65%, believes that there are no "most fertile methods" that would be worth emphasizing. Three teachers (7.90%) haven't responded. The following table presents the methods of active learning, modern teaching that are used in today's practice:

No.	Name of the method	Number of teachers that apply it in practice	% of teachers in relation to the total number of the surveyed
1.	Project - method	3	7,90%
2.	Cooperative learning	2	5,26%
3.	Learning through play	1	2,63%
4.	Learning through associations	1	2,63%
5.	Research learning (text)	1	2,63%
6.	Learning by visual methods	1	2,63%

Based on conducted survey and answers obtained, we can conclude that 18 teachers (47.37%) do not have a clear perception in distinguishing the methods and forms of work, since they mention group form of work as a method:

- group work, 7 teachers or 18.42%; learning (work) in pairs, 4 teachers or 10.53%; frontal form of teaching, 4 teachers or 10.53%; individual work, 3 teachers or 7.90%.

D. Presence of teachers at seminars and readiness for new educations

School reforms in elementary school (descriptive grading, new subjects: optional), secondary school, reorganization at faculties (work on Bologna principles), introduction of licenses for work of the teaching staff, have resulted in attending seminars and educations that are mandatory or optional. **According to survey results, the teachers have shown the readiness and desire for further training.** 76.32% or 29 teachers are familiar with the methods of active teaching (through the education at seminars), while 23.68%, i.e. 9 teachers didn't have a chance to become familiar with modern learning methods.

Depending on age and gender structure of teachers, the readiness, i.e. interest of the same for the application of modern methods of teaching is also changed, as well as the interest for the continuation of professional training through seminars attending and other educations. To the question: “Are you ready to continue the education, to exchange experiences with colleagues from other school and to learn about new methods of learning?”, the structure of answers is following:

Females: 30 teachers or 78.95% of respondents

a. from 25-35 years, there are 9 teachers or 30%, and all of them (100%) are willing to continue their education,

b. from 35-45 years, there are 12 teachers or 40%, of which number 9 (75%) are willing to continue the education, while 3 teachers or 25% do not want further education,

c. with more than 45 years of service, there are 9 teachers or 30%. 4 of them (44.44%) want to continue the education, while 5 teachers (55.56%) have categorically rejected any form of further training.

From the data presented, it can be seen that younger generation (25-35 years) is more willing for further education, while with the age (from 35 years), the percentage of female teachers who are not interested in further education also grows.

Males: 8 teachers or 21.05%

To the same question about the continuation of education, the answers of male teachers are the following:

a. from 25 to 35 years of service, there is one teacher година (11.11%). He is willing and he wants to continue the education (100%),

b. from 35-45 years, among the surveyed ones, there are 3 teachers (33.33%), of which: 2 teachers (66.67%) want to continue the education, and only one (33.33%) does not want to continue with professional training,

c. with more than 45 years of age, there are 4 teachers (44.44%). Only one teacher (25%) wants further education, while 3 teachers (75%) do not want further education.

Once again, we come to the conclusion that as age limit moves up, the teachers lose the motivation for further training.

Overall research result:

Education:	Males: number (%)	Females: number (%)
a) want to continue	4 (50%)	22 (73.33%)
Б) do not want to continue	4 (50%)	8 (26.67%)

E. Motivation of teachers as prerequisite for further education and professional training

Very often, it is discussed whether the teachers are sufficiently and adequately rewarded and stimulated, and would an additional stimulation change their attitude towards work as well. Through the survey, the following results were obtained: 31 of them (65.79%) point out the earnings as the most significant stimulus for attending further educations, while 12 teachers (13.58 %) considers that money is not an important reason for which they would accept the education. Only one teacher (2.63%) believes that further education of teachers is not “the question of money” but it is the question of personality and teacher’s decision.

As in teaching practice it is spoken about conflicts in the situation when they escalate and become open, and they are accessed by imposition of disciplinary measures and convictions, it is necessary to train the teachers to recognize a conflict, take the right attitude and act in accordance with the situation before, during and after the conflict.

IV. Conclusion

There are very few exact feedback information that confirm the application and usability of the knowledge acquired at seminars, meetings and other forms of education in schools, as well as real reasons for so-called “continuation of work as usual”. As it can be concluded on the basis of answers of surveyed teachers, the female respondents are much more flexible in the selection of methods and a greater percentage of them is ready for further education, while twice as higher percentage of male teachers have declared that they are not interested in further education. In addition, education level, college or university degree, is not the prerequisite that influences the motivation and willingness of teachers to continue the education and knowledge acquisition. It is recorded that the older teachers are more focused on traditional knowledge acquisition and methods, noting that they have tried the role in which they are put by the methods of “active learning”. Unlike them, the younger teachers do not make a clear difference between forms and methods of work and they mention “individual, frontal and group work” as the main method. For most teachers, 66% of them, the additional money stimulus would be a great motive and driver of the desire for further education. If we take into account the qualified teaching staff as the primary resource, the requirements for better equipment in schools and continuous professional training of teachers are imposed.

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LEARNING BOTANY AND BIOLOGICALLY IMPORTANT ORGANIC COMPOUNDS AT THE ELEMENTARY SCHOOL

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Abstract - In teaching biology modern learning methods and teaching technologies are used. Physiological processes in plants, such as: photosynthesis, respiration and transpiration are presented by computer simulations. Learning botany in the current curriculum is in the fifth grade and is correlated with the phonological calendar, so that the pupils in the fifth grade are able to collect plants in spring and use collected plant material to follow the botany lessons on the collected plant material. Biologically important organic compounds, present in plants and living world around us, are studied in the eighth grade of the elementary school. In order to realize the knowledge pupils have accepted about plants in the fifth grade and how pupils know to apply it on the recognition of biologically important organic compounds present in plants, pupils of the eight grade were asked to respond on the questionnaire. The survey was conducted at one elementary school in the urban area and one elementary school in a rural area of the municipality of Novi Sad, Serbia.

I. INTRODUCTION

Teaching biology and chemistry is following the modern teaching processes using modern educational technologies in many schools, especially in urban areas of Serbia. Teaching biology (botany) and chemistry (biologically important organic compounds) should include the use of plant material and botanical collections. According to the syllabus of biology for the elementary schools in the Republic of Serbia botany is taught in fifth grade of the elementary school, while the biologically important organic compounds are taught in the eighth grade. Knowledge gained in the fifth grade, at the botany lessons, should be applied at the lessons of biologically important organic compounds in the eight grade.

II. MATERIAL AND METHODS

The subject of this study was the analysis of pupils' knowledge of botany gathered in the fifth grade of the elementary school and its correlation with the knowledge in the field of biologically important organic compounds that are taught in chemistry in the eighth grade of the elementary school.

The aim of this research would be to encourage the teachers of chemistry to transfer the knowledge in the field of biologically important organic compounds in the eighth grade using also the botanical collections and plant material the pupils have gathered in the fifth grade during regular biology classes and in that way encourage the pupils in active learning of chemistry.The method used was theoretical analysis.

The instrument used was a survey done by pupils of the eighth grade of the elementary school.

III. RESULTS AND DISCUSSION

According to the syllabus for the second cycle of the elementary education and training for the fifth grade of elementary education, within the operational tasks is envisaged, among other things, understanding the concept of botany as a scientific field of biology, learning plant species, the major plant kingdoms and developing an interest in expanding knowledge in relevant institutions (Botanical Gardens, Museum of Natural History, Libraries). While the content of the syllabus provides, among other things, learning the plant kingdom – structure and processes of plants and within that, among other things: the plant process: photosynthesis and the practical experiment: Isolation of chlorophylls from the leaves. The content of the syllabus provides, *inter alia*, the content: plant diversity, the importance of plant protection and in that content: The edible and medicinal plants, collection of plants for the herbarium and the collection of plants for the school herbarium. In the way of achieving the syllabus it is recommended that 60% of classes are for learning new knowledge and 40% for other types of classes, including going to the parks and gardens. Going to the parks and gardens implies the observation and monitoring of natural phenomena, processes and plant collection for the herbarium. Under the theme of biologically important compounds, operational tasks are, among other things, that the pupil gets to know which food is rich in fats and which in oils, carbohydrates and proteins, which vitamins are soluble in water, which are soluble in fats and get to know the importance and role of vitamins in the human body. In the instructions for the realization of the syllabus is recommended, among other things: In the correlation with the biology classes pupil should learn that glucose, as the main source of energy for living beings, is formed during the process of photosynthesis. It is necessary to show to pupils the chemical equation of photosynthesis, to comprehend that from the simple inorganic molecules: carbon (IV) - oxide and water, under certain conditions, a molecule of glucose is formed. The formation of polysaccharides should be presented as a way the energy is stored. It should be mentioned to pupils that the starch and cellulose are different natural polymers made of monosaccharide units. It is important to point out the broad number of carbohydrates in nature and their application in everyday life: the sucrose in the food industry, starch in the food and pharmaceutical industries, cotton and cellulose in the textile industry, etc. Within this project pupils have to learn: the six major types of substances necessary to human body (proteins, carbohydrates, fats and oils, vitamins, minerals and water), about the importance of proper nutrition and eating disorders.

How the teaching of botany and biologically important organic compounds is correlated was the goal of this survey. The survey was filled in by 78 primary school pupils in urban area of Novi Sad and 55 primary school pupils in the rural part of Novi Sad. The survey results are presented in Table 1 and 2.The analysis of results points out:
1. More than 90% of pupils, at both schools, know that the fruits of the family of roses: apples, strawberries, peaches, cherries and blackberries are rich in vitamins. Vitamins are studied in the chemistry at the eight grade of the elementary school, in units, such as: division of vitamins and their role in the body, food that is the source of some vitamins, diseases and symptoms caused by vitamin deficiency [1].
2. At the village school 96.36% of pupils know that the storage monosaccharide in apples, strawberries, peaches, cherries and blackberries are glucose and fructose, not the polysaccharide starch. At the city school the percentage is lower and is 85.90%.
3. At the village school, all pupils know medicinal plants and this percentage at the urban school is 98.72%. Medicinal plants are a special chapter in the biology book for the fifth grade of the elementary school [2]. In the chemistry book for the eight grade of the elementary school only nettle is mentioned in the chapter describing carboxylic acids, where it is mentioned that the formic acid is present in the nettle plant [1]. Medicinal plants are described in the biology book for the fifth grade of the elementary school [2].
4. Pupils from the rural school in 90.91% know that poisonous plants are: Belladonna (nightshade), ivy and pheasant's eye, while 78.21% of pupils at the urban school know that these plants are poisonous. In the biology book for the fifth grade saffron is mentioned as a very poisonous plant and that there are plants that contain compounds that exhibit very strong and even harmful effects on human organism [2]. In the chapter where Solanaceae family is described it is written that tobacco, nightshade, henbane and stramonium contain toxic substances. In the biology book, at the fifth grade of the elementary school, poisonous plants are described [2]. In urban areas, it could be recommended, to organize the visit to the country, outside the city, so that pupils living in urban areas can get to know plants. That includes additional material and time effort to biology teachers and parents in learning botany [3, 4].
5. At the rural and urban school almost equal percentage of pupils known that spice plants are: garlic, onion, paprika, parsley and bay leaf. Some of these plants are mentioned in the chapter of the biology book under the chapter of edible plants in the fifth grade of the elementary school [2].
6. Pupils at the rural and urban schools know that the fruit of olive is rich in oil. In the chemistry book for the eight grade of the elementary school within the chapter: Fats and oils, is mentioned that seeds and fruit rich in oils are: sunflower and olive, respectively [1]. It can be concluded that there are no difficulties and obstacles in the realization and correlation of the theme fats and oils with the plants learnt in the fifth grade.

7. The most interesting data was obtained by analyzing the answers to the question: Do plants from the Brassicaceae family (cabbages) contain chlorophylls? Pupils living in urban communities have responded positively in 57.69%, while pupils from rural areas have responded affirmatively in 85.45%. Photosynthesis is taught in fifth grade of the elementary school in biology, under the thematic area: Life processes: photosynthesis, respiration and transpiration [2]. Also, within this thematic unit is the experiment: Isolation of chlorophylls from the leaves [2]. In the chemistry book for the eight grade

of the elementary school, in the chapter describing the carbohydrates photosynthesis is described. It is written that the carbohydrates that occur in green plants are made from carbon (IV) - oxide and water, in the presence of enzymes and plant pigment chlorophyll [1]. Chlorophyll and photosynthesis are studied at the biology classes in the fifth grade and at chemistry lessons during the eight grade of the primary school. Even though, nearly half of the pupils of the eighth grade living in the city do not know that plants: cabbage, wallflower, cauliflower, Brussels sprouts, kohlrabi and broccoli contain chlorophylls. Computer simulations can present photosynthesis, but it is necessary to have the fresh plant material for the pupils in order to explain a basic physiological process in plants – the photosynthesis.

8. At the village school 90,91% of pupils know that they have a herbarium at the school, while in urban area 66.67% of pupils know that at the school they have the herbarium. It happened before that the collection of plants for the herbarium was planned by the syllabus during the winter. With the present syllabus the collection of plants is planned in spring so the pupils can collect plants and make a herbarium [3].

9. The pupils in rural area 96,36% know that they have made a herbarium, while pupils in the urban area, 78.21% know that they have made a herbarium.

10. For biology classes exists an illustrated herbarium, with 108 plants recommended for the collection [5]. In rural areas 65.45% of pupils answered that they have gathered fifty plants for the herbarium. Some of the pupils, living in the urban community, wrote some non critical answers. Others, 12.82% of the pupils living in the urban area answered that they have gathered thirty plants, and 17.95% of them have collected fifty plants. It can be concluded that the best number of plants for the herbarium is from 30 to 50 plants and that this is the best number of plants pupils should have in their herbarium.

IV. CONCLUSIONS

Teaching botany in the fifth grade of the elementary school meet the form of recommended biology syllabus, with a modest remark that the process of photosynthesis and the presence of chlorophylls in the leaves of plants pupils should learn better. In teaching biologically important organic compounds there should be mentioned what compounds are present in edible, medicinal, aromatic and toxic plants. The classes of chemistry, processing new materials, repetition and systematization of biologically important organic compounds, should, where possible, refer to plant species that have been learned at the classes of botany in the fifth grade of the elementary school.

TABLE II. THE SURVEY RESULTS ON THE CORRELATION OF TEACHING BOTANY AND BIOLOGICALLY IMPORTANT ORGANIC COMPOUNDS IN THE ELEMENTARY SCHOOL IN THE URBAN AREA OF NOVI SAD

Question:	Answers	Number	%
1. The fruits of the family of roses: apples, strawberries, peaches, cherries, and blackberries are rich in vitamins?	a) yes	72	92,31
	b) no	6	7,69
2. The fruits of: apples, strawberries, peaches, cherries and blackberries are rich in:	a) glucose and fructose	67	85,90
	b) starch	11	14,10
3. Are plants: marshmallow, blue mallow, sage, chamomile, thyme, juniper and lavender medicinal plants?	a) yes	77	98,72
	b) no	1	1,28
4. Are poisonous plants: Belladonna, ivy and pheasant's eye?	a) yes	61	78,21
	b) no	17	21,79
5. Are: garlic, onion, paprika and parsley leaf spice herbs?	a) yes	74	94,87
	b) no	4	5,13
6. Is the olive fruit rich in:	a) oil	75	96,15
	b) fats	3	3,85
7. Do plants from the Brassicaceae family (cabbages) contain chlorophylls?	a) yes	45	57,69
	b) no	33	42,31
8. Do you have a herbarium at school?	a) yes	52	66,67
	b) no	24	30,77
	I do not know	2	2,56
9. Have you made during the biology classes a herbarium?	a) yes	61	78,21
	b) no	17	21,79
10. If you have made a herbarium during biology classes, how many plants you have collected for the herbarium?	I can not remember	6	7,69
	I was not present during that lesson	1	1,28
	A lot	6	7,69
	insufficient	1	1,28
	no	17	21,79
	yes	2	2,56
	0	1	1,28
	2	1	1,28
	10	3	3,85
	15	2	2,56
	17	1	1,28
	20	4	5,13
	25	4	5,13
	30	10	12,82
	40	1	1,28
	50	14	17,95
	88	1	1,28
	114	1	1,28
	more than 300	2	2,56

The survey concluded that it is necessary to develop a comprehensive understanding of the theme: Carbohydrates, with special emphasis on the creation of carbohydrates through the basic physiological process the photosynthesis.

TABLE I. THE SURVEY RESULTS ON THE CORRELATION OF TEACHING BOTANY AND BIOLOGICALLY IMPORTANT ORGANIC COMPOUNDS IN THE ELEMENTARY SCHOOL IN THE URBAN AREA OF NOVI SAD

Question:	Answers	Number	%
1. The fruits of the family of roses: apples, strawberries, peaches, cherries, and blackberries are rich in vitamins?	a) yes	50	90,91
	b) no	5	9,09
2. The fruits of: apples, strawberries, peaches, cherries and blackberries are rich in:	a) glucose and fructose	53	96,36
	b) starch	2	3,64
3. Are plants: marshmallow, blue mallow, sage, chamomile, thyme, juniper and lavender medicinal plants?	a) yes	55	100,00
	b) no	0	0,00
4. Are poisonous plants: Belladonna, ivy and pheasant's eye?	a) yes	50	90,91
	b) no	5	9,09
5. Are: garlic, onion, paprika and parsley leaf spice herbs?	a) yes	53	96,36
	b) no	2	3,64
6. Is the olive fruit rich in:	a) oil	51	92,73
	b) fats	4	7,27
7. Do plants from the Brassicaceae family (cabbages) contain chlorophylls?	a) yes	47	85,45
	b) no	8	14,55
8. Do you have a herbarium at school?	a) yes	50	90,91
	b) no	5	9,09
9. Have you made during the biology classes a herbarium?	a) yes	53	96,36
	b) no	2	3,64
10. If you have made a herbarium during biology classes, how many plants you have collected for the herbarium?	0	4	7,27
	40	1	1,82
	50	36	65,45
	55	1	1,82
	70	2	3,64
	86	1	1,82
	100	8	14,54
	107	1	1,82
	312	1	1,82

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MATHEMATICAL ANALYSIS AND VISUALIZATION IN ENGINEERING DESIGN EDUCATION

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Abstract - Expansion of using computers in the field of graphical data processing has been developing permanently. By means of graphical data processing, information can be analyzed, controlled, modified in dialogue with computer. In this paper the software package Mathcad was chosen to visualize automation calculation of elastic beam loaded by force and animation of regressing polynomial. Mathcad contains a great number of options, incorporated functions and developed methods for a graphic interpretation of quantified data. Using available techniques and with minor experimenting characteristic for every user, very effective graphic visualizations and their functions in two-dimensional and three-dimensional design can be achieved.

I. INTRODUCTION

One of specific objectives in engineering, in all its fields, is to develop computer methods and procedures for efficient use in solving complex engineering problems. It also involves processing of appropriate mathematical methods and models of calculation, as well as verification and presentation of the obtained results. The general goal, in a more sociological meaning, is to indicate to some of numerous challenges which the present and future generations of engineers will certainly meet [1].

Researches in the field of general problems of management and their corresponding fields of mathematics, combined with the progress of computer technique, provide a basis for automation of new spheres of human activity. A method of mathematical modeling which reduces research of the outside world to mathematical problems is elaborated in the theory of models and holds a distinguished place among research methods. Specific and general methods and algorithms are used as necessary and powerful tools for exact research of nature and society. These ambitions could help form much larger number of new software defined methods. A large number of researchers have worked and will work on them. However, it is almost certain that they will deeply integrate with computer systems performance. Undoubtedly the spirit of those systems is software, which is becoming more and more complex and sophisticated. Enormous "mathematic space" is always behind software. This virtual space is permanently being loaded with programs based on mathematical and exact structures which are well-known in a traditional meaning of the word. Along with its nearly unlimited possibilities of application, i.e. its enormous impact on development of modern theory and practice, today's mathematics has decisively brought up new and serious questions of education of scientific, expert and pedagogical professionals in the area of science, art and philosophy [2].

One of the possibilities of automation of calculations is the use of mathematical software as an aid in design, such as the Mathcad. The Mathcad is a very popular computer program used for technical calculations which students, engineers and scientists make at universities, in research centers and in various other activities worldwide. It has become popular due to its powerful functions and simple, easy-to-use features.

II. MATHEMATICS AND VISUALIZATION IN ENGINEERING

A computer will considerably accelerate all types of calculations in mechanical engineering which will ensure more accurate data and simpler optimization owing to the fact that a parallel calculation can be easily done. To make calculations it is necessary to have corresponding professional software or the software can be designed independently in design bureaus [3].

Calculation means transformation of the input physical values into desirable results by means of mathematical and physical laws. Presentation of the results of calculation is done by drawings and diagrams.

The efficiency of Mathcad is proved in calculation of differential equations, 3D diagrams presentation, programming the calculation itself, application for mathematical iteration, where with defined conditions of iteration the calculation is self-updated and momentarily shows the result which contains numerous steps of recalculation. The units can be included directly into calculation and the result can always be given in desirable time units. It is compatible with databases, CAD applications, which can ensure enrichment and enhancement of calculations.

A. Computer calculations and graphic

Graphical creation of functions and their esthetization is one of the key intentions of the software package Mathcad. This includes a complete graphical processing of a function (or functions) by designing graphs with pre-set conditions, interpretations of obtained results, reports presented in tabular form, etc. In the most modern software tools in mathematics graphics are objects in analytical or numeric form, i.e. a function presented in the fields of Descartes, polar, spherical or other coordinate systems. A dependence function is presented graphically as a result of calculation or conversion of final sets of numeric data from other applications, addressed in a database with the same or different extension (e.g. from other software packages) [4].

B. Elastic beam bending under concentrated radial force loading

Design calculations are unavoidable part of a design process. They can be done before (in order to chose dimensions) or after designing. Modern design approaches are reduced to calculation integration (simulation, optimization, stress analysis, dynamics, etc.) in the course of geometric modeling.

It is important for designers to know all phenomena that may occur in machine parts under the action of different types of loading. The loading is effected by a system of outer forces and couples which attack a machine part. Working load which affects a machine part tends to change its shape and dimensions. The material resists deformation by action of inner forces. Such a state is called strain. According to the deformations a loading may cause, those strains can be volumetric (axial – straining and pressure, bending, shearing, torsion) and superficial (contact). In machine parts they combine. Experiments help discover how machine parts made of real materials behave and then these results are compared with theoretical ones. The calculation is mainly based on reliability needed in work, i.e. needed strength of parts. There is a tendency today to simulate outer and inner action of forces so that an engineer could have a clearer insight in a mechanical system behavior during exploitation. Computer can follow behavior of a design under loading, e.g. deformation, so that all possible weaknesses could be noticed immediately and overcome promptly as early as in the design phase [5].

On the example of the Mathcad environment a calculation of basic characteristics of a supported beam (fig. 1) will be shown: moment of inertia of cross section, characteristic values of beam bending,

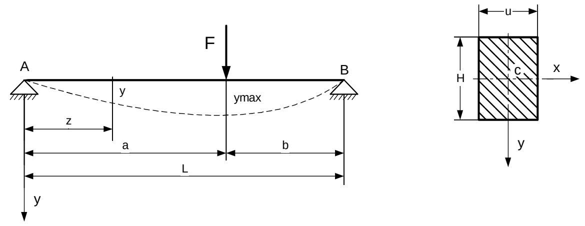

Figure 1. Elastic beam under the action of radial force

bending moment and similar [6].

Beam dimensions:

Beam length: $L := 1.2 \cdot m$

Profile height: $H := 8 \cdot mm$

Width of the lower base: $u := 8 \cdot mm$

Intensity of radial force: $F := 250 \cdot N$

Distance of force action from the left and the right end:

$a := 0.75 \cdot m \qquad b := L - a \qquad b = 0.45\,m$

Module of elasticity of a beam: $E := 2.1 \cdot 10^{11} \cdot Pa$

Derived characteristics of a beam:

Moment of inertia:

$$I := u \cdot \frac{H^3}{12}\ ,\ I = 341.33\ \ mm^4 \qquad (1)$$

Distance from the neutral axes:

$$h := \frac{H}{2}\ ,\ h\ =\ 4\ mm \qquad (2)$$

Area of cross section:

$$A\ :=\ u \cdot H\ ,\ A = 64\ mm^2 \qquad (3)$$

Longitudinal points on a beam:

$$i := 0 .. 50 \qquad z_i := i \cdot \frac{L}{50}$$

$z^T =$ (cm)

	0	1	2	3	4	5	6	7	8	9	10	11	12	13
0	0	.4	.8	.2	.6	12	.4	.8	.2	.6	24	.4	.8	.2

Bending function – deflection (fig. 2):

$$y_i := \frac{F}{6 \cdot L \cdot E \cdot I} \cdot \left[b \cdot \left[\left(z_i\right)^3 - a \cdot (L + b) \cdot z_i \right] - \mathrm{if}\left[z_i > a, L \cdot \left(z_i - a\right)^3, 0L^4 \right] \right] \qquad (4)$$

Distance to the greatest bending:

$$zmax := \sqrt{\frac{a \cdot (L + b)}{3}}$$

$$zmax\ =\ 64.23\ \ cm \qquad (5)$$

The greatest bending:

$$ymax := \frac{F \cdot b}{6 \cdot L \cdot E \cdot I} \cdot \left[zmax^3 - a \cdot (L + b) \cdot zmax \right]$$

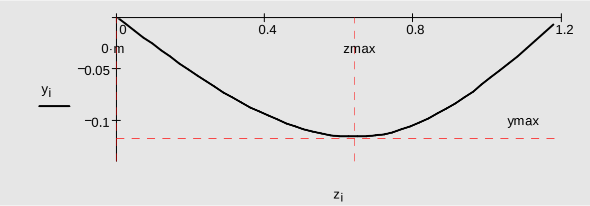

Figure 2. Graph of bending function in y-z plane

$$ymax = -115.5\ \text{mm} \tag{6}$$

Strength of bending moment of a beam (fig. 3):

$$M_i := F\cdot b\cdot\frac{z_i}{L} - \text{if}\left[z_i > a, F\cdot\left(z_i - a\right), 0\cdot F\cdot 1L\right] \tag{7}$$

The greatest bending moment:

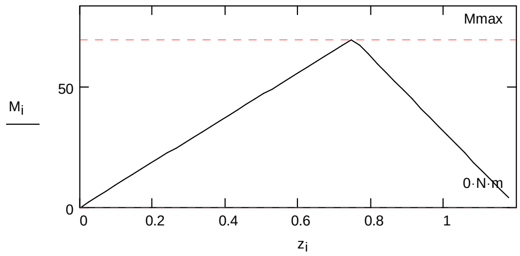

Figure 3. Bending moment diagram

$$Mmax := F\cdot b\cdot\frac{a}{L}, \quad Mmax = 70.31\ \text{N}\cdot\text{m} \tag{8}$$

Bending stress (fig. 4):

$$S_i := M_i\cdot\frac{h}{I} \tag{9}$$

The greatest bending stress:

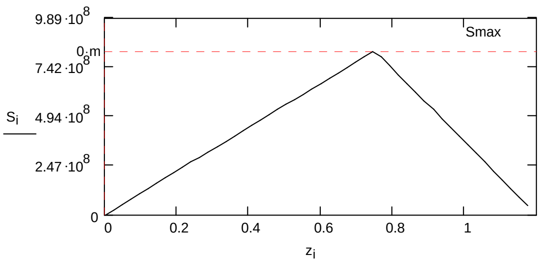

Figure 4. Bending stress diagram

$$Smax := Mmax\cdot\frac{h}{I}, \quad Smax = 8.24\times10^8\,\text{Pa} \tag{10}$$

Note: Values in previous equations although equal to zero must be dimensionally defined as:

$0\cdot F\cdot 1L = 0\,\text{N}\cdot\text{m}$ $\qquad 0\cdot F = 0\,\text{N}$ $\qquad 0L^4 = 0\,\text{m}^4$

The Mathcad is not exclusively graphical software. However, from the point of view of mathematical graphics, it is so. Apparently, mathematics is used here directly and software communication is visual. As with other mathematical software a fine combination with visualization is achieved here, too.

III. COMPUTER ANIMATION

In evolutional development of computer graphics, next visual language which has intensively developed, are mobile pictures or film. Individual and single picture from which is later formed mobile picture, is statically one. Demonstration of movements depends on eye characteristic to continue to observe light as well after its disappearance. This characteristic is called vision permanence. When images are presented to eye rather quickly and with certain continuity, eye interprets a series of images describing form in different places as continuous motion of that form [7]. From technical point of view, this presents animation or digital film. It is essential series of bitmapped graphical scenes, reproduced through certain degree of speed. According to language genesis, animation demonstrates reanimation or liveliness of certain object. With cartoons it is animation of static images. If we with camera take photo on an action during time, so that it would repeat it at the same speed, every of these photos is called one frame of film. In animation, motion of an object is visualized through creating images for every frame, as if a form were snapped in motion, and then those frames were again reproduced in time series. To comprehend how many modifications is necessary between frames for creating illusions of motion, there was taken an

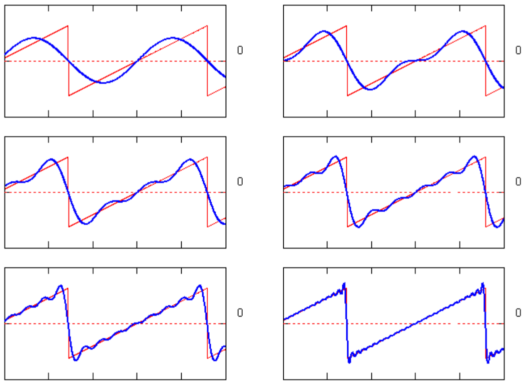

Figure 5. Six chosen frames out of substantially more necessary, number in order to animate the functions of Fourier's transformation [4]

example with six characteristically frames (fig. 5), of many more necessary for demonstration new function of Fourier's type.

A. *Statistic way of graphics demonstration*

Calculation of a function is performed within defined domain of its argument. That domain is being defined from initial to final value, with assigned increment. After that is formulated function and appropriate value is being looked for. If we calculate function value for assigned domain points, we get vector (matrix) of solution. On the basis of arranged pair: argument and appropriate function, we create plots e.g. 2D or 3D. With two – dimensional plot there are one independable and one dependable variable. Plot is in that case static by its nature, and it doesn't change until something is changed in mathematical model that generates it e.g. increment, domain, variable and the like.

B. Creating animations through frames

With computer frames through changes of certain parameters in systematized series of graphic objects, we creates convenience for understanding and visualization of wider class of phenomena, than it is case in a static demonstration of graphics. Mathcad contains modules for animation that enable visibility of change in graphical presentation at the moment when a parameter (or a set of parameters) changes. Animation is established on built in variable FRAME, always written (synthesized, syntheticated) with capital letters. In order to create animation, one function is fixed and one diagram is prepared and in it is entered this variable. It should be replaced for variable whose values cause visual alteration (modification) e.g. graphics. In terms of it, creating animations by way of frames like "dynamics graphics" is totally based on mathematical calculations and is enabled both for vector and raster graphics.

C. Animation of regressing polynominal

Example of Mathcad functions for regressing polynominals of n^{th} degree (fig. 6). It is supposed that the first column of matrical data for Y–variables, and the second for X–variables [8].

The matrix of data pairs:

Q :=

	0	1
0	0	32.6
1	1.4	48.5
2	3.6	37.8

The number of matrix rows:

$N := \text{rows}(Q) \quad N = 9$

The degree of polynomials for fitting:
$n := 1 + \text{FRAME}$

Matrix columns: $X := Q^{\langle 0 \rangle}$ $Y := Q^{\langle 1 \rangle}$
Regressing function:
$Z := \text{regress}(X, Y, n)$, $i := 0 .. N-1$
Values of regression factor:

$Z^T = (3 \quad 3 \quad 1 \quad 40.62 \quad -0.38)$

Regression equation is assumed as polynominal one $y = a_0 + a_1x_1 + \ldots a_nxn^n$ where the coefficients are defined by the function:
$a := \text{submatrix}(Z, 3, \text{length}(Z) - 1, 0, 0)$
The scaling of idependent variable: $x := 0, 0.05 .. 16$
Regression polynom and its coefficients:

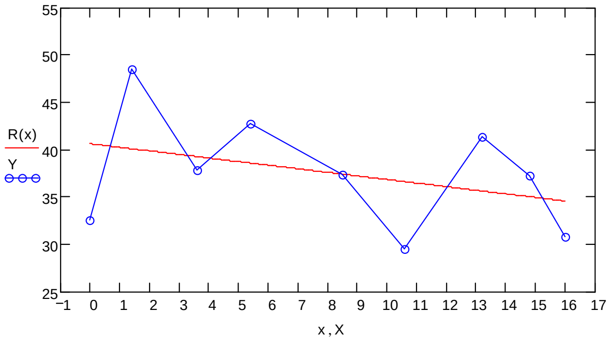

Figure 6. Plot of original data and the function of regressing polynominal (n=6)

$$R(x) := \sum_{i=0}^{n} \left(a_i \cdot x^i\right), \quad a^T = (40.62 \quad -0.38)$$

IV. CONCLUSION

The Mathcad is problem-solving software used in the area of technique and engineering. It is designed for applied mathematics and physics. The Mathcad applies mathematics and mathematical operations in the same way as a designer. Interface is a worktop where equations, functions or graphics are inserted and can be linked with a text everywhere on the page, which facilitates focusing on the problem which is being solved. A great contribution is given to various types of analysis since the time needed for simulation of behaviour of the examined object is shortened, while the graphical data presentations are momentarily updated.

When we speak about living objects, besides motion and modification of geometry, it is essentially also to stimulate authentic character of person. This skill is artistic form of great deepness. Regarding that education for animators in the first phase implies manual or computer drawing of characters, as in cartoons. In the second phase would be performed copying and substantial extension through computer methods of animation. The greatest number of programs for modeling and animation accepts either frames or objective access to animation. Nowadays animation is used in almost all spheres of visual communications. Application is concerning the next: animations in cinematography, engineer animations, animations in medicine, animations with giving expert opinions, animation in nuclear physics, animation in cosmology and airtechnics, animation in computer games, мathematical animations, animation of insufficiently known structures and processes and the like.

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CONCEPTION OF SERBIAN LANGUAGE ONLINE COURSES WITHIN HOOK UP! CE LANGUAGE LEARNING GATEWAY PROJECT

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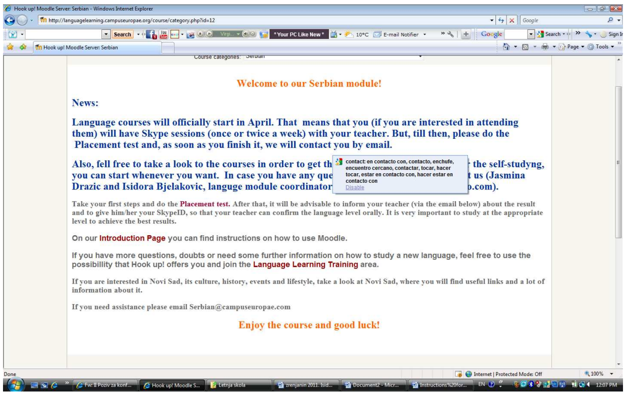
Abstract – The paper describes the conception of Serbian language courses for foreign students involved in distance language learning. The content of courses is described and divided according to standardized levels of knowledge. It is further classified with regard to the requirements related to language system and skills. The paper presents the facilities offered by the Moodle platform for meeting various needs in this kind of teaching: lesson presentation, vocabulary and grammar acquisition, types of exercises for these areas, tools for the acquisition of all four language skills, knowledge testing facilities and types, student assessment, course evaluation and self-evaluation.

I. INTRODUCTION

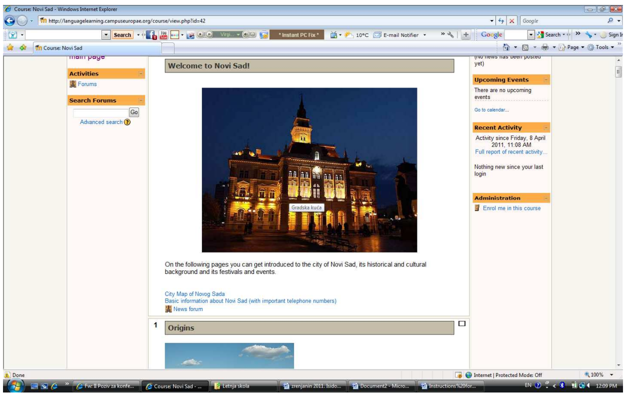
Hook up! CE Language Learning Gateway project (http://languagelearning.campuseuropae.org) was launched with the support of Lifelong Learning Programme of the European Commission and it is used by the universities participating in the Campus Europae Programme (http://www.campuseuropae.org/en/). Hook up! enables students to learn one (or several) of twelve languages in the CE university network. The plan is to design online courses at the levels from A1 to B2 so that students will be able to study at one of the universities that are the members of the European University Foundation. The Moodle platform has been used for designing all of the courses including the Serbian language course.

II. STRUCTURE OF SERBIAN LANGUAGE ONLINE COURSES

After accessing an appropriate course on the home page (http://languagelearning.campuseuropae.org/), the user has the opportunity to take the placement test (if they have certain prior knowledge).



Moreover, on this page, there is a link about Novi Sad that provides students with the opportunity to meet the host city, its culture, history, current affairs, etc.



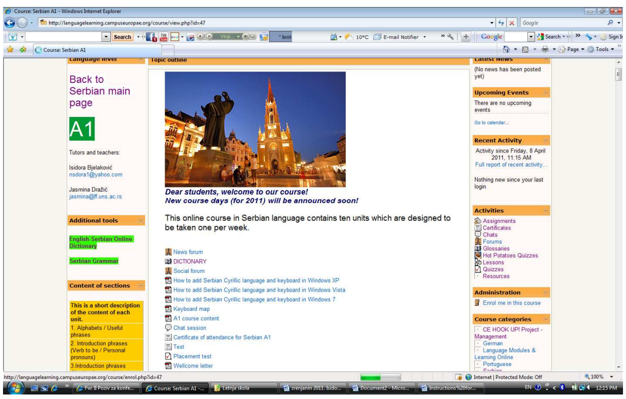
After taking the placement test, students can access one of the three currently offered courses (A1, A2, B1) according to their level of knowledge. All the courses are designed in accordance with the Common European Framework of Reference for Languages.

The courses are divided into topics the number of which is not limited. However, their content is clearly defined. Serbian language courses are divided into ten topics (*topics format*) and designed according to the principles of the contemporary communicative method to the greatest possible extent. The loaded content of each offered topic is structured according to language systems (grammar and vocabulary) and skills (reading and listening, speaking and writing). Although the listening exercises occur least frequently, tracks can still be found since every text in PDF format is recorded into an audio file (except the texts related to grammatical categories). Thus, a student can listen to native speakers of Serbian even after the class. That way, students are enabled to independently acquire reading competence. Furthermore, within each topic, there are tests, links, forums, evaluation (after every third lesson), etc.

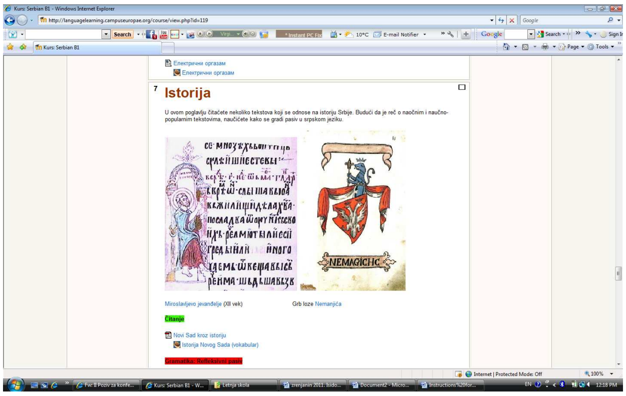
The focus is, thus, on users' needs and categories that are in accordance with the expected outcome. The courses are based on the existing coursebooks *Let's Learn Serbian 1 and 2* [1, 2, 3, 4]. However, they have been complemented and refreshed to a large extent with new texts, exercises, links, etc.

III. PAGE DESIGN

The page is divided into three columns. The central part is the middle column. Within its first window, there are introductory notes for users (welcome, instructions for installing Serbian cyrilic and latin keyboard layout, course content, etc). After introductory notes, the central part of the page is dedicated to the lessons. The left and right columns contain the information on the instructors, content of particular lessons, present participants, future activities and events, messages written by students, etc. In the left column, there are also links related to the grammar of the Serbian language and an English-Serbian dictionary including the links to particular radio and television stations.



As far as course designing is concerned, the Moodle platform is an excellent choice since it provides a number of facilities. An instructor can organize the course chronologically, on a weekly



On the portals of A2 and B1 level courses, the links to the radio and television stations B92 and RTS 1 are provided within the left column.

IV. CONCLUSION

It can be concluded that the Moodle platform is a proven course design tool due to the numerous facilities that it provides. However, it is also an excellent means of both instructors and students' competence improvement in the area of information and communication technology.

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[8] http://hookuplanguagelearning.weebly.com
[9] http://moodle.org

FOREIGN LANGUAGE LEARNING WITHIN *HOOK UP!* PROJECT

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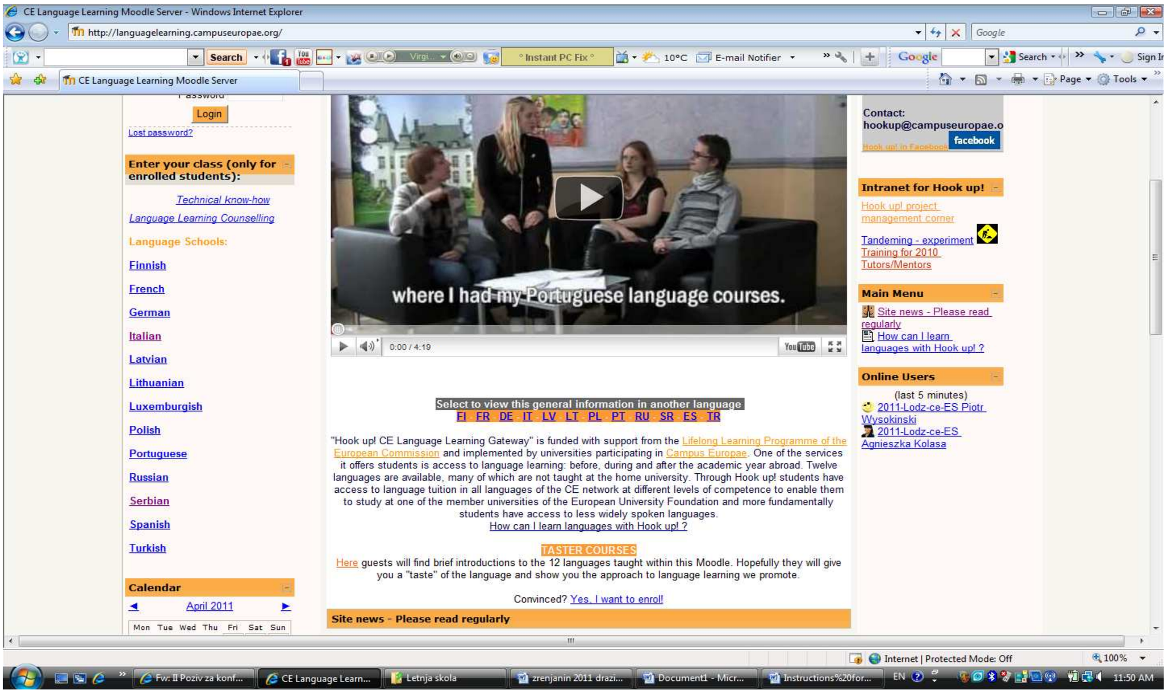
Abstract – The paper gives a short description of the Campus European project, one of the international projects of the Council of Europe. The emphasis is on the segment of the project which is related to distance foreign language learning. In the context of student mobility and study visits, this project promotes the idea of language learning at a foreign university. The Hook up! platform based on the Moodle platform offers a student the opportunity of online language learning before their arrival in a country where they will spend their mobility year. The paper presents course designing facilities provided by this platform.

I. INTRODUCTION

One of the basic ideas within the Campus Europe project, which enables students from Europe to spend a part of their studying period in one of European countries, is to promote the language of the host country. This idea resulted in the creation of *Hook up! CE Language Learning Gateway* (http://languagelearning.campuseuropae.org*)*, the project within Campus Europe. Hook up! is set up with the support of Lifelong Learning Programme of the European Commission used by the universities that participate in the Campus Europae programme (http://www.campuseuropae.org/en/).

With time, there appeared the idea of creating online courses for all languages in the network of this project, which would be taken by students before their study period abroad so that they would be ready to take on a higher level intensive course (at least A2) in September on arrival at the host institution. Thus, after completing these two courses (online and intensive) and passing A2 level exam, a student without any prior knowledge of the language that they are supposed to learn (i.e. an absolute beginner), can integrate into the courses of the host university in October. Furthermore, during an academic year, students are obliged to attend the language course and, at the end of the year, reach B1 level of knowledge according to the Common European Framework of Reference for Languages.

Hook up! provides students with the opportunity to learn one (or several) of twelve languages belonging to the network of CE universities. The plan is to design online courses for every language from A1 to B2 levels of knowledge with the purpose of enabling students to study at one of the universities that are the members of the European University Foundation.



II. PROJECT CONCEPTION

Designing of all online courses is based on the Moodle platform. [1]

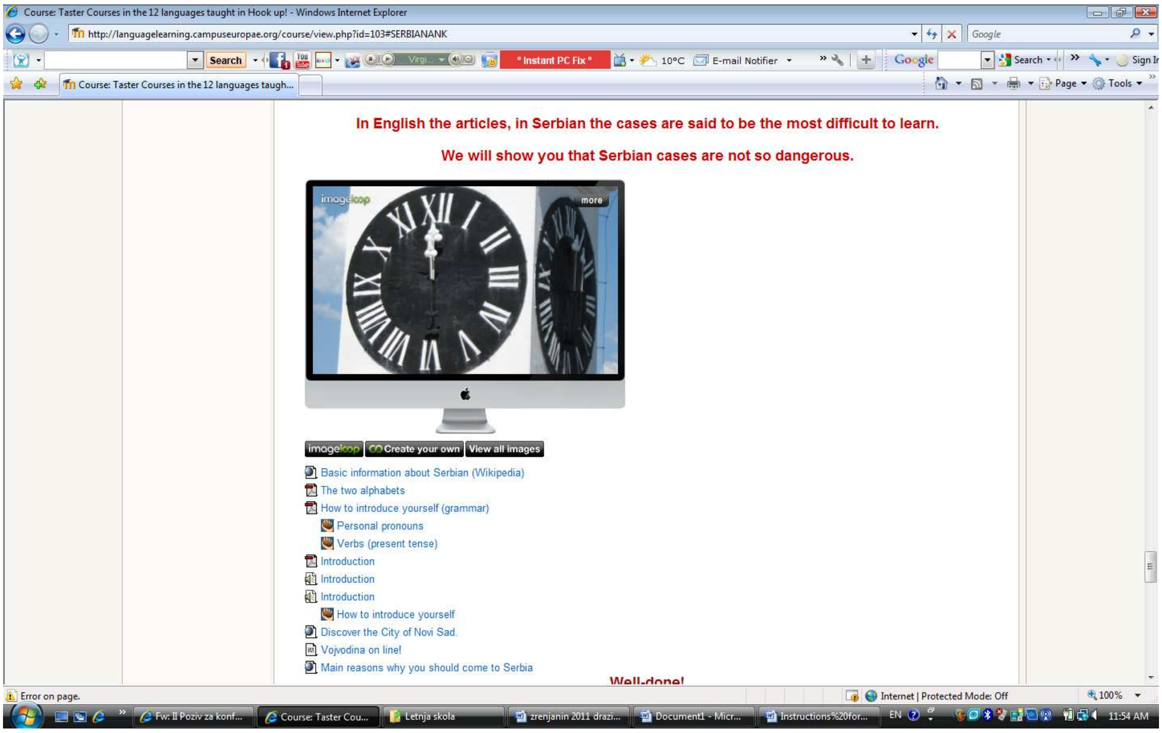
Moodle provides a user and/or language instructor with the following facilities:

- loading of necessary materials during the creation of online courses (texts, links, grammar explanations, comments, tasks, tracks, video material, etc.);
- activation and use of forums and chat sessions as a way of communication beyond an interactive online lesson. On one hand, the forums provide students with the opportunity to ask questions related to the course, comment on the lesson, etc at a temporal distance since the communication is not simultaneous and it allows enough time for both asking and answering the questions. Every sent message is automatically forwarded by e-mail to all students including the instructor. The chat sessions, on the other hand, provide students with the opportunity to simultaneously communicate (only with the instructor or together with other students within a conference);
- creation of an online quiz, i.e. a test on the basis of which it is possible to (1) determine the level of knowledge of students with certain prior knowledge (placement test), and (2) monitor students' advancement;
- creation, realization and assessment of writing tasks
- monitoring learning advancement of each registered student – at any time the instructor can check students' activities, marks, course attendance, regularity of homework [1].

In addition to the basic information on the project itself, application forms and online courses for twelve languages, Hook up! provides (1) the so called tester courses for each offered language, (2) Language Learning Counseling, (3) site news as well as (4) online training for instructors.

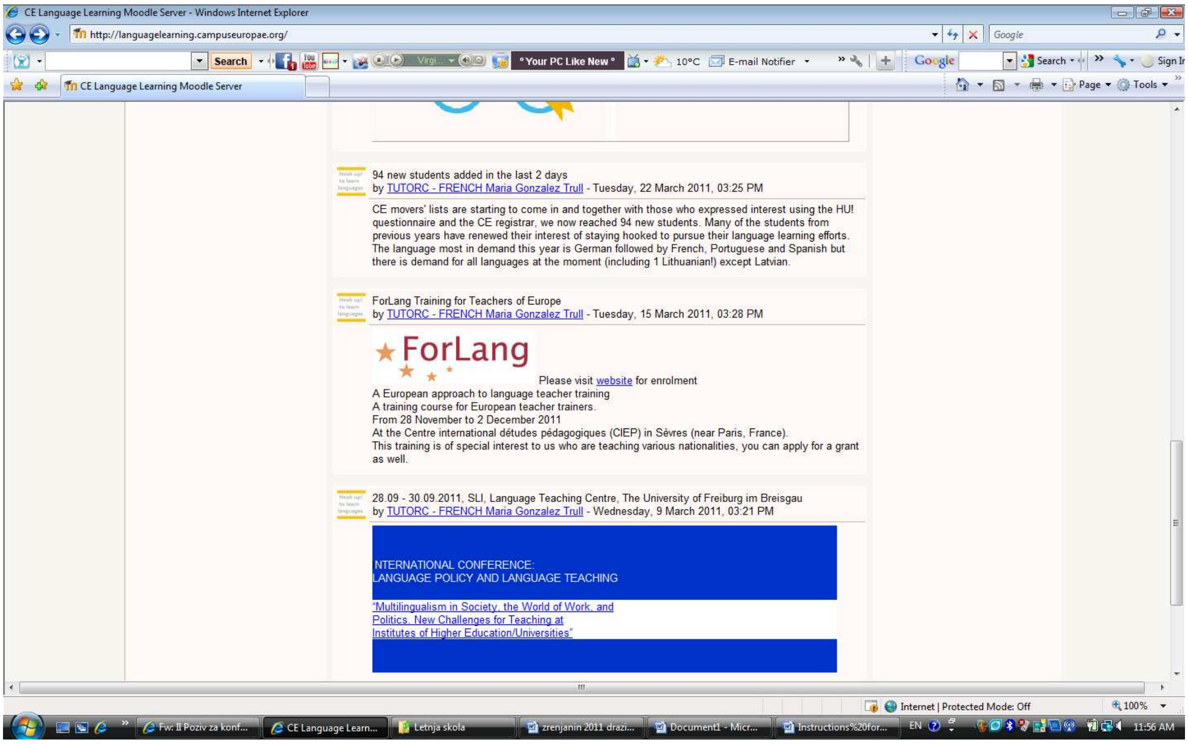
(1) **Tester courses** are short courses for all offered languages that are realized independently. Their aim is to motivate students as well as to promote a host country and its language. Every tester course contains the basic information on the country, region and/or city of the host university, interesting links and several exercises at the beginner level of language learning so that students can gain a general picture of the language, country and city that they will visit.

[1] Moodle - *Modular Object-Oriented Dynamic Learning Environment* (COLE AND FOSTER 2007) is free software that provides the facilities for creating various systems used by universities, various organizations and institutions as well as individual instructors in different areas to enrich and refresh their courses with multimedia tools and technological innovations.



(2) **Language Learning Counseling** began as the result of students' need to answer various questions and solve problems related to language learning (opportunities, advantages, motivation, etc), which they could encounter during their stay in a foreign country.

(3) On the home page of the Hook up! Platform, there is a regular news update on the number of students, course attenders, world conferences on foreign language learning or distance language learning, dissemination activities, etc.



(4) **Training for instructors** was organized during the online courses. Interactive conferences and meetings on a particular topic (chat sessions, video conferences, etc) were organized once a week so that instructors could share information and experience.

III. CONCLUSION

It can be concluded that Hook up! provides students with the opportunity to learn one of twelve given languages as well as to meet students from other countries, who are involved in the same learning process at the host university. Furthermore, students acquire the skills in the area of information and communication technologies (ICT) that improve their learning habits, make them independent and prepare them for active participation in "knowledge society".

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ELEMENTARY SCHOOL PUPILS IN INFORMATICS AND COMPUTERS EDUCATION AT RANDOM SAMPLING

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Abstract - In the Republic of Serbia, from the school year 1987/1988, the elementary schools for the first time, using appropriate educational plan and program, could also introduced "Basic elements of informatics and computers" as optional school subject in the seventh and eight grades or just in the eight grades. The subject research has been realized under real conditions with a view to comparative qualification of the eight grade school pupils at education of Basic elements of informatics and computers as optional school subject, i.e. Informatics and computers regarding the total number of the eight grade elementary school pupils in cities and elementary schools, being selected by random method in the Republic of Serbia in the school 1999/2000, 2009/2010 and 2010/2011years.

I. INTRODUCTION

By appropriate reform captures at elementary school education in previous period and by mentioned optional school subject the teaching program has been changed keeping the same subject title and from the school year 2007/2008 its teaching plan and program has been changed and named into "Informatics and computers". Elementary school pupils, from the mentioned school year, have had possibilities to study the mentioned optional school subject in the fifth, sixth, seventh and/or eight grades if it had been offered by schools within the optional subjects.

In the school year **1987/1988** in elementary schools of Serbia an optional school subject could be **for the first time** introduced at appropriate grade, with suitable annual number of classes (Educational Gazette of Federal Republic of Serbia, no. 25/87). Among offered optional school subjects it was also presented the school subject **Basic elements of informatics and computers (BEIC)** being thought at the seventh grade (40 classes annually) and at the eight class (60 classes annually), namely at the eight class only (60 classes annually).

On June 28, 1990 Educational Council of the Republic of Serbia, according to its authorization, for all elementary schools on the area of the Republic of Serbia, established the Plan and Program of elementary education (Educational Gazette of Federal Republic of Serbia, no. 4/90). The mentioned plan and program included the elementary school teaching from the first to the eight school grade and was started to be applied in the school year 1990/1991; in the **seventh** grade it was in the school year 1**992/1993** and in the eight school grade in the school year **1993/1994**. When the mentioned Plan and Program of elementary education came into force the Rulebook on common plan and program of educational work in elementary school (Educational Gazette of Federal Republic of Serbia, no. 21/86) expired

In elementary schools of the Republic of Serbia up to the school year 2001/2002, teaching of the **(BEIC)** was realized as per so called **"old"** educational program and from the school year 2002/2003 up to the school year 2007/2008 as per so called **"new"** educational program; from the school year **2007/2008** as per so called "**the newest"** educational programs but as optional subject under new name "Informatics and computers" [5,6,7,8]. Teaching of the mentioned school subject was further realized as per the Rulebooks on educational plan for the **second cycle** of elementary education at the **fifth school grade** from the school year 2007/2008 (Official Gazette of the Republic of Serbia- Educational Gazette, no. 6/2007), for **the sixth school grade** from the school year 2008/2009 (Official Gazette of the Republic of Serbia- Educational Gazette, no. 5/2008), for **the seventh school grade** from the school year 2009/2010

(Official Gazette of the Republic of Serbia-Educational Gazette, no. 6/2009) and for **the eight school grade** from the school year 2010/2011 (Official Gazette of the Republic of Serbia-Educational Gazette, no. 2/2010)

Elementary schools were obliged to offer to the "**V"** list pupils at least four optional school subjects to be chosen only one by a pupil and among offered optional school subjects on the list it **could have been** the **Informatics and computers** (**IC**) as optional school subject with one class a week, namely 36 classes a year. Pupils could opt for (**IC**) as optional school subject at the end of the previous school year to attend it in the next school year while pupils were not obliged to continue their attendance in the following school year into continuation.

II. ORGANIZATION OF SUBJECT RESEARCH

By **Subject research** it was wanted to perceive if, during the period from 1999 to 2011, a number of the eighth grade pupils, who attended the Basic elements of informatics and computers as optional school subject, namely Informatics and computers, increased.

Aim of the reasearch is to determine statisticaly how many out of a total number of the eight school grade pupils of elementary schools in the school years 1999/2000, 2009/2010 and 2010/2011 attended the Basic elements of informatics and computers as optional school subject, namely the Informatics and computers.

Basic hypothesis: interestiong of elementary school pupils to attend the Basic elements of informatics and computers as optional school subject, namely the Informatics and computers in the period from 1999 to 2011 increases.

Sample: by random selection, in the Republic of Serbia, three cities were selected (Novi Sad, Požarevac and Kragujevac) and twelve elementary school in totally. Sample makes pupils of the eight school grade of the elementary schools where, as per the existing educational plan and program for the school year 1999/2000 ("old" educational plan and program) and 2009/2010 ("new" educational plan and program), a school **could** offer to their pupils to attend the Basic elements of informatics and computers as optional school subject at the seventh and eight school grade or only at the eight school grade, namely at schools where from the school year 2007/2008 ("the newest" educational plan and program), **were obliged** to the pupils of the fifth to the eight school grade to offer at least four optional school subject from the "**V" list** to be taken only one by a pupil and among offered optional school subjects the Informatics and computers **could have been** one of them.

It is important to underline that parallel in elementary schools, in the school year 2007/2008 the teaching of the optional school subject **(BEIC)** was realized at the seventh and the eight school grade as per "new" educational plan and program and as per "the newest" educational plan and program at the fifth school grade but of the Informatics and computers as optional school subject. In the school year 2009/2010 the education of the Basic elements of informatics and computers as optional school subject was finished by the last generation of the elementary school pupils who was educated as per "new" educational plan and program, and in the school year 2010/2011 the education of the Informatics and computers as optional school subject was finisched by the generation of the elementary school who was educated as per "the newest" educational plan and program.

The city of Novi Sad is the largest city of the north Province of Vojvodina and a headquarters of the province authorities, and the third city of Serbia as per its population. On the last official census from 2002 the central city area of Novi Sad had 191.405 inhabitants and 37 elementary schools (34 regular and 3 for special needs). Sub sample was formed by the method of random selection and five were selected out of 19 city elementary schools (Svetozar Markovic „Toza"-I, „Dositej Obradović"-II, „Žarko Zrenjanin"-III, „Đura Daničić"-IV and „Kosta Trifković"-V), making 26.31% of the total number of city schools [9,10].

Požarevac is a city and a headquarters of the Braničevo district. As per census from 2002 in the central city area there were 41.736 inhabitants and eight elementary schools. Sub sample was formed by the method of random selection of 8 elementary schools in the city of Požarevac and two elementary schools were selected („Vuk Karadžić"-I and „Dositej Obradović"-II) making 25.00% of the total number of the city schools [11,12].

Kragujevac is a headquarters of the Šumadija district and the fourth city in Serbia. As per its number of inhabitants on the last census from 2002 it had 180.252 inhabitants. Elementary education is organized in 25 elementary schools (22 regular and 3 for special needs). Sub sample was formed by random selection and five were selected out of 22 elementary schools („Radoje Domanović“-I, „21. oktobar“-II, „Stanislav Sremčević“-III „Mirko Jovanović“-IV and „Sveti Sava“-V) making 22.73% of the total number of schools [13,14].

For subject research a special questionnaire was used for data base; the questionnaire was sent by mail to elementary school directors or it was presented personally in April and May. The requested data were regularly delivered by mentioned elementary school.

III. Results and discussion

This research results are divided into three parts. The first subject research part contains data per schools and cities for the school 1999/2000, 2009/2010 and 2010/2011 years identifying number of the eight grades, total number of the eight grade pupils and average number of pupils per grade. The second subject research part contains results being reached by statistical input data processing showing number of the eight grade pupils as per cities and schools who attended Basic elements of informatics and computers as optional school subject i.e. Informatics and computers regarding the pupils who did not attend the mentioned optional subject education. The data sample is presented in the third subject research part showing pupils who attended Basic elements of informatics and computers as optional school subject i.e. Informatics and computers regarding the pupils who did not attend the mentioned optional subject education.

A. The first subject research part

For five indicated elementary schools in the city of Novi Sad the results show that the number of the eight grade pupils in a referent school **1999/2000** year was 599 of pupils, that in the school 2009/2010 year the number of pupils **was decreased** regarding the referent school year by 3.84%, and in the school 2010/2011 year **was decreased** by 7.85%. Average number of pupils in one class in the school 1999/2000 year was from 26.8 to 29.0 in the school 2009/2010 year was from 22.43 to 29 and in the school 2010/2011 year was from 21.7 to 28 (table I).

For two indicated elementary schools in the city of Požarevac the results show that the number of the eight grade pupils in a referent school **1999/2000** year was 283 pupils, that in the school 2009/2010 year the number of pupils **was decreased** regarding the referent school year by 16.61%, and in the school 2010/2011 year **was decreased** by 3.19%. Average number of pupils in one class in the school 1999/2000 year was from 25.8 to 30.8 in the school 2009/2010 year from 23 to 24.2 and the school 2010/2011 year was from 25.6 to 28.8 (table II).

For five indicated elementary schools in the city of Kragujevac the results show that the number of the eight grade pupils in a referent school **1999/2000** year was 631 schools, that in the school 2009/2010 year the number of pupils **was decreased** regarding the referent school year by 10.15%, and in the school 2010/2011 year **was decreased** by 14.43%.

TABLE I: Review on number of the eight grade elementary school pupils of a sub sample for the city Novi Sad

SCHOOL YEAR		ELEMENTARY SCHOOL				
		I	II	III	IV	V
		Svetozar Markovic „Toza“	Dositej Obradović	Žarko Zrenjanin	Đura Daničić	Kosta Trifković
1999/2000	Total of pupils	161	87	130	87	134
	No. of clases	6	3	5	3	5
	No. pupils	26,8	29	26	29	26,8
2009/2010	Total of pupils	157	71	137	87	124
	No. of clases	7	3	5	3	5
	No. pupils	22,43	23,6	27,4	29	24,8
2010/2011	Total of pupils	168	65	125	75	119
	No. of clases	6	3	5	3	5
	No. pupils	28	21,7	26	25	23,8

TABLE II. Review on number of the eight grade elementary school pupils of a sub sample for the city of Požarevac

SCHOOL YEAR		ELEMENTARY SCHOOL	
		I	II
		Vuk Karadžić	Dositej Obradović
199/2000	Total of pupils	129	154
	No. of clases	5	5
	No. pupils	25,8	30,8
2009/2010	Total of pupils	115	121
	No. of clases	5	5
	No. pupils	23	24,2
011	Total of pupils	144	128

Average number of pupils in one class in the school 1999/2000 year was from 25.5 to 37.3 in the school 2009/2010 year was from 21.5 to 25.5 and in the school 2010/2011 year was from 19.4 to 25.83 (table III).

TABLE III. REVIEW ON NUMBER OF THE EIGHT GRADE ELEMENTARY SCHOOL PUPILS OF A SUB SAMPLE FOR THE CITY OF KRAGUJEVAC

SCHOOL YEAR		ELEMENTARY SCHOOL				
		I	II	III	IV	V
		Radoje Domanović	21. oktobar	Stanislav Sremčević	Mirko Jovanović	Sveti Sava
1999/2000	Total of pupils	130	102	144	143	112
	No. of clases	5	4	5	5	3
	No. pupils	26	25,5	28,8	28,6	37,3
2009/2010	Total of pupils	108	102	126	145	86
	No. of clases	5	4	5	6	4
	No. pupils	21,6	25,5	25,2	24,2	21,5
2010/2011	Total of pupils	97	93	120	155	75
	No. of clases	5	4	5	6	3
	No. pupils	19,4	23,3	24	25,8	25

B. The second subject research part

The subject research results show that in five indicated elementary schools of the city of Novi Sad the eight grade pupils of the elementary school „Žarko Zrenjanin“ did not have optional subject Basic elements of informatics and computers when they attended the seventh and the eight grade in the school 1999/2000 year while the other schools had the mentioned optional school subject when attended the seventh and the eight grade and the subject education was attended by 360 pupil totally, i.e. 63.27% out of total number of pupils. In the school 2009/2010 year, the pupils of all five indicated elementary schools attended the mentioned school subject in totally 404 pupils, i.e. 70.14% out of total number of pupils meaning 6.87% more than in the school year 1999/2000 year. In the school 2010/2011 year all indicated schools were obliged and they offered four optional school subjects from "V" list to the pupils and among them **it was** Informatics and computers as optional school subject. Pupils who chose to attend Informatics and computers as optional school subject in the fifth grade also chose the same optional school subject when they attended the sixth, seventh and the eighth grade therefore the subject was attended by 448 pupils in total, i.e. 81.16% out of the total number of pupils; it means regarding the school 1999/2000 year more by 19.89%, and regarding the school 2009/2010 year more by 11.02% (chart 1).

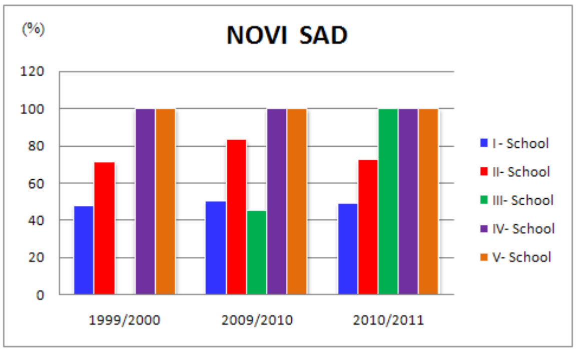

Chart 1. Number of the eight grade pupils who attended the mentioned optional school subject - city of Novi Sad

The subject research results show two indicated elementary schools in the city of Požarevac where the eight grade pupils had Basic elements of informatics and computers as optional school subject in the seventh and eight grade in the school 1999/2000 year and the subject education was attended by 47 pupils totally, i.e. 16.61% out of total number of pupils; in the school 2009/2010 year the subject education was attended by 151 in total i.e. 63.98% meaning 47.37% more than in the school 1999/2000 year. In the school 2010/2011 year elementary schools in Požarevac were obliged to offer four optional subjects from the "V" list to the pupils and among them there was Informatics and computers. Pupils who chose to attend Informatics and computers as optional school subject in the fifth grade also chose to attend the same optional subject in the sixth, seventh and in the eight grade; the mentioned subject education was attended by 214 pupils in total, i.e. 78.10% out of total number of pupils meaning it is in the school 1999/2000 year more by 61.49% and in the school 2009/2010 year more by 14.12% (chart 2).

The subject research results show five indicated elementary schools in the city of Kragujevac where the eight grade pupils had Basic elements of informatics and computers as optional school subject in the seventh and eight grades in the school 1999/2000 year and the mentioned subject was attended by 377 pupils in total, i.e. 59.75 % of the total number of pupils. In the school 2009/2010 year the mentioned subject was attended by 387 totally, i.e. 68.25% meaning it is 8.50% more then in the school 1999/2000 year. In the school 2010/2011 year all elementary schools in Kragujevac were obliged to offer four optional subjects from the "V" list to the pupils and among them there was Informatics and computers. Pupils who chose to attend Informatics and computers as optional school subject in the fifth grade also chose to attend the same optional subject in the sixth, seventh and in the eight grade; the mentioned subject education was attended by 388 pupils in total, i.e. 71.85%; it is regarding the school 1999/2000 year more by 12.10% and in the school 2009/2010 year more by 3.60% (chart 3).

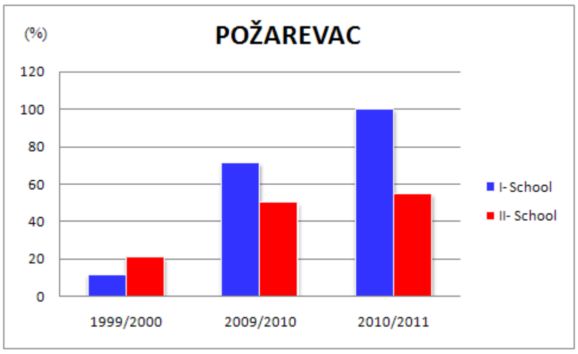

Chart 2. Number of the eight grade pupils who attended the mentioned optional school subject - city of Požarevac

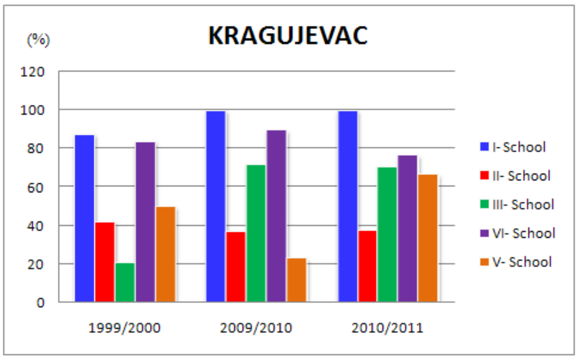

Chart 3. Number of the eight grade pupils who attended the mentioned optional school subject - city of Kragujevac

C. *The third subject research part*

The subject research results as a sample level show five indicated elementary schools where the mentioned optional school subject was attended in the school 1999/2000 year by 51.82%, of the eight grade pupils in the school 2009/2010 year by 68.31% and un the school 2010/2011 year by 78.87% regarding to the total number of the eight grade pupils.

Review on number of the eight grade school pupils who attended the optional school subject at the sample level in researched school years regarding the total number of the eight grade pupils of indicated elementary schools (chart 4).

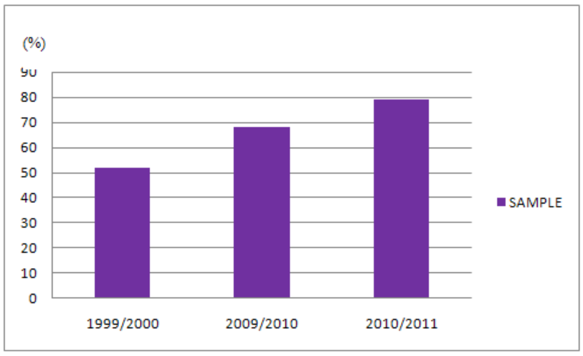

Chart 4. Number of the eight grade school pupils at the sample level who attended the optional school subject

elementary schools, 294 schools for special needs pupils, 5 private and 16 elementary schools for adults. In 2011 it is expected that about 80.000 pupils of the eight school grade finish their elementary school education. [15]. The subject research in the school 2010/2011 year has included in total 1513 eight grade school pupils making about 1.89% of the total number of the eight grade pupils in the mentioned school year; thus these subject research results are statistically important.

In **1999.** in the Republic of Serbia 9.8% homes had PCs and presence of PCs differs in regions (in Belgrade every third home, in Vojvodina 23% and in central part of Serbia 17%). In this calendar year, in Serbia, more than 50.40 % had PCs and with relation to 1999 it is a propulsive increase of number of PCs at homes. It is expected in the middle of **2011** more than 2.910 elementary school will be equipped with PCs in Serbia [16,17,18].

The reached subject research could have been affected, separately or in combination, by some factors of the factors related to the cities, location of schools, type of teaching program, educational process, teachers, pupils, PCs in cabinets, internet availability as well as number of PCs at homes. It is expected that professional and scientific public would be attracted attentively by this paper and indirectly, in some way, upgrades education of the mentioned optional subject.

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THE IMPORTANCE AND BASIC CHARACTERISTICS OF MASS CULTURE

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Abstract - In determining the concept of mass culture, different definitions and characteristics are emphasized. Theorists' opinions on mass culture are not adjusted, but generally prevailing views are that it favors mediocrity, the average way of life and suppresses man's creativity and spirituality. There was an expansion of consumer society at the end of the 20th and the beginning of the 21st century, which on the one hand, resulted in the increasing use of media, industrialization, technological revolution, and on the other, in lowering of cultural standards and the emergence of depersonalization.
The aim of this paper is to present the basic elements of mass culture, positive and negative characteristics of mass society and mass media, in order to give the comprehensive picture of the importance and value of mass culture.
When the notion of mass culture is discussed, the fact that the masses consume this culture is usually emphasized. Population that appreciates the value of the mass culture is wider than the social elite, and it represents something new in relation to social groups where folk culture is contained. Therefore, the mass culture is a specific field of cultural area, characterized by various qualitative and quantitative elements different from other forms of culture.

I CONSUMER SOCIETY - FOUNDATION OF CREATION OF MASS CULTURE

Society of the late 20th and early 21st century, consumer society, is characterized by exclusion of the versatility of life on behalf of the quantitative growth. Consumption represents increasing discrimination in power. People own television sets, watch the same programs, read popular books. Many of these items, in the cultural sense, are not as important for their value as they are symbols of social status by which social classes can be separated from those on the bottom of the social ladder.[1] On the other side with the aristocratic prestige, bourgeoisie it does not matter how you behave, but how much you pay. The significant role in manipulating human drives, aspirations is played by powerful government agencies that indicate that you have to skillfully advertise your goods, in order to take the first place in the consumers' consciousness, ahead of other goods.

Consumer culture emphasizes that the world of goods and its principles of structure are key for understanding contemporary society. This includes dual focus: first, on the cultural dimensions of economics, symbolization and using of material goods as communicators and not only as the necessities, and the other, on the economy of cultural heritage, demands, capital accumulation, competence and monopolization which work within the sphere of life styles of cultural heritage and goods.[2]

"The act of consumption should be a concrete human act which includes our senses, physical needs, and our aesthetic taste, where we are included as specific sentient human beings; the act of consumption should be meaningful, human, productive experience." (E. From, 1984, 105)

Consumer culture for Baudrillard is the real post-modern society with the culture without depth, where all values are overvalued and art triumphs over reality. The aestheticism of the reality foregrounds the importance of style, which was initiated by the market dynamics with constant search for new fashion, styles, sensations and experiences.[3] Consumption has entered the age of mass individualization and psychologizing with the development of society. However, Edgar Morin on the other side notes that one's increased possibilities for spending in leisure time can be considered positively. Increase in consumption shows that the man has started out for the road of civilization of well-being which changes and improves the leisure itself, thanks to which it "no longer is just the time for rest and recovery of physical or mental forces (...) but also the possibility to live the consumer life" (E. Moren, 1979, 79). The leisure is changing and it is increasingly becoming more important sphere of man's life thanks to the consumption.

[1] Zoran Bajić, *Sociologija*, „Braća Karić" University, Belgrade, 2008, 162

[2] M.Featherstone, *Lifestyle and consumer culture*, II, number 4, 66
[3] *Idem*, 67

II THE MAIN FEATURES OF MASS CULTURE

Mass culture (culture of mass society) was created on the foundation of the consumer society we analyzed. Intensive development of mass culture is achieved in the period after World War II due to the strong influence of the media, and it was created as a by-product of the industrial revolution, along with industrialization and urbanization.

Milestone in the development of mass culture was the demographic expansion, that is, the relocation of residents from villages to cities and the development of mass media. The expansion of population caused the creation of mass culture to new urban dwellers' taste, while the mass media (press, radio, television, music devices, electronic network - computer, cable, satellite) were extremely widespread and influenced the reduction of social and cultural differences between specific social groups.[4]

The certain style of mass culture and leisure time is formed in the commercial system of mass, developed society. Mass media contribute to passive participation in collective entertainment. The evolution of audience's interests and attitudes leads to the formation of the new category of social symbols that are the subject of large audience. "Mass culture audience is composed of atomized individuals that act like a mass, giving up their personal characteristics by uniforming themselves." (Z. Golubović, 1969, 1289).

In its pursuit of means of communication, mass culture seeks an image. Image - the document, as the primary means of communication, represents the field of universalization of mass culture forms, where the assessment of cultural production is carried out by an average man. Producers of mass culture, that introduce the common denominator principle, satisfy the need of the broad masses according to economic goals and political needs.[5]

When stressing the importance of mass culture, it is necessary to point out its essential characteristics which relate to: homogenization - that is equalization, opposition to aristocratic culture, the development of mass media, and modern acts of culture. K. Mannheim observed the process of homogenization as the process of losing distance, or inclusion of higher cultural level elements into the lower area, as well as their joining, equalization. Three major forms of homogenization are simplifying, immanent, and mechanical. The first type of homogenization is based on processing the higher cultural level elements that are transmitted through the mass media, which leads to greater accessibility and popularization.[6]

Immanent homogenization shows the authors' talent and skill to appeal to interest of the large scale of recipients, or their ability to attract wide and diverse audience.[7]

The most typical form of homogenization is mechanical. Its essence is reflected in new cultural products, various amenities attractive to mass audience, as well as in the intensive exploitation of all available works that can enter the circulation of mass communication.[8]

The opposition to aristocratic culture refers to the increase in literacy and education of the masses. According to this conception, the spiritual and material creations are common to all people, and that enables the prevention of the historical social injustice that only the elite layer can use the benefits of the cultural progress.

The mass media are among the basic factors of mass culture according to the large number of scholars, in other words they are "mediator that transmits culture, presents it to the large audience" (B. Džuverović, 1980, 57) which allows each person a contact with the achievements of scientific-technological revolution and raising the general educational level of society.

However, frequent simplification of mass media messages by using symbols and avoiding complex messages caused the negative connotation of mass culture. Lasting impact of mass media ie. their one-way influence has led to the gardual narrowing of cultural facilities.[9] Negative connotations caused the negative effects of mass culture that relate to: the creation of false cultural needs, legalization and supporting of kitsch and trash, creation of consumerism, commodification of man, under-development of criticality.

III KITSCH AND TRASH

Mass culture is a fertile ground for expression of various forms of decadence. This phenomenon is also recognized by urban scientists. Thus, "E. From

[4] Mihailo Pešić, Jovan Bazić, *Sociologija,* University of Priština, Teacher training Faculty Prizren-Leposavić, Leposavić, 2004, 331
[5] Zorica Tomić, *Komunikologija*, Belgrade, 2003, 106.

[6] Idem.
[7] Idem, 107
[8] Idem.
[9] Snežana Pantelić-Vujanić, *Savremena sociologija*, Megatrend University of Applied sciences, Belgrade, 2006, 308

thinks that this is a consumer culture,"[10] but this mass consumption is really an important factor which is the basis for the manifestation of backward elements in this field. The sense of loneliness, torn personality is the clearest indicator of declining of urban society cultural level. We will present an example that shows that the primitive village, where you still have the old customs, celebrations, where there is no literacy at all, is culturally more advanced than our educational culture that reads newspapers and listens to the radio. Serial production of certain mass culture goods has led to the emergence of kitsch. Commercial moment emphasized and put aside cultural and artistic values. Floods of crime movies, trash literature, low aesthetic value arts placed on the market to meet consumers' demands present serious signs of cultural value deterioration.[11] Taking into account the fact that the kitsch emerged as the kind of cultural response to increased demand, many writers and artists gave the advantage to the market value under the pressure of kitsch. The fact that these mass culture values are increasingly offered to young people is frightening, because they are not able to critically evaluate and reject them. These issues are much discussed in order to mitigate the consequences of decadent phenomena in culture. On the other hand, the huge profit that kitsch makes on the market of cultural goods can be the source of temptation for art itself.

The term *šund* (trash) originates from the German word *schund* (garbage, trash, valueless art), which is even more worthless than what kitsch represents. We can find trash in newspapers with mass circulation, certain movie genres, new folk music.[12] Kitsch and trash can not significantly affect the culture of one nation; however, they are not insignificant, which points out great caution in their spread, and the ability to overcome them through education.

IV MASS CULTURE AESTHETICS

Mass culture is the negation of true values. In extreme forms, mass culture is identified with the kitsch, where no aesthetic criteria can be applied, for the one who creates kitsch is an outcast as well. On the other side, the aesthetic values of the film are undeniable; however, other means of mass media can create artistic values. In addition to various kinds of information, various media (radio, television, print) use genres (travels, essays, TV drama) through which they can shape aesthetic messages and their contents can be placed through the aesthetic forms.[13]

The mass media substantially include aesthetic factor in the field of visual communication and design. In the era of mass media, we may talk about mass taste. Taste is linked to the market, profits and massive industry, and that is why it is followed by bad taste attributes, such as light entertainment, cheap passions... Mass culture has its art creators. Basically, it is not against art, even though there are many examples where mass culture production does not follow the principles of artistic creation, and this is especially notable in television production.[14]

Mass culture products cannot be identified with kitsch in terms of production. The ability to distinguish between good and bad taste in art cannot be left to people, class, or professional instincts. "Taste is not the root but the fruit of artistic culture", Hauser claimed, refusing to justify present situation in the mass culture by the audience's desire for that kind of production quality. Through further analysis, Hauser found that the products of mass culture not only spoil the taste, but also open insights to new spiritual spaces for most people.[15]

V THE INFLUENCE OF MEDIA ON MASS CULTURE

By the new way of electronic expression, mass media played a crucial role not only in the abandonment of traditional culture but also in creating audio-visual techniques. This suggests that the mass media help create psychological illiteracy and strengthen the ruling norms and values. The ideology subjugates not only conscientious, but also the emotional part of a being through the mass media. Feelings, beliefs, behaviors lose the original properties of free and creative personality when faced with powerful, imposed ideas.[16]

Watching television, listening to records, reading books are not neutral or unique patterns of behavior, but actions imbued with different meanings, actions that can create various pleasures. Television, radio, newspapers, records and movies are also important because their nature allows people to use them in a way people want to. Since they cannot impose their meanings upon people, they cannot impose any

[10] Aleksandar Todorović, *Sociologija masovnih komunikacija,* Gradina,1974, 206.
[11] Idem, 209
[12] Dragan Subotić, Živojin Đurić, *Socijalne i političke dezorganizacije društva*, Belgrade, 2008, 108

[13] Nikola Božilović, *Kič kultura*, Zograf, Niš, 2006, 161
[14] Idem, 165
[15] Idem,164
[16] Ratko Božović, *Leksikon kulturologije*, Belgrade, 2006, 194.

manner by which they would be received in everyday life.

The mass media and electronic communications leave behind the principle of creative individuality on the one side, and collective experience as a generally accepted desirability on the other. The mass media that follow the trend of standardization, singularity, and stereotype can meet some psychological tendencies, but can hardly avoid the process of mediocrity and depersonalization.[17]

The media mostly set the problem between national and foreign, repetition and difference. Through electronic media we see how the new experience of virtual spaces and places, and virtual communities is constructed. Christopher Coker has indicated that television is not influential because it affects thinking and concepts, but because it affects the ratio of feelings and models of perceptions. We begin to resemble the anthropologists who observe the world of others, thanks to the media."[18] Observing through the media can be an obstacle to understanding. Paul Hartmann and Charles Husband demonstrated long time ago that the realism in Britain was under the influence of media images of black people, in areas where white people were less encountered with them but relied more on media images to find out something about them.[19]

In psychological terms, the screen is not only a medium through which the images are transmitted to us, we also transmit to the screen our own fears, fantasies and wishes concerning others, upon which we define and construct our identities. The screen is a powerful metaphor of our times. It symbolizes the way our existence in the world today, our contradictory state, when we act and when we do not act.[20] We are increasingly confronted with moral issues and dilemmas through the screen. The screen provides access to strange, fantastic, frightening experiences. Thus we can say that this is an area where we can keep our discomfort under control, and that allows us to test our fantasies in order to overcome the discomfort.[21]

The film, as the important means of mass communication, transmits variety of topics. The great expansion of television affected the change in the structure of radio, newspapers, and readership.[22] Thus the radio quickly found its way to the audience. Its technological structure has enabled it to mass-distribute audio messages.

More present form of mass culture contents through mass media are advertisements. If an ad appears as a tool that allows increasing of the company's total turnover, the function of mass acculturation upon consumer society is also attributed to it, in the effort of spreading the new way of life focused on the acquisition of market products. An advertisement wants to fundamentally change the traditional ways of life, and to establish modernist society mechanisms. An advertisement adapts more to social sensibility than it imposes new ways. The more its power to stimulate grows, the more it listens to the society."[23]

All these forms of mass culture, media, technical and technological development, have enabled young people to enter the adult world much earlier, to comprehend life, to be informed, independent and prepared to live from their own world.

VI Conclusion

According to Antonjina Klosovska, today's culture has a mass character and deserves the name Mass culture. It refers to the phenomena of contemporary transmission of identical or analogous contents that flow from few sources to the large population masses.

As the major collective source of information and images, media play multiple roles and meet many individual needs. They provide connection with larger social groups on a personal level, and indirect relationships with other people, through the sense of cohesion and solidarity.

Universal acceptance of the media indicates that the most diverse needs and requirements are met, and media access has enabled human community and the emergence of mass culture.

In mass communication by daily reception of messages through press, radio, television, a lot of information that informally affect the whole knowledge of every person exposed to the activities of mass media are accepted. The explicit presence of the media significantly influenced the reduction of social and cultural differences between certain social groups.

[17] John Fiske, *Popular culture*, Klio, 2001, 236
[18] David Morley, Kevin Robins, *Spaces of identity, Global Media, Electronic,* Routledge, London &New York, 1995, 131
[19] Idem, 132
[20] Idem, 138
[21] Idem, 139
[22] Dragan Subotić, Živorad Đurić, n.d, 102

[23] Gilles Lipovetsky, *Paradoxical happiness, Analysis on the consumer society*, Zograf, 2008, 114.

Strong economic growth, urbanization and industrialization have led to changes in population structure, potential of production, consumption and profits. Therefore, the creative experience of cultural contents must be understood as the expression of human freedom and lived existence, for the growth of man's abilities itself cannot be imagined without the influence of cultural values.

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CO-OPERATION AND ASSOCIATION FOR ACHIEVING EFFICIENCY OF E-LEARNING

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Abstract - We are in an era of intense social change. Terms we were unknown a decade ago have become part of everyday use. Intense changes in the information communication technology (ICT) and the parallel growth in the development of these technologies for educational purposes are mark the beginning of the 21st century.

The aim of this paper is to illustrate the existing technology cooperation and association in the light of computer-supported work in all dimensions that are supported by electronic communication. On the basis of the problem, will be selected and described the existing technology solutions in the field of information communication technology (ICT).

I. INTRODUCTION

Development of human civilization problems they encountered a man grew and exceeded the capacity of an individual to solve them. People have become forced to come together and cooperating to seek solutions. The needs for faster, easier and more successful communication are resulting from this process and become a condition for any further progress.

The quality of communication depends primarily on the social and emotional skills that man has. Epoch of information and advanced technological discoveries are made to communicate on a whole new and extremely important dimension. The use of computer technology in collaboration brought much greater prosperity. The obvious fact is that computers are multi-bridge and reduce the distance, decrease the time, connect millions of people who collaborate and thus enhance the focus on solving problems that are more complex. [1]

Structured process where two or more people or business entities cooperate in order to achieve a common goal, sharing knowledge, learning communities with the consensus, based on cooperation, coordination and creativity at the enterprise level, region.

It is not uncommon for institutions to consider creating a website and placing text on it to create a platform for e-learning. The fact is that the institutions, when they invest large sums of money, human resources and time in developing content for e-learning, meet with poor results, and thus a negligible contribution. [2]

Knowledge Base is available to all users who subsequently included, informed about specific topics that have already guided discussion. Modules for writing support are intended to provide the ability for users to easily create content regardless of their location and level of awareness of information technology. Using only a standard Web browser, a user is able to edit already published a web page without having to know any programming languages (PHP, JSP, HTML) or some of the tools for web design, editing and publication (Dreamweaver, FTP clients).

The chosen software system in the original version is functionally adapted, and then applied in the real environment of the work process. The aim is to provide computer support for qualitative and optimized process of time it will be possible to collect, create, organize and share information and resources between the actors in this process. [1]

II. ACCESS E-LEARNING

In the rush to accept e-learning, many teachers can not do anything more than to set up the course and power point presentations for his lectures on the web site of course. This is no different from copying of such material and its share in class. While the setting of the course and lesson scripts on the web very useful application of this technology, there is much more that ICT can offer in support of teaching and learning.

In order to fully exploit opportunities that these technologies offer, it must be paid full attention to teaching and learning transactions. This refers to the „plan" environment for teaching and learning that integrate, consider how the case will be presented, what the students do, which will support teaching; learning will be assessed and how will get feedback.

Changing needs of education and training in higher education, are forced to consider the classical approaches to teaching and learning. It seems that, among other things, changes the role of teachers, to move into the role of "guide on the side". This includes changing nature of learning from the "tutor-guided" to "student-directed" or "student-centered". Information and communication technologies play a significant role in supporting these implied changes in the nature of teaching and learning.

French, Hale, Johnson & Farr (1999) suggest three ways in which we can use information and communication technologies to support "self-targeted" and "focused on students" learning environment. These are:

1) ***Increased teaching*** based on the premise that the teacher can increase the practice of teaching by supporting the one or more aspects of activities based on ICT. Increased classroom can use all of the use of the Web for disseminating information about the courses, to e-mail communication for discussion between student and lecturer for communication and discussion among students, as well as the cooperation of students via a computer.

2) ***Virtual learning*** refers to the process of teaching and learning over the Internet without a personal contact between participants. In this way, it replaces the standard lectures, creating new opportunities for "self-oriented" and flexible learning.

3) ***Progressive application*** refers to the process of application of ICT, based on progressive technology for teaching and learning to develop students' confidence in using technology and its benefits. The concept of progressive implementation of technologies based on the notion of learning "on time", which is the process of access to education at a time when the student wants to learn something. [2]

III. LEARNING STYLES

The influence of learning styles in design and efficiency of learning study are considering Kolb model of learning styles.

Drawing on approaches to learning according to Piaget, Levine and Jung, based on research on the model of experiential learning, Kolb's learning styles designed model that reliably describes the differentiated learning styles, adolescents age and those older, assuming that is applicable to younger ages (the lack of sufficient empirical confirmation).

He was a model of learning styles divided into four elements, which are arranged in two dimensions: process continuum (horizontal dimension) and perceptual continuum (vertical markets).

According to Kolb identified four learning styles:

- ***Activists -*** enjoy acquiring new experiences and opportunities that enable them to learn through experimentation, they like to actively participate in the learning process, learn best in short interactive tasks.
- ***Thinkers -*** they like to watch and thoughts reflect the information before they move into action, like making them responsible when they do not like to hasten. Learn best from observing the experience of others.
- ***Theorists -*** like to explore methodically. They reflect a step by step and ask questions. Analytical and do not link up emotionally. Learn similar thinkers, but prefer to apply their own concepts and theoretical models.
- ***Pragmatists -*** prefer practical solutions, do not like to theorize, and they want to gain practical experience. Act quickly and confidently. They learn so activists, but prefer to have a convenient target for their activities.

Most people prefer two or more learning styles. It is common for those styles of learning that people do not prefer, running through it quickly and superficially.

Kolb Learning Style Model has been used in numerous studies of learning professional knowledge and skills, and is therefore a functional analysis of the impact of learning styles to design and evaluate the effectiveness of e-learning. [3]

IV. INFLUENCE ON EFFICIENCY OF LEARNING STYLES OF E-LEARNING

Format e-learning is part of the organization of the e-learning. It should also be familiar with what the age group is, what knowledge and make that the goal of e-learning. One must take into account different learning styles that are conducted, as well as organizational and technical capabilities available, and available resources for e-learning.

Taking into account the burden which users are exposed during the e-learning, all this reflects on the efficiency of e-learning specific subjects taught.

According to Reference Guide for Instructional Design and Development, 2001 [4], planning of teaching takes place in the following steps:

1) Assessment of educational and instructional needs,
2) Analysis of the user (features, performance...),
3) Defining goals and outcomes,
4) Selection and development of teaching strategies;
5) Development of training materials and
6) Planning the evaluation.

Learning style is useful because it makes editing the structure of the material, how the material is connected into a whole, and the extent of learning steps, then the method and procedure of evaluation of knowledge leading to more efficient e-learning.

Users will learn better and faster if the teaching material used in compliance with their preferred learning styles. Knowing the Kolb model of experimental (experiential) learning and using modern technology in e-teaching, the teacher is able to shape e-learning that will enable the user maximum progress in learning. Kolb learning styles model is described by two-dimensional: continuum perception and processing, thus predicting a more efficient e-learning depends on the content that attract these preferred characteristics.

Table 1 presents the requirements and recommendations of user activity within the e-learning, taking into account the Kolb model of learning styles.

Learning style and combination of process	**Users needs Organization of e-learning**	**Recommended actions in organizing e-learning**
Activist (Action and experience)	Interaction between users, free-form learning and thinking, without strict deadlines	Group work, problem solving expert, the conversation in real time
Searchlight thinker (Experiences and reflections)	Organized methods of e-learning, content learning is emphasized, systematic instruction	E-books, discussion forums
Theorist (Reflections and opinions)	The traditional view, clearly defined objectives, well-prepared exercises, tests of knowledge	Logical tasks and preparation of case studies, quizzes during the learning
Pragmatist (Of thought and action)	The possibility of experiential learning, application of ideas	Practical applications and exercises, conversations in real time

Table 1: Colby learning styles in e-learning (Filppula, 2006). [5]

Handling teachers according to learning style encourages its users selection of a proper organization of e-learning, an appropriate flow of e-learning and testing procedures adopted by the users knowledge. The following table provides an overview of ways of thinking of users, as well as the role of teachers in the process of e-learning, depending on the learning styles according to Kolb.

Learning styles	**Reflective thinker (Diverger)**	**Pragmatist (Konverger)**	**Theorist (Assimilator)**	**Activist (Akomodator)**
The combination process	Experiences and reflections	Thinking and acting	Reflections and opinions	Activities and experiences
Thinking	Induction	Analogy	Deduction	Analogy and deduction
The role of teachers, trainers	Motivator, and suggests appropriate	Coach, takes practice and give feedback	Expert	Observer

Table 2: Some elements of the organization to continue learning styles (Bjekić, 2008). [6]

The more accurately determine the primary learning styles of users is of great importance for the organization of e-learning. This is difficult to determine what the user is not even fully aware of which learning style suits him. If the user environment, which runs e-learning, offer a sufficient range of diverse E-materials, it will very soon be in a position to determine their primary learning style.

As an example of organizing e-learning according to learning styles, will serve the organization web site to the Kolb model.

E-learning itself is organized into modules, and e-materials are divided into colors depending on the style of learning that are designed. Finally, the required feedback from the students themselves, if they find such an organization web site helps to acquire new knowledge, learning styles that are best aligned with e-material, and whether they and different learning styles (which are not their primary), this way of presentation are accessible.

One way to increase the effect of e-learning, under the influence of learning styles is a collaborative and cooperative e-learning, made possible by grouping users into groups that facilitate electronic communication and collaboration. In this way, giving users the ability to practice cooperation and gain life experience to work in groups, but must ensure that the groups are made up of users who have similar learning styles, expectations, knowledge ... [3]

V. DRIVERS OF CHANGE

By definition, e-learning is learning supported and enhanced use of information and communication technologies. The growth of e-learning through this “industrial age” was minimal and did not create significant challenges in classroom work (OECD, 2005).

Higher education in the “Connected Society“ or “knowledge society”, not so much what you would expect. According to Katsu, higher education, from the standpoint of the students perspective, has to fulfill two major tasks:

- Developing skills for the pupil into the practice of lifelong learning
- Gaining knowledge from the discipline or profession (Catts, 2004).

E-learning is e-learning in which students create content, collaborate with their peers in forming learning networks with distributed content creation and responsibilities.

How to e-learning based on collaboration between students, instructors and resources.

E-learning is based on informal learning (in the workplace, at home, in the hours of rest). At work, during breaks, learn more than in the classroom. Reveals how to do the job through informal learning - observing how others are doing, inquiring, working by trial and error.

The development of e-learning enabled the transformation of the Web and the emergence of software for social networking. Web tools provided by: Blog for discussion, Wiki for information - which allows the average user to create, collect, and distributes content from the Web according to their own requirements. Web enabled users connected to the learning networks.

Network concept that is often used in e-learning involves the structure of the group of connected people to each other. Derived concept of networking means the process by which these connections develop and strengthen. In these communities, the students participate, create and share activities, plans, learning resources and experiences with peers and institutions. One of the main features of network learning is the width of the profile of the network provides a healthy diversity of opinion. Users can be students, instructors, workers in practice, managers and anyone else interested in the activities, resources and experience that is available in online learning. [7]

VI. PERSONAL E-LEARNING ENVIRONMENT

E-learning has enabled the emergence of ideas about the concept of Personal Learning Environment, (PLE) of whom since 2005. The academic community in the developed countries take the expert discussions, organized roundtables and international conferences, conducted numerous projects...

Personal environment broke out in the forefront as a new approach to development tools for e-learning, consists of a collection of loosely coupled tools, including technology to work, learn, exchange views and cooperate with others, as the space in which people actively cooperate and communicate and whose final result of learning and dissemination of collective knowledge.

Learning is a social activity and historically there was no more suitable time for its improvement. Social networking tools such as the forums have the potential to improve dialogue, discussion and networking skills. Effects of social networking and developing a sense of the conversation provided by blogging, keep people involved and in addition to motivation, just the desire to write the answers. Similarly, the tool for content creation such as the wiki has begun to attract considerable attention in the universities because it has the potential for co-production and joint editing of student work in groups.

The idea of personal learning environments recognizes that learning is continuous and aims to provide tools to support such learning. It also recognizes the individuals role in organizing his own learning. Pursuit of personal environment based on the idea that learning happens in different situations and in specific context, and that can not be provided from a single supplier.

Teoretics and technologists education emphasize the potentials of a personal environment in connecting different worlds, learning in educational institutions, workplace learning and learning in life in general. It consists of all the different tools that are used in everyday life to learn. These tools and activities they no longer need to be used only in a context, and for one purpose, such as are now used in most educational institutions.

Social software offers students the opportunity to seek information (Google), creating and publishing (blogs, podcasts, YouTube, Flickr), cooperation and exchange of ideas (wikis, del.icio.us), joining communities (MySpace, Facebook) with the possibility of creating their own community . All of these tools are available to students in an unlimited duration. The knowledge gained in an educational institution, which is inert, it can be the update, expand, focus to your needs students (Attwell, 2007).

The explosion of social software and its popularity among young people has enormous implications for higher education. For some teachers use these tools in education is perceived as a good thing, for others it is just the accumulation of cargo, because the rapidly changing and there is no time to effectively participate in their classes.

Central to that is behind a personal environment is that ownership and management of learning institutions and escapes from moving towards a student. The clear implication of this approach is that students are responsible for assessing their individual needs, planning learning activities, create learning resources and control of personal progress toward the goals of learning (Attwell, 2006).

In a personal setting, this instructor helps students to achieve self-regulation, to develop the skills of planning, organizing, self-control, self-study and self-evaluation (Zimmerman, 2000).

Another thing is that environment puts personal trainers in a position to learn. In such an environment, the combined activity of the associates may be viewed as a special learning process in which the instructor receives something of an active exchange of knowledge and thinking typical of the network learning.

On account of the liberal point of personal environment, the academic community there is concern about the disposal of intellectual property.

The new generation of students need help to understand that active participation in such communities of learning can not exist without a full understanding and acceptance of ethical standards (Twist & Withers, 2007).

Type a lifelong, independent learning, with the cooperation and pooling of immanent in the shift towards personal environment, requires a number of significant and complex changes in students and teaching staff. The nature and capabilities of people at the university will have a key role in creating interesting, useful and successful implementation of a personal environment.

Acceptance of PLE and lifelong learning centered on student, is theoretically the best solution. Expected of students departure from their earlier practice of learning, where their learning is planned, controlled and evaluated the speakers - in an approach where they take on this role, in a large part of his teaching. There is concern that many students fail to perform this change without external assistance (Longworth, 2002).

While students require more support to perform this transition, they may not get from teachers, who often fails to teach more than curriculum of the subject. The teaching staff is suspicious of any change in traditional pedagogy, and is expected to accept the innovation while working under considerable stress (Wingate, 2007). [7]

VII. CONCLUSION

Learning style is a way of thinking, processing and understanding information. Since the perception of external information carried by a diverse variety of people, there is no dominant learning style. Learning style user depends on the age of his age, the circumstances under which they teach, as well as its needs.

Quality learning is the ability that users alike to every learning style. This means that in the process of e-learning teaching methods should be applied to suit every style of learning. Regardless of which learning styles to suit him, it is desirable to encourage the use of learning styles and those that users gain from less.

Cooperation and association with e-learning is provided by grouping users into groups that facilitate electronic communication and cooperation, but should take into account that the groups are made up of users who have similar learning styles, expectations, knowledge...

Acceptance and use of personal learning environments (PLE) at the Universities incorporated shift that rejects many of the existing institutional practices of e-learning.

It can be concluded: the concept of environment PLE in its early stages and it is difficult to predict its impact on the future practice of higher education. One of the greatest authorities in the field of e-learning Stephen Downes believes that, over time, learning management systems that deliver educational institutions evolve into systems for the delivery of educational content useful for personal learning environment (PLE). They will be, in fact, “remote resources” available in a given context (Downes, 2009) services via the environment PLE.

Individual differences among users are reflected in how users accept and process information. Users should be given the opportunity to choose the style of learning, and communication with the lecturers and their colleagues.

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USE OF INTERACTIVE DEVICES AND SOFTWARE FOR TEACHING IN TECHNICAL AND COMPUTER SCIENCE

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Abstract - Acquisition of modern teaching aids mostly is associated with the separation many funds. If you still try to purchase interactive smart electronic table, you will stop on the first step with partial-term review of the commercial offer of the leading manufacturers. This work will show that it needn't to be the rule. Interactive board at the price of cheap inkjet printer, certainly warrant attention to introduce an alternative solution. All this accompanied by an appropriate interactive educational software raises the level of quality of teaching in which students trough the game learn new content and teachers raise their professional development.

I. INTRODUCTION

In the growing supply of electronic boards on the market today, we can see two commercial solutions. The first is a classic interactive whiteboard, standard and fixed dimensions, with their elements up to resemble the right panel (electronic chalk, via an e-sponge), with an area that is sensitive to the touch and that is trough a standard USB connection pluged into the computer. While the second solution is based on monitoring the position of electronic pen with a device which are usually placed on the side, pointed to the desktop, connected to a computer via USB or Bluetooth connection. In both cases we as the basic hardware needed computer and video projector which will image from your computer project to the interactive surface. Both solutions have their advantages and disadvantages - the first has a big advantage of "natural ability" environment, the system is easy to use, training is fast, but the size of the table is restricted by the size of hardware ie. an area that is sensitive to the touch, the system is static, it can not be transferred from the one room to another, the price is unacceptable to most institutions that have a need for these presentations assets. The advantages of the other solutions lie precisely in the mobility of the whole system, size of the "table", ie. virtual surface has no limitations, price is 4-5 times lower, while the disadvantages lie in the need for more training to work with pen, inaccuracies of the system and the less powerful support.

Unfortunately, both commercial solutions are unavailable today for most institutions that have modest financial resources. The solution is here.

II. INTERACTIVE DEVICES

In 2006 the Japanese company known for production of home consoles Nintendo, has released a new device called the Wii to the market. What is interestingly in this device is the controller (the Wii Remote - Wiimote), which brought to the players a new dimension of gameplay, with the help of an accelerator and an infrared detection gave the players ability to control the game with their physical movements, not only by pressing the buttons [1].

Figure 1. Nintendo Wii Controller

A few years later, the engineer Johnny Chung Lee presented the public his three projects, which have shown how and in what way is it possible to use built-in infrared camera in the Wii controller for serious purposes. One project is an interactive table, called the "wiimote whiteboard". With its price, order of magnitude as the average low-cost inkjet printers, this project has attracted many enthusiasts around the world [2].

The principle is simple: the built-in infrared camera in the wiimote controller will detect infrared diode set on top of electronic pencil, position information emitting diodes will be sent via Bluetooth to a computer and dedicated software will convert the coordinates of the diodes in the position of the mouse pointer which will always be aligned with the position of infrared emitting diodes through projected images by the video link.

Besides the Wii controller, we need electronic pen and USB Bluetooth adapter on computer in case it does not already exist as a built-in. By its design, this pen is very simple, and with a little assistance from the teacher, can be made by eighth grade on classes in electronics. It is a simple circuit with a single power source (AA-size batteries), an open button and an IR diode, all set in case of an ordinary marker drawing [3].

Figure 2. Electronic IR pen

Getting started is first reduced to a connecting device and calibration software with the size of the projected image and its position on projection surface. Connecting the device is like any other connecting devices via Bluetooth, the system recognizes the wiimote like any other HID hardware, then it is necessary to fix the controller and does not move it anymore, as well a projector ie. position and size of a picture. Powered by the calibration procedure the system is ready for use. If we use electronic pen as a substitute for the mouse, so far described the procedure is all that is needed for further work ..

But here we will mention two commercial programs for Windows operating systems, which will slightly extend the possibilities of using the aforementioned system, and bring him more close to classic-term interactive boards and their possibilities. These programs, besides the option to control the mouse, the simulation of left and right button, has the possibility of notation over any image that is displayed on the screen, again with many new features.

III. INTERACTIVE SOFTWARE

Iwiiboard - custom software that integrates everything you need to work with the wiimote device and its use as an interactive table, in addition to easy ways of finding and connecting to the hardware, the software has the following features [4]:

- pen - write freehand on the screen
- right click – simulation of right mouse button
- blackboard - writing on the monochrome surface
- snapshot - capture screen contents
- tools - system applications quick start
- screen keyboard – turn on virtual keyboard

Under the pen option, there are many new options, the most interesting are:

- highlighter - transparent highlighter bookmark
- size - the size of a pencil
- rubber – eraser
- shapes - drawing defined symmetrical shapes
- zoom - pounding parts of the screen enlarger

Figure 3. Part of menu Iwiiboard

Smoothboard2 - unlike Iwiiboard's, this program has poorer option, but lot more optimised, primarily in notation over the current image on computer. What sets him apart are completely defined tools that help working in Power Point, and the possibility of applying adjustments in the user interface [5].

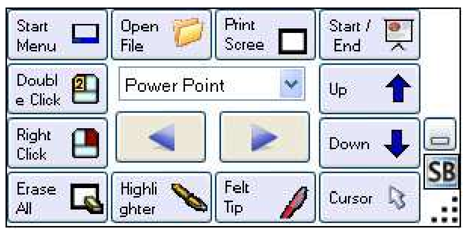

Figure 4. Part of menu Smoothboard2

Adresia, Classroom Presenter, E-pointer, Linktivity Presenter, Massive board, Pointofix, Screen Marker, Zoomit are just some of many free programs for notification and drawing on the screen, but less used like two previously mentioned.

IV. EXAMPLE OF INTERACTIVE EDUCATIONAL SOFTWARE

Multimedia software for teaching was implemented in the package Adobe Director [6]. Using its advanced technologies, there are integrated all the elements necessary to complete good interactive teaching. See Fig.5.

Figure 5. The working screen of interactive educational software

Multimedia application is designed to help teachers in the presentational part of class, with as many possibilities of using electronic table. Except for navigating the presentation using the systematic interactive software's cursor options (Smoothboard2 chosen because of its optimisation), there are actively used the possibilities of notation over an existing image. Collecting multimedia material, it was taken care that the images on the one hand, are colorful, with lots of visible detailes, and on the other hand that every picture (graph, table) has a space for a simple redrawing which will be "record " on the interactive board during lectures. For example, omitting the arrows that connect the elements or some framed pieces in the picture, gives us room to use the electronic pen during the presentation and handwritten elements' drawing that are missing.

There are also provided students' activities on "smart" board, in the form of exercises and tests. The exercises are made to require interactions trough using them, for example, it is necessary to recognize and re-draw some elements from one part to another part of the screen to solve the task, while the conventional test has questions and multiple choice, with programmed part of the accompanying correct answers and eventually ejects a result. The software itself is not a software where students will be individually assessed and improved, but collectively ie. grouply, primarily aiming to create a new atmosphere in the classes with the use of a modern teaching resources such as interactive whiteboard.

The software combines units from the theme **Machines and mechanisms**, which are learnt in the lessons of the Technical and computer science at the seventh grade [7]. After the screen where is displayed the title of the theme and a short introductory animation, there is a main menu which is divided into seven groups:

- Introduction
- Principles of work
- Elements
- Production machinery
- Transportation machines
- Exercises
- Tests

At the bottom of the screen there are the navigation keys that are intertwined throughout the presentation in the same way and same place (options next, return and menu above). At the upper part there are the keys to exit the program, assistance, and return to the main menu. Each teaching unit is presented with many pictures, some with videos.

Processing multimedia materials described above, we will be also described in a few examples. At the principle of leverage, we use the image on which is not drawn pillar (Fig. 6). With the help of an interactive table we draw it (sl.6b, 6c), and develop a dialogue with students who comment on whether and why the first pillar, ie. The second one is bad or good.

Another type of interaction is the illustration for which omitted references have to be entered during the lecture so it could be attractive. Representative example of picture shows elements of the bike, without the drawn arrows (Fig. 7a) and with the marked arrows during the presentation (Fig. 7b)

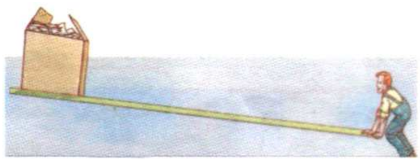

Figure 6a. Example of image used in the interactive presentation

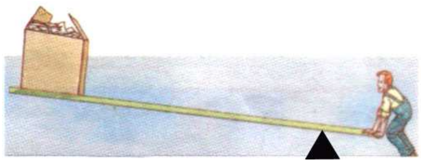

Figure 6b. Drawn support in the wrong place

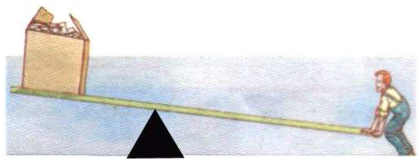

Figure 6c. Drawn support in the right place

Figure 7a. Example of image used in the interactive presentation

Figure 7b. Marked with arrows through "smart" table

For the students are planned exercises and tests. An example of one exercise lies in identifying tools that operate on the principle of the lever and the principle of the wedge. At the bottom of the window frames there are strung out a hammer, a knife, pliers, axes, saws, openers, door knobs, and by dragging them with the help of electronic pens, the task is to allocate them into their group, ie. the picture of element is need to drag to a rectangle which is entitled "Principles of leverage" and to the other which is called "Principles of the wedge”. When all elements are properly placed in their gatherings, the program will verify the accuracy of realized task. See Fig.8a and sl.8b.

Figure 8a. Example of exercise recognition principles

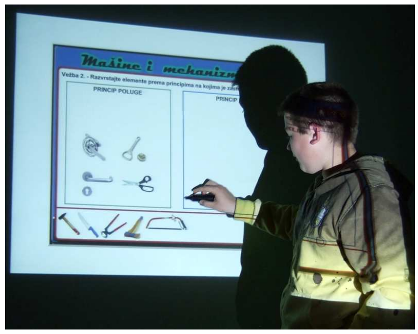

Figure 8b. Exercise in class - recognizing the principle of work

Figure 9a. Example of exercise connecting pairs

Figure 9b. Exercise in class - connecting pairs

Another example consists of exercises “line couples”, where couples are pictures of some old devices or manually worked jobs on one hand, and modern machinery on the other hand (example: blimp -> plane, horse carriage -> bus, abacus -> computer, digging spade -> tracked , etc.). See Fig.9a and sl.9b.

Students’ activity is here expected and it is important for everyone to be active when using the electronic pen on the whiteboard.

Knowledge test is a set of twenty questions with multiple choice. For example:

Mark scheme’s elements of the real mechanical system:

- vertical machines, the transferring of cargo, reach work
- power, power transmision, machinery

- prosecuted machines, rotary machines, linear system

In the right part of the screen, the appropriate script will enter the current number of points. Tests are repeated with the same issues, as long as all groups of students don't do the test with the maximum number of points, and so strengthen their knowledge.

V. CONCLUSION

Interactive electronic whiteboard using the suitable software, is a device which in the first comparison with a classical education has a acquired advantage. Durability of knowledge and achievements of students in conventional tests shows that these parameters improving by almost 20%, while the motivation of students for the Technical and computer science itself, reviewing student' responses to the survey, repairs by 50%.

The current problem is the lack of quality interactive software, a well thought out in a team of teachers and educators, and weak technical skills for the use of such devices. There is no doubt that such or similar device will be a standard teaching tool in every classroom for a couple of years. This paper shows that it can be today.

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ELECTRONIC LEARNING SYSTEM SECURITY

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Abstract – Security is one of great problems in the creation and implementation of e-learning solution. As an end user is not able to see these problems, they are often neglected. As all other applications, e-learning portals are widely distributed and available to a wide audience, which makes them vulnerable in a way. As the concept of Web applications is very spontaneously developed without a detailed plan, and with great effort invested in development of programming languages and interpreters for Web applications, there is a danger from manipulation by malicious users.

I. INTRODUCTION

Basic security requirements are:

- Confidentiality – it refers to the belief that information and data, which imply something secret and private, will not be discovered by unauthorized persons, processes or devices. Namely, students need to be sure that their exams, which they have taken on-line, are kept private and that they can be accessed only by authorized users – teachers.

- Integrity – it refers to the belief that information and data will not be, accidentally or with malicious intent, modified or destroyed and that they will retain their accurate, correct and complete original form. Namely, the students need to be sure that their exams, taken on-line, reach the teachers in their original form.

- Availability – it refers to the belief that information and communication resources are available and reliable in a timely manner to authorized persons. Namely, the students need to be sure that they have a reliable and timely access to e-learning system when they want to take their exams in time.

Emergence of electronic communications, particularly the Internet, has significantly influenced the increase of frauds and identity thefts. For that reason, identity protection has become crucial in cyberspace. Basic and recognizable set of characters of an entity is what constitutes the identity, and it is also the thing that enables the others to be different from the rest. Such concept suggests that there aren't two same identities and that each identity is associated with a single set of characters that is unique to him. In on-line environment, the identities of users are digital identities.

The simplest way to ensure the protection of digital identities is the use of user login. All it takes is user ID and password of the user. As a result, user login provides three crucial access services of identity:

- Identification – recognizes the user as a true member of user association,

- Authentication – verifies user identity and

- Authorization – authorizes the access to specific resources.

Secure login system provides: control – review of user's on-line transactions; jurisdiction – linking user actions; recognition – elimination of activities that were rejected by the user

II. SECURITY MODEL OF DISTANCE LEARNING SYSTEM

A security model of distance learning system is based on role policy [4]. If it is assumed that U – is a set of users; G – a set of user groups, which consists of the following elements: G={administrator, teacher, student, guest}; P – is a set of authorizations to access the objects, presented in a matrix of access rights; S – set of user sessions in the system.

For these sets, the following relations can be defined [6]:

$PA \subseteq PxG$ - shows how the set of authorizations is reflected on the set of groups, where tools, indicated by those authorizations, are installed for each group; $UA \subseteq UxG$ - shows how the set of users is reflected to groups, defining the tool to access the groups for each user.

Security rules of access policy control and define the following functions:

User: S →U – for each session, S function defines the user, who accomplishes this session with the system:

User(s)=u; group: S →P(G) – function defines tools from the set G for each session s, which can be simultaneously available to user in this session:

$$group(s) = \{g_i, |(user(s), g_i) \in UA\};$$

Authorization: S →P – this function will mark tools necessary for authorizations in sessions, authorization is defined as a set of authorizations of all groups, used in this session:

$$authorization\,(s) = U_{g \in group(s)} \{p_i | (p_i, g) \in PA\}$$

As a criterion of the security model, the following rule uses the following formula:

$$\forall u \in U, \exists p \in P, \exists s \in S$$
$$(u = user(s)\,\&\; p = operation_i(s)) \rightarrow$$
$$p \in authorization\; s(s)$$

Where the operation$_i$(s) – is a function that will mark authorization for action number i.

In that way, the system is secure if any system users, who operates in session *s*, can accomplish actions, requiring the authorization *p* only in that event, and if *p* belongs to the set of available rights of session *s*.

III. APPLICATIONS FOR E-LEARNING COURSES

Many applications were developed as support in the preparation of *e-learning* courses. All those applications perform some common functions [5]:

Administration – application of administration is designed for the purpose of managing administrative information of an institution/organization. Administrative information is very sensitive, given that it refers to personal information. These tools are aimed at enabling the administrators to manage the important information of an institution/organization in an easy way.

Authorization of courses – many distance learning courses are designed to be accessible over the Internet. As a result of that, there is a need for rapid development of tools for multimedia courses.

Delivery of course content – after the *on-line* course is designed, it is necessary to deliver it by appropriate tools. These tools provide the students with the access to *on-line* courses over the Internet. On the other hand, students can have a variety of devices and tools and they can move them on various platforms.

Synchronous communication – some tools are made in such a way to support synchronized activities between instructors and students. Typical example of that is a tool for a video conference that is designed in such a way that activities, such as visual communication "*face-to-face*" and audio communication, require synchronization between communication parties. Although these tools are useful, they also have their disadvantages. First of all, they require the expansion of network scope, which will support communication requirements.

Multimedia lectures – some applications offer tools for synchronization of video "*slide show*" presentation. These multimedia applications aim at providing the learning environment that is similar to the traditional learning environment.

Assessment of students' knowledge – it is a challenge for each instructor to assess the knowledge of students and determine how well the student handles *on-line* courses. Different tools that support *on-line* testing were made. These tools tend to focus on the creation of *on-line* exams or to monitor students' logins.

IV. TYPES OF ATTACKS ON E-LEARNING SYSTEMS

Some of the types of attacks are browser kidnapping, theft of cookies, theft of database, changes of access rights, i.e. DoS (Denial of Service), SQL/HTML injection, cross-site inclusion etc. [3] HTML injection is an attack that is done by entering HTML/JavaScript code in the text fields that should, later on, be shown on one of the pages of Web application [2].

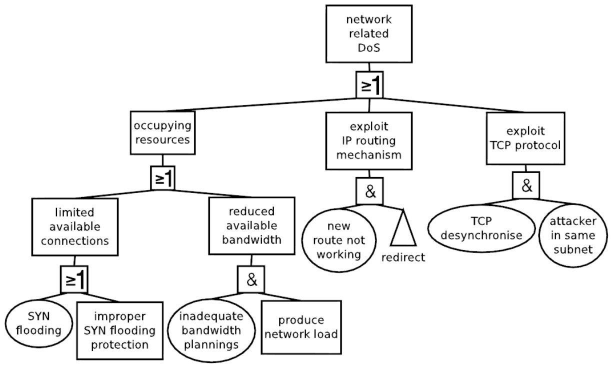

Figure1.: Fault tree excerpt for network related denial of service (DoS)

Such failures are often used for so-called "session thefts". Each user who visits the page that contains a malicious code, including the administrator, is a potential victim of the attack. The attacker can write a code by which he can record all cookie variables from user's browser on a remote location, including those that contain sensitive data, such as session's identification number. The attacker can then present those cookie applications as his own, and the application will, by the identification number of attacker's session, see the attacker as the one whose cookie is stolen. In that way, if the attacker steals administrator's cookie, he will have all the privileges in the application including editing and deleting the content and user accounts. SQL injection is another very frequently used technique [1]. It is relatively similar to HTML injection, but it is even more dangerous. This attack allows the attacker to edit or read arbitrary entries from SQL base, and this can be used in many ways, such as by creating new administrator's user account.

Security gaps are found in two basic ways:

a) By brute-force access, i.e. by testing all the possible failures "blindly".

b) By reading the application code and analyzing it.

From all this, it follows that only well-checked cryptographic algorithms should be used (RSA; DES, Blowish, MD5, SHA,…), instead of writing own solutions. Verification of important information should be done on server's side that is opposed to client-side of language. Thus, security-critical information must not be verified, and an important code must not be located in languages that are performed on client-side (JavaScript, Java, VBScript, Flash, …). All input data should be "cleaned" from potentially dangerous parts by deleting HTML and JavaScript from the text that the user sends to be presented on web pages or provides the translation of special characters into equivalents for the use in SQL queries. So, web applications are most frequently written in languages whose code is never compiled, but it is interpreted, i.e. their code is readable. One of the most common techniques for hiding the code is obfuscation. Obfuscation is coding (not encryption) of the code, for the purpose of reducing its readability. It is aimed at reducing "the sense" of the written code by changing the names of variables, functions, classes, to replace as many codes by equivalent etc. In case of using PHP, most frequently used solution is ZendGuard that partially complies the code into so-called bytecode, in addition to obfuscation. It should be stressed that regardless of all this, there is no completely secure way to hide a code if the executable file is in question.

V. SETTING THE SECURITY ASPECTS OF APPLICATIONS FOR E-LEARNING COURSES

Web sites consist of client and server components. By this classification, it can be said that the system is completely secure as long as it is in the context of the client, because it actually does not have anything to do with the server. However, in the moment when a user-defined process takes place on the server, one site becomes vulnerable.

What happens in the process of broadcasting one static HTML page? Client application sends a request to *web server* and *web server* responds by finding and broadcasting the requested *HTML* document. In such process, there is no room for anything, except for the mentioned series of activities and, because of that, this application is secure.

In process of creating and broadcasting dynamic *web* side, this process has a few more steps. In the beginning, and here, the client application requires a particular document, but the server, instead of finding and forwarding that document, forwards the entire request to server script and it processes it and transmits on the output (to the client). This processing is a key point for security of one *web* application, because if the user succeeds to infiltrate its part of the code in server script, it will have "unlimited" possibilities to manipulate the server.

Therefore, the input is the most vulnerable part of the application. For that reason, it is the most important to be sure about everything that enters the application; and that security will, of course, be accomplished by controlling all "inputs".

A. What are the inputs into a web application?

In order for the user to reach the server code of an application (through that application), it is necessary to turn to it through some parameters. These parameters, usually, reach the application through the forms (*post*) or parameterized *URL string* (*get*). When some of these parameters reach the server, server puts it into an appropriate variable. These variables are unique and available to the complete context of application and, for that reason, they are called superglobal variables.

Most of the superglobals, in case of each request and response, pass the way from a client to server and vice versa and, therefore, they are considered unclean and they need a special treatment in order for their use to be secure.

B. The concept of black and white list

A lot of intrusions into application occur through controls that are, generally, an insecure source. For that reason, in case of every such information input, a certain filtration is performed. Primarily, it should be devised what is to be filtrated.

When you are filtrating data, the application can be said to do one of the two things:

- not let anyone in who does not meet particular conditions,

- let only those who have met particular conditions.

These two concepts are called black and white list.

Difference between these concepts is in the fact that black list requires much less attention, because, after we list the objects that do not have the access to the structure, it will be available to all other objects even if the list is not timely refreshed.

On the other hand, white list requires a more regular refreshing, depending of the frequency of objects. White list is considered to be a better security concept than black list, because the input is limited only to the values expected, and thus the undesired object has much less chances to pass.

C. Input

The first vulnerable point in the system is superglobal variable, and that is simultaneously the place where server code has a possibility of a control.

The first thing that can be controlled is whether the user is appropriate or not. In case that it is a user that is not registered in the system, it can be verified from where it came. The location from which the user came is called ***referrer***.

If it is expected for the user to be registered in the system, the systemic verification is done (through the *cookie*, *session* or base).

When the user is verified, the following point is the input itself, i.e. superglobals that contain that input. In *web* applications, the user can cause serious harm only through a server or *SQL* script. For that reason, such an input is most frequently necessary to be prevented; the best way is to forcing the user to enter exclusively valid content.

VI. CONCLUSION

Development of many *e-learning* courses is most frequently based on technical details, as well as the manner of their delivery. Security, as the need of these systems' existence is frequently neglected. Namely, the role of security in *e-learning* systems is to provide a secure „*end to end*" session between students and *e-learning* network, where security is treated as a technical element.

Observed from the perspective of students, security in *e-learning* environment is focused on something else. The ability of a student to manage his own space, especially when personal information is shared, is very important. In *e-learning* environments, when physical interaction practically does not exist, the confidence is essentially important.

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DIRECTING THE PROCESSES IN HIGHER EDUCATION TOWARDS QUALITY REQUIREMENTS

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Abstract – The current achievements in the field of integrated systems of quality can be used for directing the processes in higher education, and for a strategic guidance of institutions towards constant improving of the quality of teaching, scientific and other processes. Quality requirements demand the institutions of higher education to be well technically equipped, to enable students to gain information and access Internet, to seek confirmation of their graduate students' competences in the work field, etc. This article presents a segment of a broader research of students' evaluation of the quality of services in various institutions of higher education in Vojvodina. The results show that the requirements of quality education are more easily fulfilled by students in Novi Sad, and that students, regardless of their place of study, are not satisfied with the organization and quality of the teaching process and the (un)reliability of information. The students from the institutions in Zrenjanin, Sombor, Subotica and Kikinda are less satisfied with the technical and spatial resources, the opportunities they are given to use personal computers and Internet outside classes, the support of information technology in all the educational services and the facilities provided for students' free time, but they differ from their colleagues from Novi Sad in the fact that they are more satisfied with their teachers as pedagogues.

I. INTRODUCTION

The quality of higher education plays the key role in the realization of the vision of digitally functional Europe. In order to improve quality, institutions of higher education need to bring their services closer to the requirements of internationally recognized systems and standards of quality – TQM, ISO, IWA and/or others. One quality requirement is the use of potentials of information technology in the teaching, scientific and non-teaching areas.

The quality of education is defined by the buyers and/or users of the services. What is quality education for a student? That is the diploma and knowledge highly desirable in the work field. All the processes of higher education must be directed towards this goal.

Information about whether an institution of higher education is or is not accredited is information sought and known by 100% of students questioned, according to the results of the research of the evaluation of quality of higher education in Vojvodina. Still, students are variously informed and their opinions differ about other important indicators of education quality, depending on the institution and the town they study at.

II. RESEARCH RESULTS

The research was done during the school year of 2009/2010. The research sample consisted of students from Faculty of Technical Sciences in Novi Sad, Faculty of Sciences, School of Medicine, Faculty of Philosophy, Faculty of Law, Faculty of Sport and Tourism, University Business Academy, Faculty of Economy in Subotica, Faculty of Technique "Mihajlo Pupin" in Zrenjanin, Faculty of Education in Sombor and Teacher's Training College in Kikinda; twenty to thirty respondents from each of these institutions, 303 students in total.

Measuring instrument: Likert scale for consensus based assessment, with items constructed on the basis of parameters for measuring quality according to the international ISO standards (International Organization for Standardization) and the TQM systems of quality (Total Quality Management). The items in the questionnaire were grouped in such a way that students assessed the quality and organization of the teaching process; the quality of services provided in the Student Administration Center; the quality and availability of information technology; the quality of communication with the students; the quality of informing the students; spatial resources for classes and students' free time at the faculty; and other important issues in their relation to the requirements and parameters of the international standards of quality. In addition, the students gave their suggestions, observations and comments in written.

The respondents, in approximately 80% of cases, agree that they have enrolled the faculty of their choice, and about 70% of them were informed about the employment possibilities in their field of expertise after graduation. The respondents, depending on the institution at which they study, differ in their assessments of the quality of informing the students (the speed, accuracy, regular updating of the faculties' web-sites), the quality of the services provided by the Student Administration Center, as well as their assessments of the quality of communication of the institution with its students (dialogue, forum, internet). The students are mostly dissatisfied with the organization and quality of the teaching process, and they feel that it is not always organized in accordance with the principles of Bologna.

Table1. The frequencies of values for the item:
The teaching process is very well organized at my faculty.

Degree of agreement		frequencies	percentages
1	completely not true	30	9,9%
2	partly not true	38	12,5%
3	I'm undecided	116	38,3%
4	partly true	98	32,3%
5	completely true	17	5,6%
	Total	299	98,7%
non-responses		4	1,3%
Total		303	100%

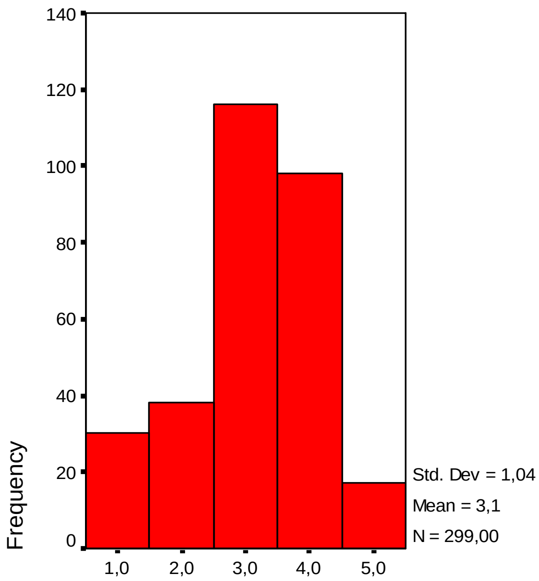

Chart 1. The frequencies of values for the item:
The teaching process is very well organized at my faculty.

III. Students' comments and suggestions

The students' comments and suggestions presented here are authentic and grouped according to the frequency and similarity of opinions on the questions of organization and quality of the teaching as well as the existing technical support: „I think that the problem is that we learn a lot of things at the faculty (both theoretical and practical) only skin-deep and we never go into the depths of a problem, so in the end, we get to be acquainted with a lot of things but only cursory and not enough so to deal with those things professionally and say that we are completely familiar with the issue." (Faculty of Technical Sciences, Novi Sad, senior year student); „Teachers need to be better pedagogues!" (Faculty of Technical Sciences, Novi Sad);

Table 2. The frequencies of values for the item:
High levels of teaching quality are maintained.

Degree of agreement		frequencies	percentages
1	completely not true	36	11,9%
2	partly not true	48	15,8%
3	I'm undecided	126	41,6%
4	partly true	82	27,1%
5	completely true	9	3%
	Total	301	99,3%
non-responses		2	0,7%
Total		303	100%

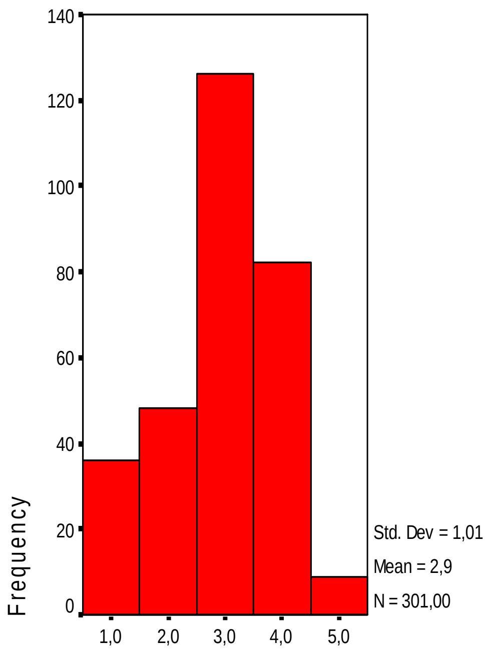

Chart 2. The frequencies of values for the item:
High levels of teaching quality are maintained.

„Faculty of Law in Novi Sad has accepted the Bologna method, but it doesn't exist at all in practice (questionnaires and suggestions like these are useless, nothing will ever change)“; „The Bologna program should be thoroughly implemented, instead of being only partly accepted or completely disregarded so everything is done in the same way, as the teachers are used to.” (Faculty of Law, Novi Sad, senior year); „Certain types of projects require more practical classes” (Faculty of Economy, Subotica); „In practical classes we should work more on computers and not on paper, practice should be implemented into the curriculum, students-teachers relations should be more interactive” (Faculty of Economy, Subotica); „The whole organization needs to be lifted to a higher level: starting with the organization of exams to the quality of the teaching itself“; „There is no room for practice classes in Computer graphics, we haven't had any classes“ (Faculty of Technique, Zrenjanin);

Table 3. The frequencies of values for the item: At my faculty, teaching is organized according to the Bologna principles.

Degree of agreement		frequencies	percentages
1	completely not true	20	6,6%
2	partly not true	44	14,5%
3	I'm undecided	36	11,9%
4	partly true	147	48,5%
5	completely true	52	17,2%
	Total	299	98,7%
non-responses		4	1,3%
Total		303	100,0

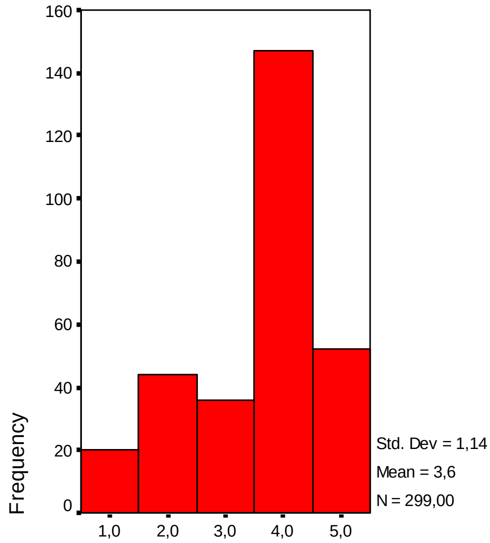

Chart 3. The frequencies of values for the item: At my faculty, teaching is organized according to the Bologna principles.

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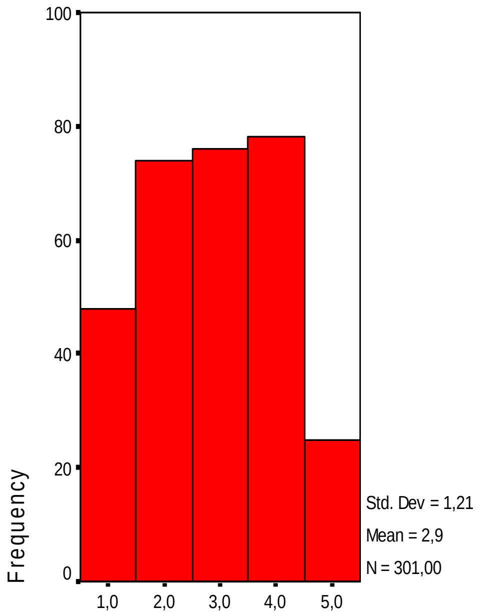
„Above all, the students should be given the opportunity for better and easier studying. 'Bologna' is partly implemented, only a couple of teachers have completely accepted it and enabled extra “earning” of credits needed to pass. The others (majority of them) haven't changed anything, so the way of studying is the same as it was ten years ago. The curriculum should include more practical classes, so the students would be encouraged to discover more, think more creatively and results would surely come.” (Faculty of Technical Sciences, Novi Sad); „I think that the faculty is doing its job fairly well, but the students don't take the classes seriously enough and they often avoid the classes, because the teachers are quite forgiving and they sign their students' books regardless of their attendance rates, and in that way the students are less stimulated to work (Faculty of Technique, Zrenjanin); „The teachers should commit more to communication with the students, they should keep pace with modern technology as well as with their field of expertise“;

Table 4. The frequencies of values for the item:
My faculty has high quality technical equipment.

Degree of agreement		frequencies	percentages
1	completely not true	48	15,8%
2	partly not true	74	24,4%
3	I'm undecided	76	25,1%
4	partly true	78	25,7%
5	completely true	25	8,3%
	Total	301	99,3%

non-responses	2	0,7%
Total	303	100%



Cahrt 4. The frequencies of values for the item: My faculty has high quality technical equipment.

„Each teacher should have a blog in which he or she could timely inform their students about their subjects, so the students would not have to go to consults but ask them questions online.“ (Faculty of Technical Sciences, Novi Sad); „We need harmonization of the teaching with the Bologna program aimed at enabling students to comprehend the educational materials more easily and allowing them to transfer to European universities“ (Faculty of Law, Novi Sad); „More practical tasks done with the students, more enthusiasm from the teachers about their work, closer follow-ups of modern technologies in the students' learning, instead of the repetition of old resources and a limited number of technologies and programs“ (Faculty of Technical Sciences, Novi Sad); „The faculty should organize classes for smaller groups of students, it should have better equipment, students should be able to access the Internet non-stop, we should have more computers, more reading rooms, more books in the library, etc.” (Faculty of Economy, Subotica, NS);

„Bologna and computers in class?!“ (School of Medicine, Novi Sad); „More computers and the use of modern technologies in organizing the classes (Financial Mathematics, Accounting, and Statistics), friendlier Students Administration Centre“; „Enable Internet connection (wireless) in the faculty building, install more computers at the “Internet cafe” but not like the useless old ones we have there now” (Faculty of Technique, Zrenjanin); „Enable students to apply for exams online“; „Students' forum on the web-site, complete bibliographies on the Internet for all the subjects“; „A lot of computers in the classroom do not work, but nobody cares about that, it is a problem that could be fixed in a short time, but no one is interested. They should put some sense in that administrator of theirs and fix several computers enabling easier work for both teachers and students“ (Faculty of Technique, Zrenjanin); „Lack of space in which students could eat, have coffee or tea during breaks“ (Faculty of Technique, Zrenjanin); „Useless computers in the information technology classroom (Faculty of Technique, Zrenjanin); „Post more information on the web-site, but accurate information and update the site regularly!“ (Faculty of Technique, Zrenjanin); „Lack of space in which students could eat, have coffee or tea during breaks“ (Faculty of Technique, Zrenjanin); „Useless computers in the information technology classroom (Faculty of Technique, Zrenjanin); „Post more information on the web-site, but accurate information and update the site regularly!“ (Faculty of Technique, Zrenjanin); „The teachers and their assistants respect only their time, but not the time of their students“ (Faculty of Technique, Zrenjanin); „More computers in the “Internet cafe” (Faculty of Technique, Zrenjanin); „We should be informed about the jobs we can get after graduation and what we shall do at those positions” (Faculty of Technique, Zrenjanin); „Non-stop Internet connection, how can 30 minutes a day be enough?!“;

Table 5. The frequencies of values for the item: The faculty cares about the opinions of the students by accepting their comments and suggestions expressed in anonymous questionnaires.

Degree of agreement		frequencies	percentages
1	completely not true	92	30,4%
2	partly not true	78	25,7%
3	I'm undecided	75	24,8%
4	partly true	43	14,2%
5	completely true	10	3,3%
	Total	298	98,3%
non-responses		5	1,7%
Total		303	100%

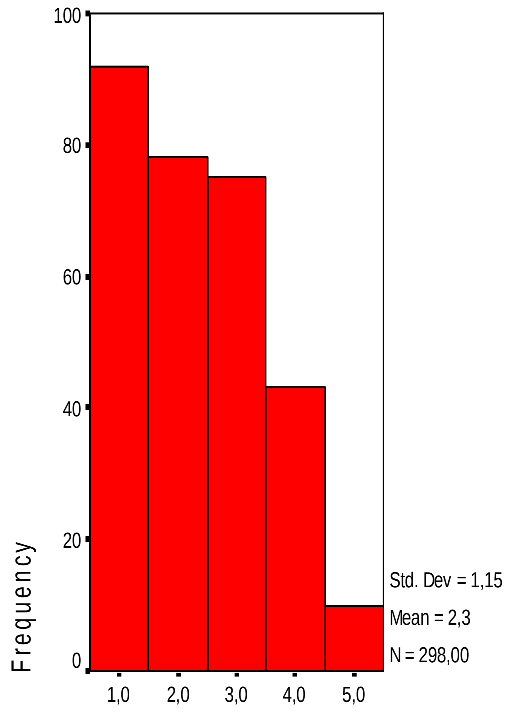


Chart 5. The frequencies of values for the item: The faculty cares about the opinions of the students by accepting their comments and suggestions expressed in the anonymous questionnaires.

IV. DISCUSSION OF THE RESEARCH RESULTS

Research results confirmed the assumption that not all the students in Vojvodina are in the same position, even when they enroll a faculty in Novi Sad. The requirements of quality higher education are more easily fulfilled by students in Novi Sad, and the further we move from the centre of the province the fewer are the possibilities for students to fulfill these requirements. The students in Novi Sad have bigger, but different privileges, depending on the educational institution at which they study: some state faculties are more privileged than others, especially in comparison to the private ones. The geographical isolation from the university centers is in our country often the cause of lower quality educational services solely on the account of lack of information and availability (lack) of material resources. For example, respondents from Zrenjanin, Sombor and Kikinda had never before heard about ECDL training (European Computer Driving License) organized by numerous faculties in Novi Sad and Faculty of Economy in Subotica – Novi Sad department. The ECDL standard is an important qualification recognized in the whole European Union which offers mobility to holders. All the countries members of the European Union are members of the ECDL foundation and they all accept these certificates.

The Law of Higher Education asks for establishment of systems for ensuring quality on a systemic level, as well as accreditation of the institutions and their curriculums. The effectiveness and efficiency of an institution of higher education is valued through internal and external reviews. Students’ evaluation is a part of internal review. Almost all students included in this research knew that the faculty that they had enrolled was accredited, but most of them were not sure about whether the faculty had an international certificate of quality (except students from Faculty of Technical Sciences, Novi Sad and University Business Academy-Faculty of Law, Novi Sad).

The certificate of quality of an institution of higher education is a document which the institution, if it owns one, presents on its website along with other information. The fact that the students who had participated in this research were not well informed about this is probably a result of absence of such a document. The discrepancy with the international quality requirements in higher education implies lack of information about these requirements and global market trends.

The respondents (34% of them) did not agree with the claim that their faculties conduct internal audits of quality and organization of the teaching process, and 30% of them were undecided. 24% of them partly agreed because “the faculty did that a couple of years ago”, and 12% of them agree that internal students’ evaluation is done yearly.

30% of the respondents agreed with the claim that “The faculty develops our conscience about permanent improving and learning after graduation”, 35% of them was indecisive, and 24% of them disagreed with this claim. The fact that “society based on knowledge” is at the same time “society of permanent learning” implies that education in general needs to be observed in a broader context founded on quality which, in turn, is planned in accordance with the demands of economic-social movements and global standards of quality. This is especially important in the context of higher education.

V. CONCLUSION

“The ability of a society to produce, select, adjust, commercialize and use knowledge proves to be a critical factor for sustainable economic growth and raise in life standards.” (Turajlić, S. 2006).

The model and the nature of a higher education institution's system of quality is more closely defined by: its mission, vision and culture; strategic goals; surroundings; programs of study and the curriculum; processes; the size of an institution and its organizational structure. The organizational structure and the size of an institution of higher education are determined by all the organizational aspects of an institution individually, depending on the type and number of programs of study offered.

It should be emphasized that no international standard of quality or a management system aims at forcing uniformity to the structure of quality management systems, or uniformity of documentation of any institution.

Different researches (from economic or sociological perspectives) show that higher level and quality of education in a society has an overall positive effect on the productivity, innovativeness, democracy and social cohesion. In order for an education to be able to give such a contribution, the education system in a country needs to be good, effective, available and equal for all. The results of (a segment of) the research presented here say a lot about the need for a broader promotion of the importance of the systems of quality, since they guarantee competitiveness both on the national and international scene of educational services and work field.

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THE IMPLEMENTATION OF NEW MANAGEMENT EXPERIENCES IN HIGHER EDUCATION TEACHING - DISTANCE LEARNING -

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Abstract – Education is a key element of development and progress of all civilizations.
Higher education is faced with challenges and difficulties relating to the issues of financing, equal studying conditions, improvements of teaching staff, increasing and providing quality of education and research, employment of the graduates and establishing of international competence. New technology is a new challenge for higher education in the sense of changing the ways how to obtain knowledge, spread it, how to approach to knowledge and how to control it. The aim of this work is to give a contribution to e-Learning – distance learning within our higher educational system, encouraging faculties as well as professors to take part in this way of teaching. This method is highly accepted worldwide and it is known as a very successful way of students` education.

I. INTRODUCTION

The great expansion of higher education marked the second half of the 20 century. According to the data provided by the UNESCO, in 1969 there were 13 million students, and in 1995 there were 82 million students, that is six fold increase. The difference between the developed and the undeveloped countries in the world was growing more and more, socio-economic stratification was more evident, which was supported by differences in approaching the higher education in the countries themselves, both the developed and the undeveloped ones. Without the adequate system of higher education and scientific research institutions that provide the critical mass of skilled and educated people, none of the countries is able to offer the real internal sustainable development, particularly not developing countries.

The future modern trends define the education as one of the key components in the development of society. Having in mind the fact that modern educational trends have a tendency of society future defining and its position in international flows, it is necessary to be actively involved in projecting and developing our educational system. Current flows of development accentuate the enormous significance of knowledge that presents a level of society success and its economy. Ahead of our educational system a task of quality and functional education is set, hereby it should provide the full contribution to the development of our economy, offering the possibility for equal inclusion in the world`s scientific and economic flows.

Rapid development of science and technology influences the people`s life. The abundance of new scientific information requires further improvements in profession during the whole career. Quality educational system must be thoroughly thought over, presenting the higher educational system of our country which is legally regulated. The task of this higher educational system can be embodied through transferring and adopting scientific knowledge and values from science, technology, art i.e. developing the human abilities to use acquired knowledge, but to obtain new knowledge and values at the same time.

Considering the fact that the quality of knowledge will present the most relevant determinant that will dictate the existence of higher education institutions, the education quality must be highlighted in the foreground. Higher education institutions must possess a significant level of flexibility. Their flexibility is reflected in the implementation of new optional disciplines, keeping in touch with new scientific and technological accomplishments as well as students` striving for permanent education through various training programs.

In order to achieve the final education goal, gaining certain competences such as knowledge, skills and attitudes, it is necessary to improve the teaching process itself through the implementation of active teaching methods.

With appearance of modern electronic gadgets for communication, the distance learning is becoming very popular way of learning, and a new term showed up – “electronic learning“. There are a few terms that have been used with nearly the same meaning like the term „electronic learning“. A lot of terms were used to describe the sustainable education by the computer, which complicates the performance of generic definition. Some of the terms are:

- Distance Learning
- Distance Education
- Distributed Learning or
- Remote Education

All these terms indicate that the student is at distance in relation to a teacher, that he uses some technological device (usually a computer) for access to educational teaching materials and that he uses the same or different technology to have the interraction with a mentor or a teacher.

Due to rapid increase of multimedia and network technology, nowdays multimedia became a constituent part of our lives and inevitable aspect in media, including the Internet. The Internet as a new global space of communication, implies the involvement of multimedia features and it opens new ways of economic connections.

The following multimedia network products appeared in the market: Internet telephony, Internet television, video conference and others. In the future, people will use more and more services such as Distance learning, various distributed simulations and work groups which will not demand that the members of one team are not in the same building, not even in the same country. Economic advantages of that work itself are obvious. As the time passes, the unique multimedia network will be established and it will be able to replace telephones, televisions and other media devices that, not so long time ago, drastically changed our lives.

Rapid development of technology, apart from the obvious technical advantages, offers new ways of advertising. A lot of companies have already been using the Internet to a large scale and hereby optimizing their communication strategies.

In the last ten years it has been done a lot on the issue of developing and improving teaching tools, teaching methods and ways of work striving for more quality and more efficient teaching process. The European Union published e-Learning which embraces the aims of the European Union within teaching – educational plan and encourages open and distant learning, implementation of communication and information techniques in teaching process and in accordance with educational and pedagogical institutions. In its strategic policy, the European Union placed e-Learning into main objectives that will lead to important changes not just in the sphere of education but in the commercial and cultural life generally.

During the last two decades modern technologies have changed various aspects of our life including the way how we communicate, how we spend our leisure time and particularly how we work. Since the needs of the way we live and work changed as a result of this technological revolution, it is necessary to alter the concept of gaining knowledge and qualifications so that children would become successful people. Technology, particularly in the form of personal computers and the Internet, is becoming the centre of attention within educational policy and reform.

Today it is more important than ever before to be lifelong pupil. Work place is being changed constantly, the employees accept team approach in solving problems, not to work in isolation. More and more emphasized demand has been put ahead of the employees and that is their ability to filter great quantities of information and communicate efficiently, in written or spoken language. Technology performs almost every work environment, due to which the employees must gain new knowledge during their career. In order to be successful, you should be lifelong pupils.

The Internet resorces may help in the education of pupils and students ready for new information era. Contemporary work position implies more and more abilities in gathering, estimating, synthesizing and applying information, as well as taking into consideration more possible solutions, not just right one. Therefore, pupils should try, during the education process, to gain experience in team work and common problem solutions. Lecturers can assist pupils in formulating questions, selecting proper responses, supporting their research and address them to cooperate with other pupils inside or outside school. Lectures should be conceived in the way that more care is devoted to learning and modelling higher levels of critical thinking.

Teaching process should be carried out in a very flexible surrounding, able to present information in more ways, with the approach to various informational sources and maximum flexibility when the interraction among the lecturer, student and information is concerned.

In order to provide the maximum flexibility, computing, video and network technology must be combined. Due to the wide scope of involved technology, it is necessary to ensure a technological bridge in teaching process between traditional analog / one-way technology and evolutionary digital / interactive technology.

A lot of foreign educational institutions have tried to satisfy all these features by developing the distance learning model. The distance learning means that the user and instructor are physically separated in the educational proces, and technology (radio, video, printed material, computer data) is used to bridge this distance. In the system of learning, no matter how it differs from traditional teaching, great attention is payed to the element of satisfaction af all didactic principles. Distance learning can improve learning in more ways; it gives to both students and lecturers the experience of work on the Internet. The Internet provides students with new information, which leads to conscious activity of development and student as well, in fact to the major improvement in work.

Distance learning gives a chance to students to gain new skills and qualifications, and to develop themselves in new directions. The rationalization of teaching is carried out through rational changes and teaching principles in order to get better effect and better result. Education based on classical methods has certain important disadvantages. One of the biggest is the necessity of presence at the place of teaching process. The second important problem is that the lectures are accustomed i.e. to the average student, hereby, those who do not belong to that category are deprived, no matter if the process of knowledge mastering is too slow or too fast for them. By expanding the implementation of computers and the Internet, new techniques of education are developed, called e-education (e-education or e-Learning) and thanks to which the above mentioned problems are overcome.

Modern trends in education have the main objective, and that is the transition from „traditional model of knowledge reproduction“ to „ active knowledge mastering“. In the process of this teaching, professors and students are partners with the same aim, and that is establishing the knowledge basis to be adopted. These trends impose the urge to individuals to participate in the process of learning actively, being forced to transform individually all gathered information into knowledge useful and appllicable. The individual must be taught how to do it, but he must be taught how to look for information too, how to handle them, analyzing and transforming them into useful knowledge. In this case the role of professor becomes a bit different: he is not the centre of classroom any more, the place where the frontal teaching process is going on, it is however a co-worker, instructor or „coach“ who helps students to learn on their own way and hereby collected information manages to convert into useful, quality knowledge. The main task of the teacher is to teach students how to study well, in fact to create information literate students, future information literate experts in their fields. Considering the fact that this kind of learning is not developed enough, the aim of this work is to make this matter more theoretically acceptable and closer to all of us, including the views of implemented solutions at certain higher institutions in our country where is possible to make comparison between similarities and differences of applicable distance learning methods, and all these with one main goal, to prove the benefits this aspect of teaching is offering.

The relevant advantages of distance learning are flexibility and adjustibility of contents to its users, providing communication between persons in the prosess of education and the existence of different techniques and methods of teaching through the application of multimedia contents. The basic disadvantage of this teaching method is forming isolation between entitities in the teaching process where all costs of this concept, for now, are still relatively high.

It is from these points that this research presents the real challenge in striving for acquiring empiric and theoretical proofs that in relation to classical, traditional teaching approach, distance learning has series of the following advantages:

- It provides constant learning (lifelong learning), professional improvement,
- Students learn independently, with their own rhythm, at the place and time they choose,

there are a number of subjects at their disposal that various institutions or teachers-individuals offer,

- Individual rhythm – students go through learning material with the pace how many times they want to,
- Tplace can be chosen – it depends on the media used for learning material (it can be done at work, at home...),
- Topic availability that courses / programs do not offer. In that segment students find and attend programs they are interested in, even though educational and business institutions do not propose them for the place they work or live in,
- Participating in the best or the most prestigious programs – a student can „attend" at least some courses at the most renowned institutions or those held by eminent experts, while at the sam time do not change their residence,
- Selecting its own way of learning – active or passive learning, various levels of interraction: „classical" written material conducted by personal notes, interractive simulation, discussions with other pupils (e-mail, teleconference,...), more mulimedia graphics,animation, sound,...
- Practical work with different technology – not just information about what knowledge to acquire are gathered, but additional skills about the usage,
- Independent learning - and professors learn from students who look for the sources of information on their own,
- Cutting the costs of rent and other costs related to the stay at the place of course maintenance,
- Selection of the school outside physical boundaries of the native country,
- Possibility to work during studies independently from the place where lectures are held,
- Overcoming obstacles in attending traditional lectures due to some permanent or temporary physical problems, damage or illness and
- Self-organizing of time for learning (high motivation, time planning and ability for analysis and synthesis of contents that are to be learned) etc.

II. Conclusion

Contemporary society is what it is supposed to be nowdays thanks to all benefits that are embraced and improved at its time. Present time is the time of information – communication technology where a lot of ideas and achievements occured through improvements of many nations and regions.

With rapid growth of multimedia and network technology, multimedia became a constituent part of our lives and inevitable factor in media and the Internet as well. The Internet as a new global communication space implies involvement of multimedia possibilities and even today opens new ways of economic connections.

Multimedia network products appeared in the market such as: the Internet telephony, Internet television, video conference and others. In the future people will use the following services more and more: distance learning, various distributed simulations and work groups that will not ask from members of one team to be on the same premises, or even in the same country. Economic advantages of such work are obvious. As the time passes a unique multimedia network will be established and it will replace telephones, televisions and other media devices that, not so long time ago, changed our lives drastically. Rapid technology growth, beside obvious technology advantages, offers new ways of advertising too.

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CHARACTERISTICS OF MATERIALS FOR DISTANCE LEARNING AND STUDENTS NEEDS FOR THEM

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Abstract - Technological changes in modern society, technology and science affect the system of education, the rise to changes in it. Application of information technology in the education system allows to increase the efficiency of education - by reducing the time of study, updating records faster, enabling the constant availability of data and information, individualization of teaching and so on. Increasing and improving the efficiency of the education and learning process can be realized by developing new educational models using new educational technologies, such as distance-learning system.

The success of users in the system of distance learning depends on the degree of adoption of the content material. Whether and how the student to adopt learning content depends on the material from which to learn, and from its form and way in which it is delivered. Form and submission materials will be adapted to the needs of students. The aim of this paper is to explore the forms and methods of delivery of materials for distance learning are the most desirable for users. The research results will serve as guidelines in the implementation of the planned project of distance learning.

I. INTRODUCTION

Distance learning is taking place between the instructor and user, which are physically separated in the educational process. separation between them bridged the use of technology (radio, video, printed material, computer data, Internet).

Programs for distance learning, were created long before the use of computers and the Internet. They used the printed documents, audio and video tapes, TV programs, then floppy disks and CD ROM.

Depending on the type and material used and in which way it is distributed, there are the following different types of distance learning:

- Correspondence Courses - the period when they occurred, using the ordinary mail to send scripts and textual material. Along with the development of technologies for distance learning have used video tapes and more recently CD ROM. Today, the correspondence courses using the e - mail.
- Courses via radio or TV program - means the broadcast pre-recorded shows. Lack was that they did not have the ability to more frequent re-broadcasts.
- Teleconferencing and videoconferencing - the remote participants communicate with each other using microphones and cameras in the room. Desktop videoconferencing, which have been developed in recent years, bringing together participants who operate computers equipped with microphones and cameras.
- Computers with special programs - teaching materials will be distributed through special programs that customers use in individual work.
- Internet services (WWW, e - mail, mailing lists, news groups, bulletin boards, chat rooms ...) improve communication of distance learning. Learning materials are provided in the form of hypermedia

Distance learning language, as one of the earliest forms of distance learning, developed in Germany 1856th year. Soon appeared in England (a course in shorthand), followed by Sweden (English course) and USA (safety in mining). In educational circles it was thought that the distant and open learning are one of the most interesting events of the day

The goal a correspondence education is to create system of education where learning is a learning process geared towards the user. The user selects a place and time for effective learning. Independently working on material from the course (reading, writing, making experiments, looking at the audio or video material). However, interactive work with a tutor on tasks and sometimes with other users via correspondence learning. Given the advantages offered by distance learning:

- Division of labor (author of the course and teachers may not be the same person),
- Fast expansion rate,
- Work with a large number of users
- Distance learning has provided the funds needed to create high-quality educational materials.

During the nineteenth century, distance education has become recognized in the U.S. and Europe. Along with the development of audio and computer communications, comes to improving the process of learning via correspondence. The first such attempt was the "Wisconsin´s School of the Air", 1920 - in those years.

Establishment of Open University (Open University) in Britain around 1970 and the introduction of new media at Wisconsin University, begins to distance learning using technology to increase quality and efficiency of distance learning.

In mid-1980 the term distance education is formed in the United States. The first forms of distance learning via the remote classroom, where the instructor at the center, because the lectures are held in one classroom, to students who are in more classrooms. Communications network that when used can be simple or complex, and is used:

- Audio teleconferencing,
- Audio Teleconferencing using other networks for the transmission of graphical data,
- Video conferencing with a separate audio lines for questions,
- Video conferencing with multiple users in different locations.

Distance learning has experienced great development abroad since the beginning of 1980 years. Many theorists have attempted to define and to better explain the essence of distance learning.

"*Distance learning refers to those forms of organized learning that is based on the physical separation of users and those involved in the organization of their learning. This separation can be applied to the whole process of learning or just to specific parts or elements. Both types of "face to face" or private study may be involved, but their function will be additional fees or a predominantly distanoj interaction.*" [1]

"*Distant education focused on some form of interaction or dialogue between the instructor and the learner and that the technical media need to bridge this communication. This is the way to expanding access to education for those who would otherwise be excluded from the educational experience.*" [2]

"*Distant education is a relationship of dialogue, structure and autonomy, requiring technical media of transmission of this communication. It is a subset of all educational programs, karakterizovanih great structure, low dialogue and greater transmission distance.*" [3]

II. SYSTEMS OF TRANSFER INFORMATION IN DISTANCE LEARNING

A. *Printed material in distance learning*

Printed material is the basis of distance learning and the basis from which to develop all other systems for the delivery of materials. The first courses were at a distance were correspondence courses, where the printed materials sent via regular mail to users and instructors who are returning this material to verify. The difficulties that have occurred in correspondence teaching is insufficient and ineffective ways of communication between instructors and users.

The development of portable two-way media technologies and offset the limitations of correspondence study. Although the technological development and has become an additional element of the repertoire of tools available to instructors, printed materials continued to be an important element of the distance learning program.

Many institutions for distance education, and today as the main means of transfer of distance education, using printed material. In developing countries as one of the main reasons for this is an expensive use of communication technologies. On the other hand, printed guides to learning are an important component of electronic distance education. Guide to learning can encourage users to read or listen to various kinds of lectures, presentations, and compares them to criticize and thus comes to your own conclusion. At the same time can integrate different media.

Printed material can be in different formats in which they delivered:

- Textbook - are the primary and main source of content for the majority of part time courses, as well as in traditional teaching.
- Manuals for learning - the instructors are usually in the manuals to learn the essential elements and state guidelines, which were presented during the course and through the use of other media, to be strengthened and emphasized.
- Workbook - are used to enable interactive mode connected to the content of the course.
- Brief curriculum - provides goals and guidelines of the course, plays the expected results, the job description, written materials related to workloads and so on.,
- Case studies - if they are written in an imaginative, very effective instructional tools, and present the basic contents of the course.

Like any other technology or teaching tool that is used in the educational process, and printed materials have their advantages and disadvantages. Main advantages of printed materials are spontatnost, instructions transparency, accessibility, ease of use.

- easy viewing and reference,
- effective price
- easier to correct and re-view,
- time-efficient.

The main disadvantages of printed materials are limited view of reality, passivity and self-management, support and interaction, depending on reading skills.

B. Computer in distance learning

In recent years, teachers and proffesor have witnessed rapid development of computer networks, a dramatic improvement in the development of the power of personal computers and the advancement of technologies for data storage. These developments have made the computers are a dynamic force in distance learning, providing a new and interactive ways of overcoming time and distance in order to educate users.

Computer applications used in distance learning can be classified into four broad categories:

- Computer Assisted Instruction (CAI) – computer is used as the only training machine to present special lessons to achieve specific, but limited educational goals.
- Computer Managed Instruction (CMI) – used computer tapping, storage and the ability to correct, in order to organize instruction and track users recording and promotion.
- Computer Mediated Communication (CMC) – describes computer applications that facilitate communication. For example, electronic mail, computer conferencing and electronic reporting table.
- Computer – Based Multimedia (CBM) – goal of these systems is to integrate different sound, video and computer technology in an easily accessible system of data transmission.

Users of computers in distance learning can be used in three forms namely the three types of on - line services, such as:

- E-mail - the message is sent through the system to a mailbox on the main computer and stay there until the recipient has not read it. Because the messages are not always connected, provide a limited form of communication.
- computer conversation - support group communication among many users, the messages are linked in chains of communication and storage on the main computer as the user fails to connect and read and reply to messages.
- on - line databases - can be found on the main computer or other computers, such as public or private databases, but users then have to gain access.

The advantages offered by the use of computers in distance learning are:

- can facilitate their own pace of learning
- these are multimedia tools - with integrated graphics, print, audio and video capabilities, can effectively link various technologies.

- are interactive - involving different software packages that are extremely flexible and maximize control of learning.
- rapidly evolving - Innovation is constantly emerging, while the price drops.
- increase access to - local, regional and national networks link resources and individuals wherever they are.

Limitations of computers in distance learning are:

- Computer networks are costly to develop - and still is expensive to develop instructional network and acquire software that will run them.
- Technology is rapidly changing - instructors constantly changing gear in an effort to keep pace with the latest technical local journalists.
- Computer illiteracy is still there - even though the computers are in widespread use since 1960 years, there are many who do not have access to computers and computer networks.
- Users must be highly motivated and skilled with computer operations before they can successfully work in computer-based distance learning.

C. *Internet and distance learning*

Inernet is the largest and strongest network in the world. It covers about 1.3 million computers with Internet addresses used by over 30 million people in more than 50 countries. More universities, schools, companies and private individuals are connected to the Internet, or through non-profit network or subscribing to information services, profitable companies. In this way opens up more opportunities for distance learning instructors to bridge time and distance to reach the user.

Access to the Internet, instructors and users can use:

- Electronic mail (e - mail) - that is used to exchange messages or other information with other users.
- Bulletin board - although there are many bulletin boards, are commonly used Usenet (a collection of thousands of actual thematic groups organized for news) and LISTSERV (includes discussion forums for a variety of topics grouped by topics or areas of specific interest).
- World Wide Web (WWW) - provides Internet users a uniform and convenient way to access a wide range of sources (images, text, data, audio data and video).

Some possibilities of the Internet are:

- Using electronic mail for informal communication with users. Response from the instructor may be accessed much faster than if the message was received via regular mail. Users can read messages, use them when they are convenient and save it for later use.
- Establishing a bulletin board in the classroom for users who often work in isolation without the help and support others.
- Developing a class home page - and can cover information on classes, exercises, literature, information on other links

Although the Internet is very important, so that all users have equal opportunity for success, it is necessary when integrating the Internet at an hour distance learning, provide the following:

- All users must have access to the Internet and WWW - in order to have equal opportunities for computer interaction and feedback.
- Users can meet the challenge of simultaneously learning basic computer skills, new software and appropriate online communication skills.
- Some users may hesitate to participate in computer conferences or sending e-mail, because you are not familiar with appropriate protocols.
- Using e - mail can help instructors to provide much faster response than sending feedback by post or telephone. Quick response generally increases users motivation and its impact.

III. RESEARCH

Technological changes in modern society, technology and science affect the system of education in his rise to changes in the school must be able to respond to any changes which impose environment. This means that schools must keep pace with society and its students to provide an efficient and economical way to acquire the necessary teaching facilities and implement educational goals. In the system's performance depends on the degree DL adoption of the content material. Successful adoption of instructional content envious of the material from which to learn its form and manner in which it is delivered and personal interests of students. Form and submission materials will be adapted to the needs of students. The aim of this paper is to explore the forms and methods of delivery of materials by the respondents are more favorable for DL. The importance of research is that the results of research show current attitudes of respondents with the positive and negative factors related to the teaching material and its adoption. Research results will serve as guidelines in the implementation of the planned project DL.

IV. Matherial and Method

Through the research we use the survey method using questionnaire techniques. For the study used a questionnaire designed for this research that explores the attitudes of respondents related to the teaching material and its adoption. The questionnaire contains questions were grouped into 3 categories. The questionnaire consists of questions where the answers gave as a Likert scale, where respondents circling one of the alternatives with the degree of acceptance. Answers have values: 1 – disagree, 2 – partially disagree, 3 – do not know, 4 – partly agree, 5 – disagree and 0 – no response. Sample was random and included about 250 respondents students of Technical Faculty “Mihajlo Pupin” in Zrenjanin.

V. Results of Research

The research results show the attitudes of respondents and their ranking of these statements, and will be presented in the text that follows. The views of respondents to the form in which the material of the content to be presented are as follows: in the opinion of respondents the most appropriate to view the content of teaching materials PowerPoint presentations, followed by educational computer software (ECD), and materials in the doc and pdf form, and the lowest quoted printed material.

The views of all respondents about what is it that makes the material interesting and motivating them to work are shown in Figure 1. It is obvious that the respondents most important aesthetic properties of materials (design, quality of content, lessons, equipment, size / volume of material) for the declared 46.8% of respondents, followed by the characteristics of personal needs (opportunities to apply knowledge, personal interests, development of personality traits, abilities and skills) from 39.6% at the end of teaching characteristics (the adjustment of programs, clear and defined objectives, the ability of differentiation, interaction, student activities, evaluation), with only 13.6%.

Aesthetic characteristics of the material the subjects were ranked as follows: first by the importance of the quality of the content of lessons, the second design, the third size / volume of material and the fourth means used in the material.

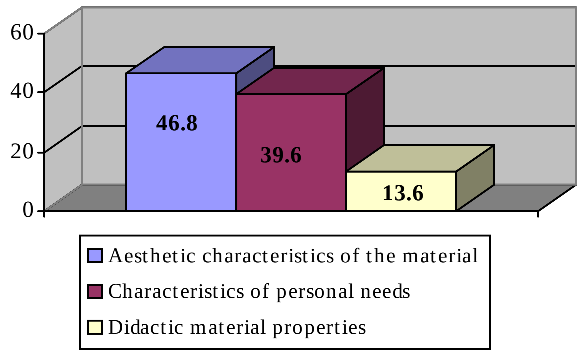

Figure 1. Characteristics that make the material interesting

Personal characteristics of respondents rated the need as follows: first of all the possible applications of knowledge, the other personal interests, and the third the development of personality traits, abilities and skills.

Didactic material characteristics respondents ranked as follows: in the first place is clearly defined tasks, the second interaction, followed by student activity, the fourth in the evaluation, the fifth adaptation of a program, and the sixth option differentiation.

Opinion of respondents regarding the method of delivering teaching material that is accessing the content is as follows: best way to approach the material through WBT 43% is considered, followed by CBT with 37.6%, access to material that is on a CD or DVD in 12.8%, other 6.6%.

VI. Discusion

Based on these results we can say that the opinion of the most appropriate teaching materials to display the contents of the PowerPoint presentation, followed by ECD. Given that the purpose of ECD is education and offers more features than the PPT presentation, we can conclude that respondents want less or no ability or did not use quality ECD.

Characteristics that make the material interesting and very vital for strengthening the motivation to work, according to respondents in the first place, the aesthetic. These characteristics respondents attach the most attention on them so that should be taken into account when developing new materials. That does not mean that teaching characteristics that are the subjects in the third place are not important, but are not fully expressed and accepted in practice.

Interestingly, the possibility of differentiation of material only in sixth place, and she is the one that allows different paths and educational opportunities that allow individualization.

Didactic characteristics need better design, display and introduce students to them because it would greatly reflect on their learning and success. Access to the material through the WBT is the opinion of the best and it certainly should be used for most of the classes and commitments.

The presented results show a need to give more attention to this problem, examine the details of its individual segments and systematic approach to solving it. Students should be informed, motivated and trained to be more easily accepted these components and distance learning.

When selecting instructional content that will be presented via distance learning, there are some requirements that must be met before implementation approaches.

Technical conditions - required to know in advance which group of users is dedicated to online educational resource. Are those users who will access from school, work or home.

Regardless of the level of technology required for the use of educational materials, future users will be able to meet all the technology and how it used to be able to decide if they allow such a manner proper and full use of planned resources.

Social context - users belong to different social groups, which has its own characteristics in terms of time, attention, understanding, interests, and the effects of educational material has on them.

Designing instructional events - presented material must meet certain requirements, such as gaining attention, creating interest and expectations in the direction will go on display materials, connections to prior knowledge, presentation of new material, adequate feedback from users and application of knowledge in practical and realistic conditions.

Gaining attention - is a very delicate task and the task because of the instructor requires proper application and combination of multimedia elements (text, image, sound, animation, simulation).

Creating the “expectations“ - designing educational resources must be so designed that the user always great interest for future work, further research, learning new concepts and knowledge which are educational goals.

Lecture of new material - as already stated, is to be harmonic combination of multimedia elements.

Feedback - means of communication with customers who respond to the appointment of performance. Feedback is in the form of dialogues and discussions designed to help users and instructors.

Tasks - the task is understood an event or process that provides insight into the user s progress in mastering the educational material.

The practice - new findings are of little value to users if they can this new knowledge to use in practice.

VII. CONCLUSION

The most important power of the individual and society is knowledge, and advancing only one who is constantly learning. Development of the individual is the starting point for development organizations and the society. If the individual has decided to develop and educate via distance learning then he should provide the best conditions for it and adjust the contents of his needs and abilities.

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THE ROLE OF INFORMATION TECHNOLOGIES IN EDUCATION MANAGEMENT

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Abstract - The aim of the education system is to form a personality profile of the knowledge, skills and attributes that are ready to engage in work and development of advanced technological innovations. It is necessary fully realize the quality in management education. Review of current status and characteristics of modern types of leadership, management and control of educational institutions at all levels is the subject of this work. Special emphasis is placed on the display capabilities of modern software in the communication and cooperation between all entities involved in educational system.

I. INTRODUCTION

Nowadays it is considered that the organization of quality education a key factor of economic development, where human resources are significant in comparison with the other. It became necessary to continuously acquire new knowledge and skills to maintain current positions or create new professional opportunities for every individual. Educational institutions are therefore needed in the education of managers, who are capable in their organizations create a creative atmosphere of active learning.

Education management is an area that involves scientific, theoretical and practical knowledges. Education management can be defined as "the coordination of human, physical and financial resources in the sector of education to achieve the goals set state, local and school educational policy, law system and the concepts and projections of educational development" (Staničić, 2008). It includes management in all educational and training process, to educational institutions, human resource in educational institutions, school development, and organization of work processes in the school.

Management is present in almost all fields of work (non-profit, non-productive), and the last 20 years in education. In this way is attempted to align the appropriate resources to achieve the goals of education, because school is an educational institution which has its own structure and dynamic elements (role, goal, tasks, people, resources, processes, technology, interconnection).

II. CONTEMPORARY MANAGERS IN EDUCATION

Today the roles of principals have changed and they need to be leaders and managers, and they are also willing to accept it, examine and promote change. Traditional, largely passive role of school principals was replaced by an active, leadership positions (managers). Principals not only care about the upbringing and education process, but also how to finance school and marketing, cooperation with the local community, etc.

To be successful in all these areas, the manager should have the appropriate competence. As an important element of competence it can be distinguished personality traits which is in correlation with managers in education. Results of research in our country indicate that in our schools mostly traditional type of management exists. The majority of principals are not equipped adequately which are not respond to any changes in the environment, or to encourage them, a very small number of school principals showing leadership skills such as initiative and creativity. This finding confirms the fact that principals have the most problems in the area of financial management school which indicates a lack of managerial competencies related with successful management of their finances and those areas of life and work of the school who are not directly related to education (individual school projects, collaboration with local community). There is the possibility of cooperation between schools on joint projects at the country level, but in European terms. The school must enter the market and fight for their service users. If you have a better performance, more efficient programs, better educational outcomes, you have the greater the chances of achieving financial aid [2].

Bearing in mind the weakness of Serbian educational management, in addition to existing educational and training programs directors it should be establish standards of competence of managers in the any form of teaching. Standards are an inevitable path which is expected to give greater efficiency principals. They define the content and direction of their professional development. Not only are the standards for determining what is the principal should know already and what are desirable personality traits for a successful managerial job in education.

Personality traits such as thinking and sensitivity are important for successful implementation in the areas of extracurricular activities, students' achievement and student satisfaction with school. All these facts should be taken into account when developing standards. Also, research should be attempt to ascertain the facts in education.

Future researchers will need to provide a stronger institutional support and greater financial resources to overcome problems unclear criteria of school success. Bearing in mind the pace of social changes, job in education will be more complex. Education reveals the ways that effective management in education [2].

Today's challenges in education management include the following:

- redefined the character and mission of schools (general education of the development function)
- new role of the state school management (decentralization)
- a new knowledge application management in educational institutions.
- In addition, one should pay attention to facts that go against management in education, namely:
- management is not in accordance with the values and contents of education,
- hierarchical organization and vertical accountability arouses mistrust, frustration and inequality in employment education and training,
- the content of educational/training organizations differ from profit-oriented,
- the idea of the market and damaging the side of educating,
- managers exploit employees and immoral use power to accomplish the goals of the organization [1].

III. MANAGEMENT IN EDUCATIONAL INSTITUTIONS

Contemporary society is characterized by very intense social changes, which strongly affect the role, purpose and goals of education. The development of information and communication technology (ICT) imposes new requirements and the role of education in terms of that knowledge and science are the driving force behind all changes. Creativity and knowledge of people is increasingly becoming a major resource development and survival in the harsh world market.

To adapt to new circumstances, developed countries have implemented major changes in their educational system. In developing countries, changes have not yet implemented. Great care professionals dedicated to changing the concept of classical education system towards a flexible, who will be able to respond to the needs of contemporary society. The best method for improving efficiency in education is a competition among educational institutions, which means not only competition for educational, scientific or technical prestige, but also a struggle for survival.

What most educational institutions leading to a situation that turned the market is a decrease in student enrollment (students), grants and other sources of income, with a simultaneous increase in various costs.

Many institutions were faced with the changing needs of those who are educated and expectations of society, increased competition for funds and soliciting for funding. On the other hand, specifies the requirements for improving quality and efficiency of teaching. Opening the market could contribute to improving many aspects of the activity of educational institutions such as more efficient internal and external communication, improving the process of delivery of educational services, issues of funding and determining the amount of tuition (if it is paid), teaching quality, customer satisfaction, etc [3].

The current system of financing schools, especially secondary is hardly a sustainable and educational institutions need to find other ways, by budget, in order to provide the necessary money to survive in the fierce competition especially the new private schools. Competition and profit must be re-introduced as the driving criteria in education. The lecturers and administrative staff will need to meet market demands, or demand, and not to use the privileges of the opposite direction from what the market requires.

The fact is that today education in different countries has become one of the most dynamic sectors, large companies develop their business school is becoming more and more international character. In the U.S., for example, studing approximately six hundred thousand foreign students a year, most of them from Japan, China, Korea, that most developed countries. That education has become a lucrative business, example of Great Britain, where the revenues from the education of foreign students measure billions of pounds a year. This is not work at the expense of quality. In these countries are located the most prestigious world universities. When they're done, you open the door to companies around the world. [3].

So, the schools and colleges are also must behave as well as other economic market objects. Successful managers will be increasingly popular and sought in these institutions.

In business that it is not enough just to be economically literate, but it is necessary to master and some other skills and knowledge in order to realize maximum profits. Therefore, there is no need to distinguish between the functions which performed by the rector, faculty dean or principal of elementary school, and the role of principal in a company which is performed.

Managers are required in all organizations and it is necessary to understand that educational institutions can not be an exception in this regard. The question remains of how the lead institution, to cooperate with people and build the positive kind of atmosphere in the organization. What is your end result in terms of performance and quality and whether you have taken responsibility for the fate of the organization you run. You might have forgotten that on the market personnel should be always present.

Changes in national economies towards knowledge-based society (*knowledge based society*), affect the perception in education management. First of all, human resources are become more important than other resources. This imposes requirements in terms of that kind of education and training employees will receive, as well as the type of elementary educations which is offer children and youth. Secondly, this happens in interaction and simultaneously with the growing needs directed towards the effective and efficient management, which imposes such requirements. Finally, leaders who act in the education and professional education shall be operating in the international context.

Given the specificity of education, managers in education brings another difficult task: to create a balance between the needs and desires on the one hand, and preserving the reputation of academic and other educational goals and other commitments. There is no doubt that should lead to increased quality of education entrepreneurs. Competition will force the school continuously improve its programs to the satisfaction of parents, pupils and teachers, because if they succeed will get satisfaction for their work [3].

There is another dimension to this problem. The market is not limited for the size of a country. Quality schools will attract students from other countries. Quality of education can become an export product, it is equally important as when a product is exported. Current literature defines management as a process of coordination and observation of work processes and work processes to others so that their activities are done effectively and without flaws.

The four basic functions of school management (Figure 1) are:
1. Planning;
2. Organizations;
3. Managing (coordinating);
4. Control.

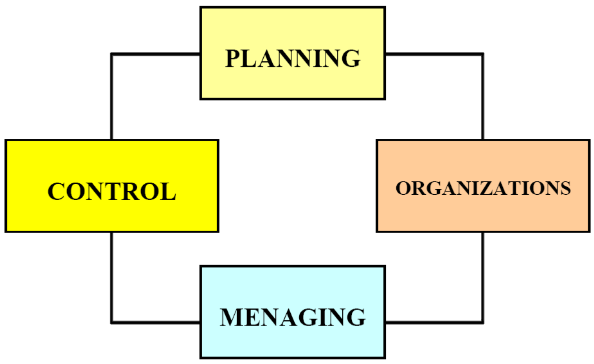

Figure 1. Management functions

Planning is a process that includes defining goals, establishing strategies to achieve these goals and developing plans for integration and coordination activities.

Organizing the functions of management, which includes the determination that the task should be done, who will do it, so the task will be grouped, like whom and where matches will take decisions.

Leadership is a management function, which involves motivating subordinates, encouraging individuals and teams to work, identifying the most effective communication channels and work to monitor employee behavior.

The function of monitoring is the observation of actual performance, comparing with the current standards and taking action if it is necessary [7].

All these functions can perform the role:

- communicator;
- negotiator;
- motivator;
- informant;
- coordinator.

Thus, the contemporary leaders in education need to be managers-leaders [4].

Other theories includes the following items: leadership, governance and management [1]. This is achieved by harmonizing the potential for achieving the goals of school systems and schools through the office, authority, legislation and autonomy (Figure 2).

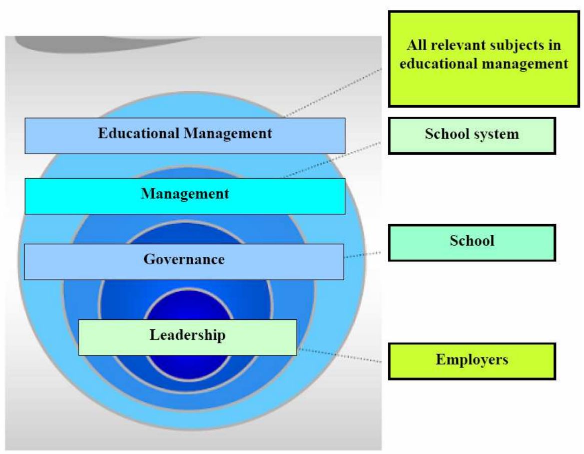

Figure 2. The structure of educational management

IV. INFORMATION TECHNOLOGY IN SCHOOLS

Training Director and mastering information technologies are of particular importance. The share of these technologies is becoming increasingly at all levels of education. The principal must possess a set of knowledge and skills that will enable it to accelerate and improve communication with the environment. New technologies can not be viewed separately when considering the systemic improvement of management in education.

Manager must always be open to acceptance of innovation and achieve progress in their work. The process of acceptance of innovations by teachers runs through five phases (D. Bjekić, 2008): 1. stage of cognition; 2. stage of persuasion; 3. stage of decision; 4. stage of implementation; 5. stage of acceptance. In working with managers revealed a complete analogy in the process of acceptance of innovation in educational institutions with the above stages, especially in the domain of acceptance of innovations in the domain of information technology [5].

The development of modern technologies has led to the development of new communication tools for educational institutions. Exchange of information in this way can be achieved between almost all participants in education system. *Internet* and *web environment* is increasingly becoming a regular channel of communications in schools. School web site presentation is now an essential marketing tool, not only in terms of communication with the school but also in terms of communication with students, parents and also other clients. In addition, modern financial and legal operations of the school, which also is in the field of management, are almost inconceivable without adequate software solutions. Different processing software, like software for creating schedules, statistical software packages, saving time and improving the organizational aspect of school. Social networks also represent a knowledge base that can be used in the management of schools. The modern approach to school development, requires the development of appropriate software to effectively monitor and control the process. In Germany, Denmark, Ireland and the Benelux countries in the management of schools applied to specific software for process management, which allows simultaneous monitoring and coordination of different processes, which enables optimization of the functioning of schools (Rottluff, 2008) [5].

Today is already widely used electronic diary as a solution for achieving direct insight of parents in students' achievement. The quality of educational work is also continuously improved through the use of various software packages and virtual solutions in the learning process (economy, law and administration).

Ministry of Education of the Republic of Serbia has made a special effort to systematically solve the IT process of keeping track of school, through the introduction of the Electronic Information System (EIS). EIS is to some extent overlap with other software solutions that schools develop and use, but a systematic basis for managing the school, which contains information on students, parents, teachers and other school employees. However, the practice work has shown that the use of this system is not fully observed, despite clear instructions from the Ministry of Education [5].

Currently Microsoft Live@edu program, which provides schools and academic institutions advanced services and tools for communication and cooperation, is an important and powerful resource. A wide range of services on the network and applications can be installed on computers and then be available to pupils or students. Live@Edu contains the services and applications to communicate, work together over the documents, data sharing, convening meetings, storage files, contacts etc [6].

The main advantages of Live@edu services for educational institutions are the following: availability, access anytime from anywhere and in multiple ways (through the internet network of local applications, from mobile phone). All services are accessible using just one user name and password, the data is safely stored in a remote location, in professional data centers, no maintenance costs, constant upgrading and additions to services, reduce operating costs-all described services are free.

Microsoft Live@Edu program includes the following services that are accessed via a web browser:

1. SkyDrive
2. Outlook Live
3. Calendar
4. Photos
5. Sync

On the other hand, application requires the installation of software on your computer, such as:

- Mail
- Photo Gallery
- Movie Maker
- Messenger
- Toolbar
- Family Safety
- Writer (Figure 3).

Live@Edu program makes Microsoft Live Essentials 2011 package, which is free and provides additional services [6].

Figure 3. Microsoft Live @ Edu

V. CONCLUSION

Education reform and the introduction of innovations in educational work, for those who manage educational institutions is a big responsibility. Profile characterized by a good manager managerial and organizational skills, ready to initiate the introduction of pedagogical innovation in teaching. Modern managers in educational institutions, who will respond and adapt to numerous challenges and dynamics, must optimize the communication and cooperation among all the general factors (both within and outside the institution). To support school development processes in all scope of activities modern information-communication technologies and special programs they offer are very helpful.

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A MODEL OF PROGRAMMED INSTRUCTIONS IN TEACHING SERBIAN GRAMMAR

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Abstract - This paper presents programmed sequences created for the topic of Serbian grammar and morphology for computer assisted learning and testing students' knowledge. As the exact field of grammar, morphology is by large suitable for the application of teaching system of programmed instructions. Teaching procedures have been presented by which this material was programmed in mastering the selected elements of the contents from the morphology of nouns.

I. Introduction

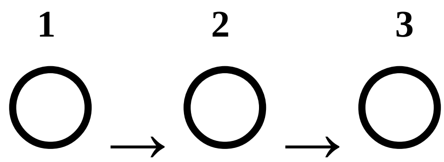
The idea of programmed instruction was introduced by B. F. Skinner in 1954 which is reflected in the need to increase the *efficiency of management* of the educational process and its construction in full compliance with *psychological knowledge*. (Skinner 1954: 24) Programmed instruction would be useful in our schools, too, which would help respect the principles of individualisation and differentiation of teaching, since such teaching plans are conceived through the steps of the program and additional tasks, according to the individual characteristics of students. Teachers should be better trained to understand and monitor individual student's development and to be more sensitive to individual problems or needs of their students in intellectual, emotional and social sphere. Individualisation and differentiation are aspects of the teaching process which permanently increase the efficiency of learning and management of the learning process, which is made easier, of course, with computer aid. To maximise the efficiency of the overall management of the teaching process, which is exactly what the ground of Skinner's programmed instruction are, teachers need to work on students' motivation by coming up with motivational elements for each step of the program, and interesting learning or systematisation of knowledge of Serbian language grammar.

The structure of language morphology is quite suitable for the application of teaching system of programmed instructing when teaching Serbian language and grammar. Logical thematic areas of the morphological system in Serbian have clearly organised structure which can be segmented into smaller units, parts, or "knowledge particles", which is a prerequisite for the development of programmed material. Programmed instruction requires that the students assimilate each part of before continuing their work according to the program. This is to ensure that a student approaches to learning only the matter for which he or she has already been prepared. Such working methods promote a complete success with mixed ability students.

Such programmed teaching provides the best opportunities for individualisation of learning, students learn on their own, each one by their own pace and they evaluate their results set as the educational objectives of the program.[1]

II. Linear programming model

By solving the linear program students progress equally, regardless of the quality of answers given in the tasks of the created program materials. This progress could be shown in the graph below:



Picture 1: Linear Program graph

[1] Such claims should be verified by the results of the practical application of different programmed teaching materials and learning units, which is the goal of this paper.

Firstly, students launch the icon of the learning software, then they read the first step of the program, get familiar with it, and solve the first task, and then, after having checked the accuracy of their responses move on to the second step of the program and the second task. After that, they move on linearly to the third and subsequent steps, no matter how they solved the individual tasks within them. It is typical for such articles to be short. Sequences are created so that students acquire knowledge gradually. Most often the students have to set and write the solution of the set tasks on their own. If a question is answered incorrectly, they immediately notice this and correct it, because the program does not allow them to continue learning if the task has not been solved correctly. The essence of linear programming is that the text of each step is composed in such a way that students are lead to answer correctly. The answer, with each step given in the program, is hidden for so long until students make up their own solution. The independent process of acquiring new knowledge allows students to use textbook or other secondary literature freely such as grammar books, dictionaries, workbooks, language exercise books and so on. When students do the task on their own, they can then compare their answers with those given in the program. Knowledge is acquired slowly and safely in linear programming. In each article, students progress only one step at a time. The purpose of linear programming is to bring students to the desired goal of such a gradual progression, with a minimum of errors and with as many examples and different problem situations as possible. Since all students need to follow the same path in such programs, i.e., to process and solve the same steps, the difference between the students will be only in the rate of learning. Less able students will take longer to learn, and the more able ones will do it more quickly, although it is expected that all of them master the program successfully and acquire the grammatical knowledge of Serbian.

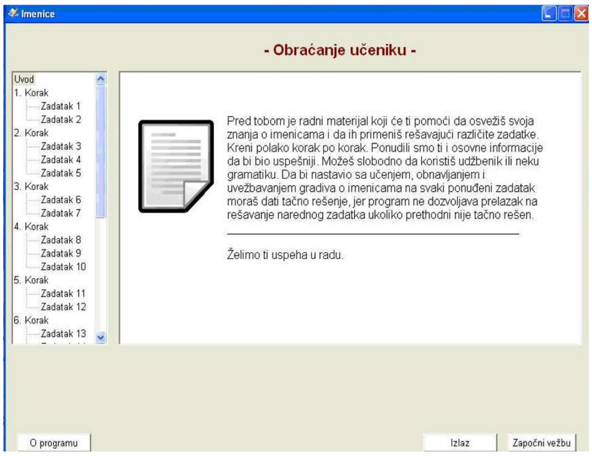
III. EXAMPLE OF A LINEAR MODEL OF PROGRAM[2]

Linearly programmed material is created for learning nouns in Serbian. The program is designed for self study for 8th graders and consists of 9 steps and the same amount of information, with a total of 26 tasks prepared. Students adopt the curriculum in the same way, having in mind that at any moment they can have a look at the solution of the task in a Word document if they run into some difficulties in dealing with and the acquiring of the teaching contents of the nouns in Serbian.

The text in the initial window of the program *Obraćanje učeniku* is an incentive for students' work, and is a natural motivation for learning, practicing and solving the tasks about nouns. A brief text provides general information and instructs students how to solve the tasks that will be offered, and how to update their knowledge of this language topic. Textbooks are allowed as a means of help, as well as a grammar school book or handbooks. (Picture 2)

Step 1 - task 1: The first task gives the initial text from which all the nouns need to be extracted. There are twenty selected noun and the task is quite extensive and takes a lot of time, but also precision. Therefore, the amount of time to create this type of exercise should be taken into account.

Notes: Most of the language models that are from literary articles in programmed learning material about the nouns are marked with a link.[3] By clicking on the link students can learn more about the biographies of the writer whose text is offered or read more meaningful segment or the piece of work as a whole (if it is short). Placing them in context provides a better understanding of the initial text and a more functional understanding of language problems in it. It is important to stress once more



Picture 2. Obraćanje učeniku (the beginning of the program)

[2] In collaboration with Damir Sel, a programmer and a senior at the Faculty of Technical Science "Mihajlo Pupin" from Zrenjanin, the programmed material for learning nouns in Serbian has been made in the development environment of Visual Studio 6 and Visual Basic 6. The program can be downloaded at:
http://www.absact.com/apps/imenice_ceo.zip

[3] Some authors mention a drawback of programmed instruction in that the topics are not associated with others field and that useful generalisations are not used, but it is this visual marking of words, sentences or text sections that enable a good connection with the context or other areas. Therefore, it is advisable to apply this in programmed instructions, because today the majority of literary texts can be read on the Internet.

that the steps and tasks in them have a lock, meaning that the program does not allow switching to the next task if the previous one has not been solved correctly. Correct answers are given, as mentioned before, in a separate file.

Step 1 - task 2: The following is a simple fill in task. Students should highlight the basic grammatical noun categories (gender, number and case).

Step 2 - task 3: The second step consists in the fact that students should repeat the declension of nouns. Certain nouns should be declined and case forms should be put in the table (*krompir*, *telo*). The program is designed for 8th grade primary school students and though this task might be easy for this age, it is very important for students to answer accurately to this question, because the minimum graphemic error makes the task incorrect and does not allow students to proceed to the next task. By practicing the case system and the declension of the nouns given, i.e., solving this problem, students realise how much precision is required because if they make a mistake in a single form, they will not be able to move on to the next step.

Step 2 - tasks 4 and 5: In this section there are tasks meant to refresh students' knowledge of the categories of gender and animate/inanimate nouns.

Step 3 - task 6: There is an initial text where students need to extract all proper nouns that indicate geographical place names. Testing the program, we realised that the students skim through the text, and hence they make mistakes in this task by extracting *Isaković* which is a proper noun but not a geographical concept. In this task, the link M. Crnjanski "Seobe" leads to *Wikipedia - the free encyclopaedia*, where they can read more about the biography of the writer and most of the excerpt that was used in the task.

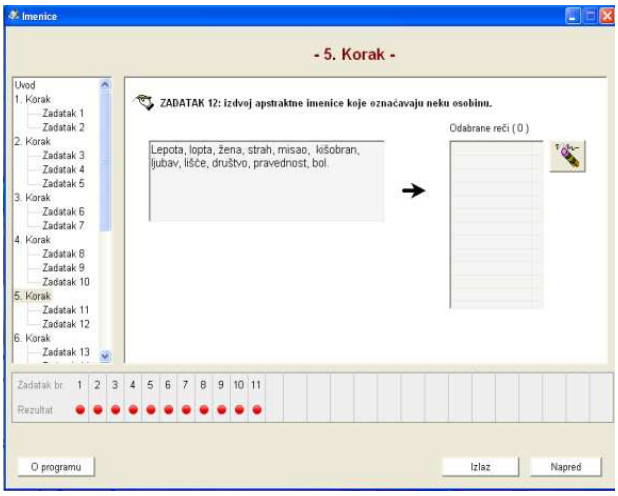
Step 3 - task 7: Another fill in task. It reminds students of the names of the solar system planets, which are, of course, capitalised, and are referred to in the grammar as proper nouns. In order to gain wider knowledge, it is desirable to read newspapers about natural or social sciences and incorporate them into the curriculum. When solving this task, each student that names *Pluton* as a planet will get the information that this is incorrect, as it has been determined recently and it is now an official and scientific decision that *Pluton* is no longer a planet.

Step 4 - task 8: This task requires to think of a common noun based on the descriptions and explanations. For example, a brief description of common noun *avion* is given which needs to be recognised and written in the space provided based on the meaning highlighted in the form of the following concrete sentences: *Svaki leti i prevozi putnike i teret. Može da bude borbeni, vojni. Pokreće ga motor (ili više motora).*

Step 4 - tasks 9 and 10: Students need to find common nouns in Dučić's verses. There is a kind of catch in task 10. Students are required to extract all the common nouns that signify beings and therefore the following has been offered: *podlac*, *pijanica*, *kockar*, *pesnik*, *čovek*, *špijun* that need to be identified and and underlined. The following is linked: J. Dučić "Podne" and R. Domanović "Mrtvo more" as the possibility to connect linguistic model with links that contain details associated with the linked authors and their literary achievements.

Step 5 - task 11: In this step, students refresh their knowledge about the types of abstract nouns and their task is to identify them and extract them from the verses of Zmaj. A link to *Wikipedia - the free encyclopedia* is offered about J. Jovanović Zmaj's "Đulići".

Step 5 - task 12: Another task about abstract nouns is concretised. Abstract nouns should be extracted from the list given, as is shown in Picture



Picture 3: Step 5, task 12 – program for learning nouns in Serbian

Step 6 - tasks 13 and 14: Since we have noticed that students tend to adopt abstract noun with difficulty, we have created these two tasks so that students know what they all could mean, and tell the difference between an idea, emotion or mood.

Step 6 - tasks 15 and 16: Students should name the abstract nouns themselves based on defining their meaning, i.e., by understanding the sentence: *Psihičko stanje u koje zapadne čovek kada se nekoga ili nečega uplaši* (here students need to determined the abstract noun *strah*).

Step 7 - task 17: This step represents a group of verbal nouns. Students need to recognise and extract all the verbal nouns in the folk song. Testing the program with students, we have noticed that they make a mistake by leaving out the verbal noun from the song title.

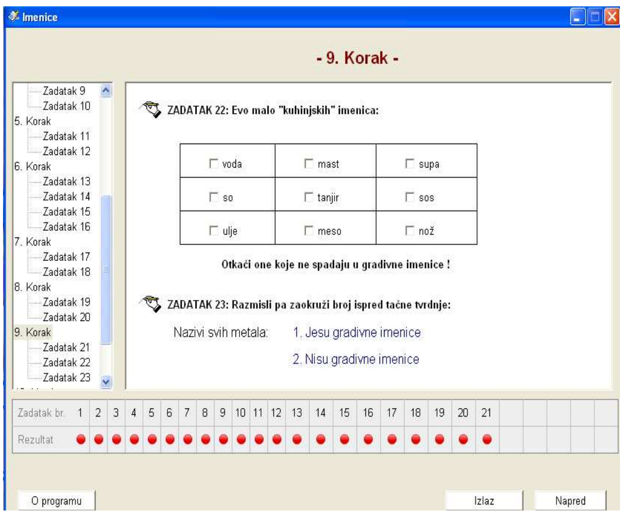
Step 7 - task 18: The verbs given must be turned into gerunds.

Step 8 - task 19: This stage of the program expects from the students to revise the knowledge of collective nouns. First the nouns need to be identified and extracted from the two offered series of sentences which contain a tiny catch, because students need to determine the sequence in which there is a collective noun in each sentence.

Step 8 - task 20: Students make up their own collective nouns out of the examples given.

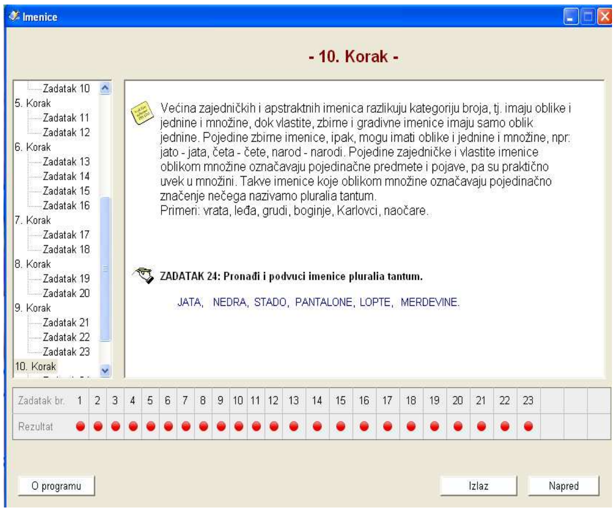
Step 9 - task 21: Students revise types of mass nouns. They solve specific task that consists of describing the preparation of concrete. Materials that have the meaning of mass nouns are used for its making (šljunak, pesak, cement, voda...).

Step 9 - tasks 22 and 23: The following tasks aim at revising mass nouns more. In task 22, students need to mark which of the "kitchen nouns" offered are not mass nouns, and in task 23 task they need to think over and answer to the question whether the names of all the metals are mass nouns. (Picture 4)



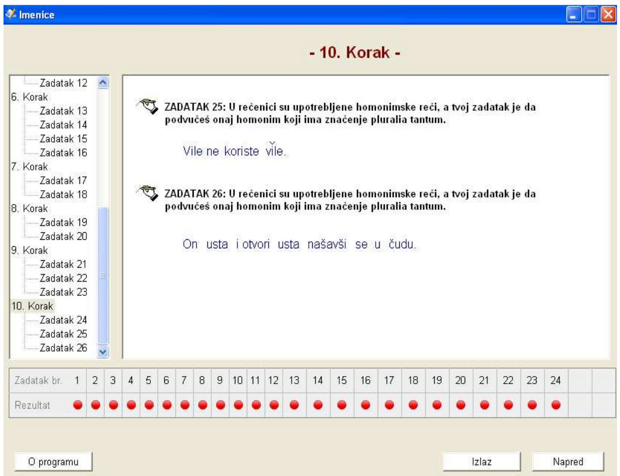
Picture 4: step 9 of the instruction program for learning nouns in Serbian

Step 10 - task 24: The aim of this step is the revise the grammatical category of number, that is, singular and plural nouns and to review *pluralia tantum* nouns which are by form plural but represent individual meaning of the word. (Picture 5)



Picture 5: step 10, task 24 of the instruction program for learning nouns in Serbian

Step 10 - tasks 25 and 26: The following tasks need a little bit more thinking. Students need to recognise homonyms in the sentences, and then to single out among them the one that has the meaning *pluralia tantum*. In the first example, students need to know how to accentuated words properly when reading sentences in order to solve the task correctly. (Picture 6)



Picture 6: step 10, tasks 25 and 26 of the instruction program for learning nouns in Serbian

Assessment of results: This software allows a possibility to assess and evaluate results for each candidate/students. At the end, each program user get feedback that he or she has successfully solved all the tasks and the time that was spent for each task individually is shown, as well as the amount of time needed for learning, practicing, and revising the basic knowledge of nouns in Serbian. (Picture 7)

Picture 7: An example of assessing and evaluating the results of a student's learning nouns in Serbian

IV. Conclusion

This paper seeks to bring up-to-date the programmed instruction in Serbian language and grammar teaching and to display a linear programming model that is less demanding for the teacher/programmer. In the teaching methods literature there is not enough practical work with different software models which could, as we have seen, develop many positive educational effects in students.

With programmed instructions, students works independently, but this does not mean that they are entirely left on their own, i.e., that no one manages the process of their learning. No educational system is universal. Programmed instructions are teaching method system that should ensure the acquisition of knowledge and better understanding among students. But it is not *the only one* and should be combined with other teaching systems. Programmed instruction is a manual by which the teacher manages the teaching process and represents the future of teaching practice which we all should strive towards in the presents, all for the increase of efficiency and realising the tasks of contemporary education of students.

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PERMANENT EDUCATION OF TEACHERS

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Abstract - Rapid and dynamic development of society imposes a constant need for improvement of all employees in educational institutions, as well as open requirement for continuous improvement of the quality of teaching process through the introduction of innovations and through professional development of teachers. The so-called „permanent or lifelong education“ is a long and continuous process that aims at improving professional work of the teaching staff. Professional training of teachers is an inseparable part of permanent education, which encourages the development of innovative knowledge, skills and abilities. In that way, it is contributed to the improvement of the quality of work, increase of motivation and systemic development of evaluation and self-evaluation. To develop such a professional education within educational institutions implies the use of contents and achievements from various professional fields and scientific disciplines, and all of that for the sake of improving the quality of educating the teachers.

I. CONCEPT AND IMPORTANCE OF PERMANENT EDUCATION

Most of us have heard the saying „one learns as long as his lives“ many times. Man has spontaneously acquired his first knowledge. After he realized the significance of the possession of knowledge, skills and habits, which facilitate his life a lot, he has approached learning in a planned and organized way for the sake of greater efficiency and achievement. To speak about organized learning once implied speaking about the education of children and the young. Educational cycle of adults would end in employment or interruption of schooling. Today, to speak about education in general means speaking about the education of children, the young and adults as well. „Permanent education is continuous, it last for the entire lifetime (hence it is also named lifelong education); scientific and technological revolution, accelerated development of economy, frequent changes of the process and means of work, informatization of society, numerous social changes etc. force every man to continuously acquire new knowledge, habits and skills, to complement, expand and change the education that he acquired in

his youth; permanent education is a basis of the new conception of adult education.“ (Potkonjka and associates, 1996: 367) Permanent education is a constituent part of the social development strategy. To speak about the education of adults means to make reference to the views of Robbins Kidd, who claims that manifestations of this education type appear back in the distant history of the slavery India. The Confucius himself also points out the significance and necessity for the people of all ages to be educated throughout their entire lives. Similar attitudes were supported by the thinkers from the Far East (Robbins J.Kidd, 1966:27), while Plato states that education should last „from an early age to the end of life“ (Plato, 1966:96), and Seneca supports the idea „it is never too late for learning“. Johann A. Comenius and his requirement „OMNES-OMNINA-OMNINO“ (J.A.Komenski, 1965:117) or „all the people should be taught everything, using everything“ openly support permanent education. The teachers have acquired the first professional knowledge in the 18th century, at seminars with so-called normal schools. Special credit for the formation of social prestige and pedagogically-methodological profile of teachers in elementary schools belongs to A.H.Franke, J.H.Pestalozzi and A. Diesterweg.

Despite the numerous facts that confirm the necessity of permanent education, it is basically very difficult for a man to change and accept the transformation as essential need of survival. The subject of this paper is the observation of the forms, permanent education of teachers, as well as listing the obstacles in that entire lifelong process. Numerous reforms in education system, the reduction of the volume of materials, appearance of new subjects, modern teaching and scientific means, innovative methods and forms of work, development of social relations and altered position of teachers/lecturers and students (of all ages) in society...require from the teacher to follow modern trends and to improve himself. „Without a

permanent education, contemporary society cannot solve its vital problems, it cannot develop normally.“ (Filipović Dragomir, 1971:12) On the other hand, according to the Study of status and directions of development, carried out by Regional Centre for Continuing Education (2005: 12/14), the term „lifelong education“, which denotes a continuous process of improvement and learning, and which begins when a level of formal education ends and lasts until the end of life or the working life, is synonymous with „wholesome education“, which is implemented from birth until death.

II. Learning in adulthood: self-directed, formal, non-formal and informal education

Today’s andragogical and pedagogical literature identifies 4 components of permanent education: self-directed, formal, non-formal and informal.

FORMAL	INFORMAL
-it is performed in institutionalized forms of education, it is financed by the state, programs are composed by experts, it is characterized by group planning, there is a high degree of mechanic knowledge acquisition- learning formulas, definitions, high level of external control (supervisors, evaluation from the part of the state).	-or so-called „spontaneous education“ or „accidental learning“. It is learned in situations when a student does not intend to learn, the possibility of institutionalized learning is excluded; it implies intentional and unintentional education; it is not limited by place, time; the interaction with others is established. It is oriented to the goal and it is mostly self-initiated. There is no external control.
SELF-DIRECTED	**NON-FORMAL**
-the individual initiates the learning, sets the objectives, diagnoses the needs, considers the available resources, selects the learning strategies so that he could evaluate his own results in the end.	- Learning and training of adults in a conscious and organized way, there is no domination of teachers; one of the main tasks of non-formal education is to reduce the differences in status and earnings between the population in towns and villages, between the educated and the uneducated and between the rich and the poor.

Learning is primarily a continuous process, i.e. a constructive process that applies the reconstruction of personal experience and it should be available to the man in all periods of his life. „The purpose of adult learning is, regardless whether it is manifested as a construction of reconstruction, bringing order and meaning into the world in which the adult person functions (thinks and acts)“ (Kulić – Despotović, 2005:94). During the learning in adult age, the experience that an individual possesses has an exceptional role. If we would try to show the most important characteristics of mentioned components of adult learning in a table, it would look like this:

III. Importance of mobility and constant professional training of teachers – field of professional education of teachers

Professional education of teachers expresses the need of connecting, updating and improving new knowledge with already acquired knowledge at teachers colleges or faculties of pedagogy. Most certainly, the emphasis is on the acquisition of new professional knowledge, i.e. on improvement within teaching profession. It follows that permanent professional training of teachers is significant and that it is one of leading priorities of social interest. Numerous previously primary roles of teachers have changed (lecturer, arbitrator, the one who gives orders etc.), some are completely extinct (the one who gives orders, executor of the punishments, grader etc.), or they are modified (organizer, active participant in development of pedagogical science, assimilator etc.) and there are also some new roles (facilitator, therapist, mediator, carrier of the new non-violent communication etc.) and all of that in accordance with historical movements and needs of contemporary society. In addition to the updated methods and forms of work, it is also necessary to introduce the innovations into the teaching process. All of that conditions a constant mobility of the professional training of teachers. The education that teachers acquire at faculties of pedagogy is often „superficial“ and theoretic. Such a teacher has a serious problem with practical implementation of modern forms of teaching.

On the other hand, the teachers who are graduates of Pedagogical Academies, great experts in content, methods and forms of work of the so-called traditional teaching also have a serious problem in implementation of teaching content of the 21st century. The teacher who has already developed his communication abilities and mastered the skills, who bases his work on open motivation with a desire to expand personal and professional functions is a need of the modern education system. Without such teachers, there is neither the development of school system, nor can the process of self-evaluation be improved. Of course, without a motivated teacher who works on self-improvement, there are no students who will explore and turn to self-learning. If self-evaluation is a procedure through which the school evaluates its work and teaching practice – by evaluating it, it is rather simple to identify the benefit of the same that is The scope and quantity of permanent training of teachers is defined by the Law. The decision on additional training is made by the teacher himself. The only benefit he can encounter is the agreement of his principal regarding the absence and possible financing of his departure to seminar. In the first years of the last school reform, when the issue of „professional/permanent training of teachers“ was accessed with much more enthusiasm, the educations were a part of teachers' trainings for particular programs that were financed by the Ministry of Education („Step by step“, „Neither black nor white“, „Equal chances“ etc.). today, it is mostly theoretically spoken about the significance of professional training of teachers that can be reached by raising the „quality of people“ and professions that are the subjects of improvement. reflected in observing the disadvantages and fields that need to be improved. Due to low earnings, the teachers very often fall into the marginalized group, which certainly affects his attitude towards work and interest for professional training. It is important to observe the other motivation reasons that come from external or internal environment and directly affect the decision of the teacher about whether he will and to what extent he will continue his professional training. The most profitable persons in professional training of teachers are the students.

IV. Professional improvement of teachers within the framework of permanent education

Well-trained teachers are essential in providing good education. On daily basis, they contribute to the development by building and developing children's capacities and encouraging them to learn.

Therefore, it is necessary to develop modern conception of teachers' education, which is in accordance with the general social changes and civilization trends. It is necessary to precisely rank the concept of teacher training as a key condition of innovative processes in educational work.

"Despite the rapid development of technique and technology, teachers remain the key factor in implementation of quality education. Regardless of the extent to which a change is founded in education and theoretically "on the paper" developed, it cannot even touch the practice without teachers who understand and accept that change and who are willing to apply it." (Pešikan, 2002)

Therefore, it is necessary to have legally regulated standards (levels of students' achievements). Some studies clearly confirm that achievements of students are directly and positively connected and conditioned by the quality of teachers (Nelson, according to Villegas-Reimers & Reimers, 2000, pp.4). Thus today, we have a legally regulated "norm" for the teacher, educator and professional associate, who are obliged to have at least 100 program classes (at least 60 from the list of mandatory programs from all fields and 40 from the list of optional programs) through attending the seminars and different educations during five years of work experience. Programs of professional training are prescribed by the Ministry of Education in cooperation with the Institute for the Improvement of Education for each school year. At the beginning of a school year, the school receives a printed Catalogue of programs for professional training of employees in education, which include mandatory and optional programs. The decision on attending the seminars is made by professional sections, Teachers' Council, the principal in consultation with PEPS service or the teacher himself. General goals of seminars that are attended by teachers reflect in helping the teachers to expand their cultural horizons and enrich their professional knowledge; exchange the experiences and make connections with colleagues from other environments, but also the transfer and application of knowledge and experiences after the seminar.

V. Professional burdens of teachers as obstacles of permanent training

There are numerous factors that burden and devastate the professionalism in the work of teachers. Some of them are personal (personal characteristics of teachers, personal attitudes and life style, attitude towards the conflicts and strategy of solving problems) and some of them come from the external world, from a wider social environment. Today, it is openly spoken about professional burdens of teachers, but nothing much is done to reduce them, abolish them completely or at least reduce them to the minimum. The most specific professional burdens of teachers that directly affect their attitude towards permanent education and professional training are the following:

- large number of children in classes, which are different and they need to work according to the same syllabus and in a consistent pace,
- all the responsibility that refers to the child, it is rather aimed at the teacher,
- the existence of extensive and unrealistic requirements of school programs in relation to the mandatory part of knowledge that the children need

- to acquire (as basic level of achievement),
- unrealistic expectations for daily provision of knowledge and motivation, fresh information and good advices, regardless of the situation in which the teacher is encountered,
- teacher is the target of assessments, evaluations, judgments, generalizations and messages from the part of students, colleagues, principals, PEPS service, supervisors etc.
- the teacher is burdened with numerous roles of contemporary society, such as: a fighter for the rights of children, health advisory worker, mediator etc.,
- continuous expectation of new knowledge sources and the individual knowledge of the teacher,
- poor material position of teachers etc.,

For that reason, we can rightly claim that there are numerous difficulties and obstacles to the professional development of teachers. How successful he will be in overcoming them depends on the teacher himself (his personality and nature, habits and skills), as well as the school in which the works, i.e. wider social environment.

VI. CONCLUSION

Today's school system requires a competent teacher, who independently organizes his work by motivating the students to explore, critically judge and adopt new contents. Without a continuing (permanent) professional training, there is no competent teacher. The Law envisages continuous professional training that enables obtaining or retaining the licenses for work. The state and Ministry of Education suggest programs (mandatory or optional) that provide and offer various methodical, pedagogical and didactic and strictly professional topics and contents to the teachers.

With the implementation of various programs and teaching contents into teaching programs, the teachers face the challenges that stimulate them and encourage them for further training.

The greatest benefit of teachers' education have the students themselves because they work according to innovation methods, adopt new strategies (e.g. attitude towards conflicts and conflict situations), become more humane and prepared for segregation with the environment (e.g. working with an inclusive child) etc. there are numerous obstacles and difficulties from the external world that directly affect the teachers' motivation for further professional training. In addition, life style, personal attitudes and experiences greatly influence the attitude of teachers towards professional permanent education.

Without continuous and professional training of teachers there is no future of schools, as well as good staff that will be able to respond to the requirements of contemporary teaching.

Apart from the teacher himself who needs to have a personal stimulation for further educations, an important role in professional development of the teacher has the state, which could adopt a range of incentives, regulations and laws by which it could stimulate free programs of professional training, study tours for the purpose of education and exchange of experiences.

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DEVELOPMENT OF TRAINING PROGRAMS FOR TEACHERS TO WORK IN MOODLE SYSTEM

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Abstract - The development of information and communication technologies and computer systems have affected all areas of human activity. So the school system has undergone great changes, especially as there is less and less traditional form of teaching and learning, and becoming more popular form of distance learning, the teacher serves as coach. The introduction of new ways of learning in the teaching process aims to facilitate the realization of the process and providing opportunities for students to learn and teachers to learn and improve when their time allows, without of the spatial distance, with much lower costs.

The very integration of ICT into the teaching process entails the question of competence of teachers and professors. It is essential that teachers gained after basic education is left on it, but to constantly work on improving their education. The society must prepare a qualified and trained personnel and delivering the breakthrough of new information technologies in the education system.. There are numerous training programs and training so. organized training, who can be of great benefit, which in practice proved to be true and good.

I. INTRODUCTION

New information and communication technology have led to the need for modernization of teaching. The traditional form of teaching is showing its weakness, because the current form of learning and teaching does not meet the requirements dictated by the faster development of these technologies. Creation of modern information society and the education system is a form of distance learning, the teacher acts as coach, and to a degree can be reached via another legacy of today - the Internet. Given the dizzying development of science and technology we are aware that our education that we acquire in schools and universities is not enough. One could well do the work every day and has a life to form.

Due to these changes there was a need for permanent learning and training teachers to work with new systems for distance learning.

Professional development of teachers achieved by implementing training (seminars). Training is achieved by programs, whose status is determined by the state, ie. Ministry of Education. Today there are a number of companies and organizations that hold free seminars for teacher training. Distance learning can be realized at all levels of education, and most are represented in the adult education programs within higher education.

The advantage of distance learning is that teachers can undergo further professional training when their schedule allows it, school or home, no travel expenses and stay in a place where training takes place.

In support e-learning emerged Moodle is a software package that is used to create Internet courses and Web sites for teaching. The word Moodle is an acronym of the term modular object-oriented dynamic learning environment (eng. Modular Object-Oriented Dynamic Learning Environment).

Many educational institutions, organizations and companies are engaged in organizing training courses: Microsoft, ECDL, AMRES, PSC Research Station, Educa humana and others. The trainings are designed to meet the needs of teachers, which is essential to a successful training program. The essential goals of the match with the needs and abilities of the group to which it is intended.

When there are training programs and conditions for their implementation, it is important to meet another one, perhaps the most important condition, and that the motivation of teachers for training or attending programs.

II. DISTANCE LEARNING

Distance learning is a complex process that requires creating an enabling environment for learning, for teacher and students generally do not share the same physical space. Communication is determined by how a choice of teaching methods and the nature of the technical means (media) by which to progress.

In such a form of learning is the basic characteristic spatial and temporal separation between speakers and listeners.

Distance learning, as well as the word suggests, means the possibility of teaching so they are not at the same location, teacher and student or teacher and student. For something like that does not need it, which proves the fact that this type of learning existed in the 19th century, when distance learning is enabled mail, or, as was the case in Australia, using radio links to communicate with remote areas. It was started with generations of adults who wanted to improve their education from home or work. Distance learning is transformed from paper forms and transferred into the electronic. Such change has brought a new name - electronic learning (e-Learning). Lessons are now sent to exclusively in electronic form (using the e-mail and FTP protocol). The completed tests returned by the educational institution by electronic mail.

Distance learning can be realized at all levels of education, and most are represented in the adult education programs within higher education.

The advantage of distance learning is that teachers can undergo further professional training when their schedule allows it, school or home, no travel expenses and stay in a place where training takes place.

A. *Systems for distance learning*

The starting point is that the traditional education system has modernized, transformed and improved. Many experts were considering how to facilitate the organization of learning activities through computers and for these reflections have arisen special software designed for distance learning, Learning Management Systems LMS (Learning Managaments Systems). There are a number of these systems for some of them to pay a license to use, and there are those who are free. Here are mentioned only a few such systems: Atutor, IBM Lotus LMS, Blackboard, Moodle.

III. Teacher training

"Subject to continued professional development of teachers, educators and professional services, under this regulation, means the follow-up, adoption and application of modern developments in science and practice to achieve the goals and objectives education and improvement of educational practice. "[4]

"Research shows that students' achievement correlates positively with quality teachers and professional development of teachers have a major impact on the quality of education that receive children and young people around the world." [3]

Professional development of teachers achieved by implementing training (seminars). Training should be well organized and designed, dynamic and interesting, concrete and every subject (area) should be devoted as much time as is necessary.

Continuing professional development activities carried out:

1) to independently undertake a teacher, counselor and associate to promote their professional development and educational work;
2) What kindergarten, elementary and middle school students and home plans annual work program:
(1) the level of professional bodies;

(2) organizing seminars for programs under Article 4 herein;

(3) the realization of their development programs;

3) organized by the Ministry of Education or the Institute for the Improvement of Education, institutions, professional society or association or a company, registered to practice in the field of education;

4) which are organized on an international level in the field of education, and participation in international seminars and conferences, in cooperation with the Ministry of Education and other institutions and organizations.

IV. Development of training program

As the need for training teachers in a particular educational institution, and if not already approved such a training program that meets the needs, then there is the possibility that a given institution make a training program to address the problem. First, the program must be accredited by the Institute for the Advancement of Education, to be general and could be carried out.

The right to participate in the competition are: institution, professional society or association registered to practice in the field of education (Article 4 of the Regulations) .

The process begins to accreditation by the Institute for the Advancement of Education announces a competition each year for approval of continuing professional development of teachers, teachers, collaborators and directors of a school year.

The basic condition for the adoption or approval of the program (Ordinance Article 5) is the fulfillment of the following requirements: that the program contributes to the improvement of educational practices, that parts of the Article 4 Paragraph 4 herein mutually connected and coordinated, that are defined and specified conditions for a successful implementation of the program.

Training programs may be compulsory and optional. Status of the Minister of Education determines the special act, when it is in the public interest. The program is approved for use for up to two years. Program that was not applied can be approved as a pilot for a period of one year. By the end of the experiment program can be granted for a term up to two years or it is approved.

If the program that is accepted. approved, it shall be published in the Catalogue of continuing professional development of teachers, educators and professional services and directors of a school year. The training program includes the following information: The status of programs, catalog number, name of authors, coordinators and implementers of programs, target groups, topics to be covered program time, number of participants in the group.

B. *Development of training programs for teachers working in Moodle.*

The training program ya work in Moodle is created according to the criteria set forth in the preceding section of this paper.

Moodle learning management system provides teachers with full computer support in organizing and executing online course or school subject.

The training program for teachers to work in Moodle primarily aims to strengthen the competence of digital, and then acquire new knowledge and skills in the field of use Moodle to manage distance learning in everyday work, which basically means information management, system management and customers, planning, organization and execution of online course communication and active learning through Moodle system.

V. INTRODUCTION TO THE THEORETICAL APPROACH TO THE STUDY

Computerization of education is a necessity and needs of this century. The use of information technologies will allow the creation of new base and new opportunities for improving the teaching process. Seeks to overcome the traditional method and the introduction of electronic technology that would contribute to a better, faster, easier, more interesting apparent learning and teaching. Must be taken into consideration economic, technological, social factors in order to enable the necessary information available to everyone, at any place and at any time.

The society must prepare a qualified and trained personnel and delivering the breakthrough of new information technologies in the education system Providing professional development of teachers in the field of computer technology is one of the conditions for the successful modernization of schools and teaching and an important prerequisite for the personal development of teachers.

If on the one hand, it that there are training programs that will allow the training of teachers, and on the other hand it is necessary that there is interest and motivation of teachers for the same. To training programs in practice fully implemented, teachers need is the motivation for this kind of work. Must first be a teacher as an important element in the process of learning information technology master, how could their knowledge through the same transmit to their students. In this key role taking training programs for teacher training. Today, when dominated by information technology in all spheres of work, teachers must adapt to the situation and stay in step with the times.

The problem is now that schools are not equally equipped with information and communication technology and can not be introduced standards and operate according to certain regulations but everything is left to the will and enthusiasm of teachers.

VI. RESULTS OF RESEARCH

The author wanted to examine how teachers are motivated to attend training for work in Moodle and how much they are willing and motivated to apply new technologies in teaching process.

This research used a survey as an instrument of research and processing of the data in the study used statistical methods and descriptive analysis of the results. The survey was conducted in two primary and two secondary schools in villages and towns.

TABLE I. STATISTICAL OVERVIEW OF SURVEY CONDUCTED

SCHOOL	NUMBER OF SCHOOL TEACHERS SURVEYED	DO YOU KNOW WHAT IS MOODLE SYSTEM OF E-LEARNING		ARE YOU INTERESTED IN ATTENDANCE PROGRAM TRAINING FOR WORK IN MOODLE ?	
		YES	NO	YES	NO
SCHOOL1	15	4	11	3	12
SCHOOL 2	24	8	16	18	6
SCHOOL3	54	23	31	49	5
SCHOOL 4	41	14	27	33	8
TOTAL	**134**	**49**	**85**	**103**	**31**

Figure 1 Shows how teachers are informed about what the Moodle e-learning system.

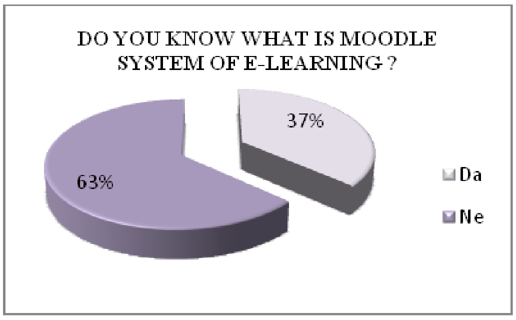

FIGURE 1 DO TEACHERS KNOW WHAT IS MOODLE SYSTEM OF E-LEARNING?

Given that our country is among the countries that use the Internet at least, this percentage is not as disturbing or especially if you look at the answer below that most teachers want to train for the Moodle e-learning system.

When asked: "Are you interested in attending the training program to work in Moodle? "

103 teachers responded in the affirmative, which is 77% of total respondents and 31 teachers has a negative answer to this question which makes 23%.

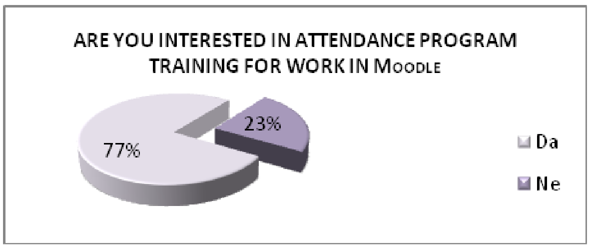

FIGURE 2 TEACHERS ARE INTERESTED IN TRAINING FOR WORK IN MOODLE?

Then the teachers asked to provide reasons why they are interested in training in the Moodle system.

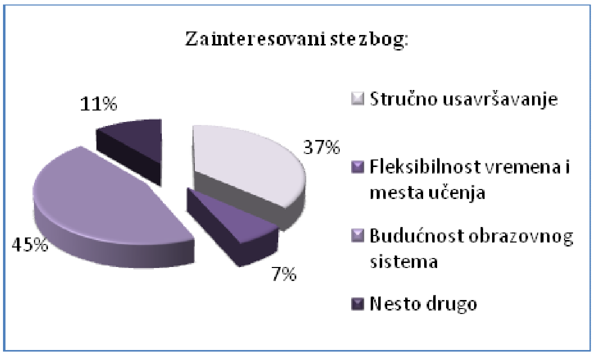

FIGURE 3 INTEREST OF TEACHERS FOR TRAINING FOR WORK IN MOODLE

In response to this question is evident that the teachers realized the importance of new technologies into education. 61 class, and 45% of teachers are interested in training for Moodle e-learning system, because they believe this is the future in education. 7% of teachers were interested because of the flexibility of time and place of learning. This certainly fits the teachers, because of work commitments are not able to go to distant places to listen to seminars and professional training, and education is the responsibility of each teacher, he thinks, and 36% of the teachers.

The other 11% of teachers cited some other responses, such as innovations in teaching, creative, and therefore more interesting work, increased individualization in the teaching process, because it can devote more time to students who need additional or extra work ...

On the other hand, teachers are not interested because they have little knowledge of computer skills (24%), while 21% considered it necessary to spend lots of time for the system of e-learning. 13% of teachers are not interested, because the terms of school competition in certain cases coincide with the term training. If the training takes place during the summer and of pupil holiday, it would certainly be interested. Other responses were related to training costs. Training is not always free and it can be a big obstacle and a reason why teachers are not interested in training.

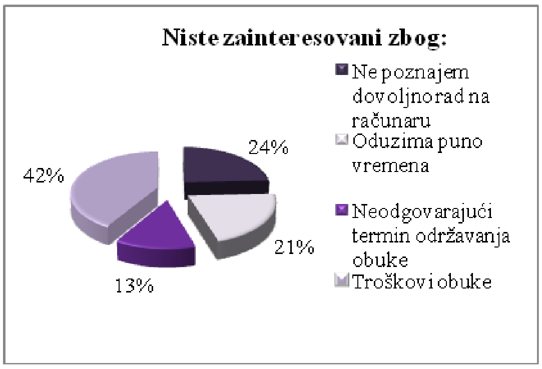

FIGURE 4 WHY TEACHERS ARE NOT INTERESTED IN TRAINING FOR WORK IN MOODLE

From the answers to the following question in the survey, shows that 93% of teachers use computers in their work, and only 7% do not use the computer. The graph shows that the needs of most teachers use a computer.

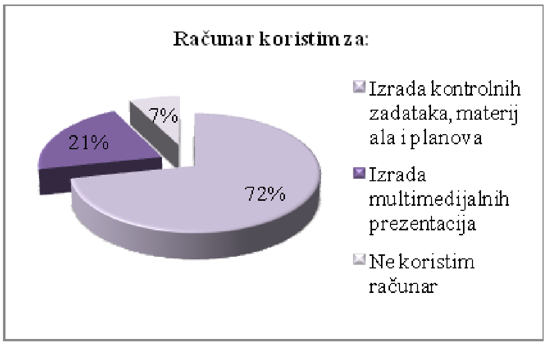

FIGURE 5 THE COMPUTER IN TEACHING PROCESS

Therefore, teachers have the necessary computer literacy and provides them with a basis for learning through Moodle e-learning, and referral of students to this way of learning, but that this ability is an advantage not istvovremeno sufficient and decisive, because in their responses using the advantage as already noted mainly for the development of individual curricula, teaching materials and the control tasks.The next question relates to the reasons why teachers want to use Moodle in the teaching process:

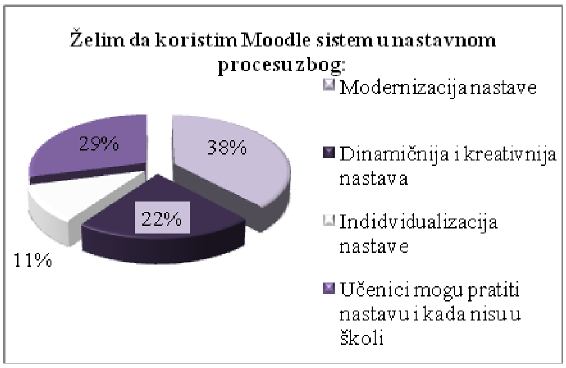

FIGURE 6 I WANT TO USE MOODLE SYSTEM IN TEACHING PROCESS FOR ...

38% of the interviewees considered that the introduction of Moodle to mean modernization of teaching that is decades out of date, 22% believe that the use of Moodle course was more dynamic and creative, 11% see the possibility of individualized teaching using this system, which together has significantly to overcoming the problem of unequal needs and abilities of students (eg, the learning time) and achieving better communication between teachers and students together, and as many as 29% of teachers believe that students can attend classes when they are away at school.

However, the answers to the following question can be seen that there are reasons for not wanting to use Moodle in the teaching process:

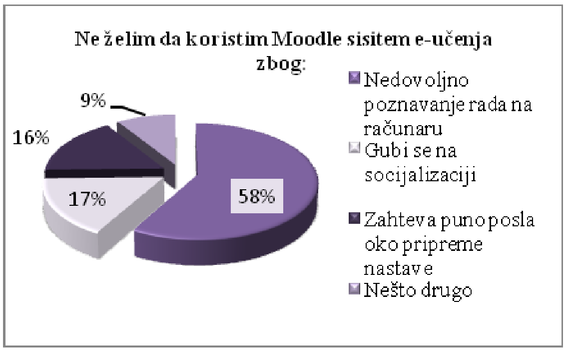

FIGURE 7 I DO NOT WANT TO USE MOODLE SYSTEM IN TEACHING PROCESS FOR ...

Teachers, regardless of their level of training for computer skills is still fear of using the computer.

Dominated response (58%) that do not have enough experience to work on your computer. The following is an opinion (16%) that for this kind of work takes time for preparing classes, and almost the same percentage (17%) teachers believed that the loss of socialization because it is not just to communicate with someone in person and via the Internet. Finally, among other responses represented the opinion that the testing can be deceiving in many ways (copying, tuition, can someone else to complete it ...).

Suggestions teachers were most frequent in the case referred to the fact that schools should provide better conditions for the realization of this form of learning, to provide the necessary equipment (computers and software), because poor working conditions badly affect the motivation of teachers to work (49%). The school then needs to provide training programs that will help teachers to be trained, and teachers need to develop awareness of the importance of information about innovations in the field of information and the importance of training (28%). If there is no initiative for teacher training school, he thinks 28% of teachers, then teachers should take the initiative and to self education, and to take responsibility for their ignorance. Therefore, there should be cooperation of teachers and institutions and the institutions and countries, make everything work properly.

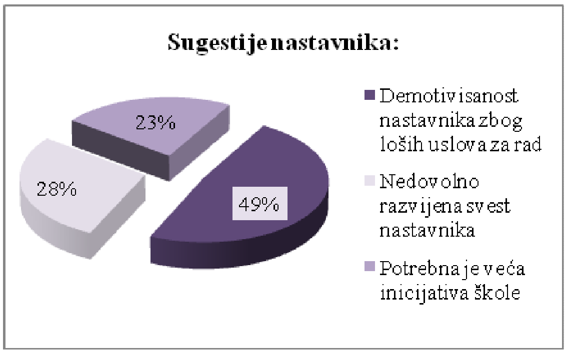

FIGURE 8 TEACHER SUGGESTIONS

Based on the obtained and presented results showed that the main hypothesis disproved, thus follows: teachers have no motivation to attend training for work in Moodle e-learning.

The survey confirmed that teachers want to learn to work with the Moodle system, but for their own purposes, because they are aware of the advantages of distance learning and Moodle system in terms of self-education and lifelong learning. Teachers realize that distance learning is very important to increase the quality of the teaching process. The ability of teachers to work on your computer with one hand is enough to confirm that there is information literacy, but if that ability is used only for purposes of making plans, the control tasks and the like. Can not be said to be sufficient to say that teachers possess the necessary computer literacy and provides them with a basis for learning through Moodle e-learning.

The economic effects of this learning system are particularly important in this time of economic crisis when schools are not able to pay their teachers, professional development, and legal obligation of every teacher to have a certain number of hours of professional development for a certain period. This point certainly not be neglected in the future, regardless of the results.

Costs are one of the main factors that can force teachers to abandon their training. Costs, but also many other factors, some of them are poor working conditions that are reflected in the lack of funds for equipment, can lead to lack of motivation to train teachers to work in a system of Moodle. If there are no conditions for work, there is no need to introduce a system of Moodle in the education process, that there is a total lack of motivation of teachers to train for this type of learning and applying the same in teaching.

VII. CONCLUSION

Through this study it was concluded that it should motivate teachers to use Moodle e-learning in the teaching process, because it would contribute to increasing the educational effects of teaching. Teacher to the distance learning was better informed about his case, a well-trained teachers with the skills of distance learning and using the same may in any case more knowledge to provide their students and contribute to better outcomes of the teaching process. The results of this study can also be used as a request to the competent institutions for the introduction of compulsory attendance at training for distance learning of all employees in educational institutions and the introduction of the teaching process.

That it might need to implement the company to the importance of information technology, especially in elementary schools.

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ADAPTIVE E-COURSES DESIGN BASED ON WEB MINING

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Abstract – In this paper the recommendations in designing adaptive e-course are given. Also, a model for time adaptivity of e-course is given. The results are based on appliance of web mining techniques. Research was done at Technical Faculty Cacak, on Moodle learning management system. Results confirm that students spend different time on different activities. The future work relates to applying model in design adaptive Moodle e-course.

I INTRODUCTION

E-learning, as a key part of distance education, is realized by using modern technologies, particularly Internet. Online learning (E-learning) systems accessible through the Internet are intranets that represents self-contained versions of the data warehouses and human behavior found more broadly accross the Internet [1]. E-learning can be used on all level of education and are used just as well in the combination with the tradicional teaching as in the distance learning. That is why knowledge about users of electronic courses is essential for understanding their ways of learning and their learning approach.

Nowadays, slight modifications and supplements to e-learning systems are not enough to ensure successful e-learning outcomes, because other important elements for e-learning success are missing such as flexibility of the system, adaptability towards students needs, effective and official design of electronic content (e-content) [2].

An e-learning system is considered to be adaptive [3] if it is capable of: monitoring the activities of its users; interpreting these on the basis of domain-specific models; inferring user requirements and preferences out of the interpreted activities, appropriately representing these in associated models; and, finally, acting upon the available knowledge on its users and the subject matter at hand, to dynamically facilitate the learning process.

To ashieve this advanced e-learning applications it is nesessery to build model and then design adaptive e-courses. In this paper we proposed web mining as a concept for designing recomendations for adaptive e-courses. Also, here is given model based on the results of applied web mining techniques.

In [3] is examined the sufficiency of existing e-learning standards for facilitating and supporting the introduction of adaptive techniques in computer-based learning systems.

Paper [4] presented the implementation of adaptive environment by extending open source learning management system Moodle.

In [2] is provided an approach to creating adaptive environment for e-learning courses. Also, there is proposed generic model and architecture of an adaptive e-learning system.

A. Web mining and adaptive e-courses

Web mining is the application of data mining techniques to extract knowledge from Web data, where at least one of structure (hyperlink) or usage (Web log) data is used in the mining process (with or without other types of Web data) [4]. Web mining can be categorized into three different classes based on which part of the Web is to be mined.

Web content mining concerns discovery of useful information (and accessing information) from web sources [5]. For the discovery it uses the techniques of Artificial Intelligence (AI), Database and most specifically Data Mining (DM).

Web structure mining is the process of discovering structure information from the web [6]. Web usage mining focuses on techniques that could predict user behavior while the user interacts with the web [7]. Web Usage mining is a very important tool to extract the hidden business intelligence data from large databases. It uses computer network concepts, artificial intelligence and database.

Taxonomy of web mining is given on the figure 1.

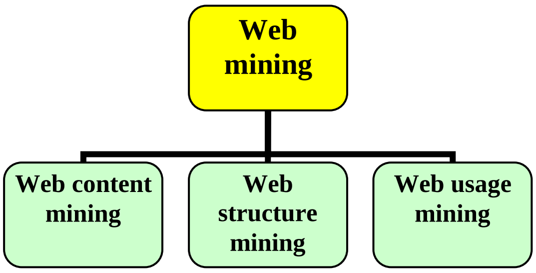


Figure 1: Taxonomy of web mining

Adaptive Web-based educational systems and standard-based courseware re-use systems constitute two large research and development streams in the field of E-Learning [8]. The lack of adaptive learning environments or an environment with adaptive features is partly due to the concepts "one-size-fits-all" [2].

Adaptive e-learning system can be described as personalized system, which beside contents discovery and assembly, is able to provide adaptive course delivery, adaptive interaction, and adaptive collaboration support [3].

At the Technical Faculty in Cacak [www.tfc.kg.ac.rs] Moodle learning management system is in use for the last four years [http://itlab.tfc.kg.ac.rs/moodle]. There are several different structures of e-courses, but the principle of using this system is similar. On the figure 2 are illustrated basic activities of Moodle users. Activity diagram is done in StarUML software [http://staruml.sourceforge.net/en]. That is open source UML (Unified Modeling Language)/MDA (Model Driven Architecture). The activity diagram at the figure 2 supposed different activities of students, and remembering of log events on the Moodle server. After successfully login student can access to own profile and see course offering. After that, student could check notifications, messages, edit profile, or, choose activity.

There are different types of activities. They could be divided into three categories:

- Learning activities
- Collaboration activities
- Checking activities

Learning activities suppose delivering teaching materials, e-lessons… Some of collaboration activities at the Moodle LMS are forum, chat and wiki. Test is kind of checking activities, which could has limited time for resolving. That is activity which could be used for self-evaluation, as formative test. Or, test could be used with the purpose of evaluation students.

After resolving, students could see their results, and true and false responses. Teachers could analyze their test through many options which are available in Moodle LMS. Also, that could be opportunity for improving test.

II PURPOSE AND OBJECTIVES OF THE RESEARCH

A typical example of an open-source e-learning system that is becoming more and more popular is Moodle, which enables course creators to efficiently organize online learning environment [http://moodle.org].

LMS Moodle doesn't allow detail monitoring of the users' activities nor the evaluation of the course contents' structure and its efficiency in the teaching process. In order to get recommendations for adaptive course, a thorough analysis is a must. Web mining techniques are used in this study in the purposes of analysis of users` patterns of behaviors.

The objectives of the research:

- Data pre-processing: clean and prepare the Web server log file
- Application of log analysis through web mining techniques
- Preparation of report
- Pattern evaluation: determination of behaviour patterns based on obtained reports and their evaluation
- Modelling adaptive e-course

The goals of the research:

- Professors, that is the creators of the courses, will have all the necessary information that will allow that kind of electronic courses' structural organisation. The result of these electronic courses is supposed to be an increased students' activity.

- Determination of the appliance of web mining techniques in the analysis and getting recomendations for creating adaptive courses

- Determination of the appliance of web mining techniues in the modelling adaptive courses

Hypothesis 1: Users spend different time on the different activities

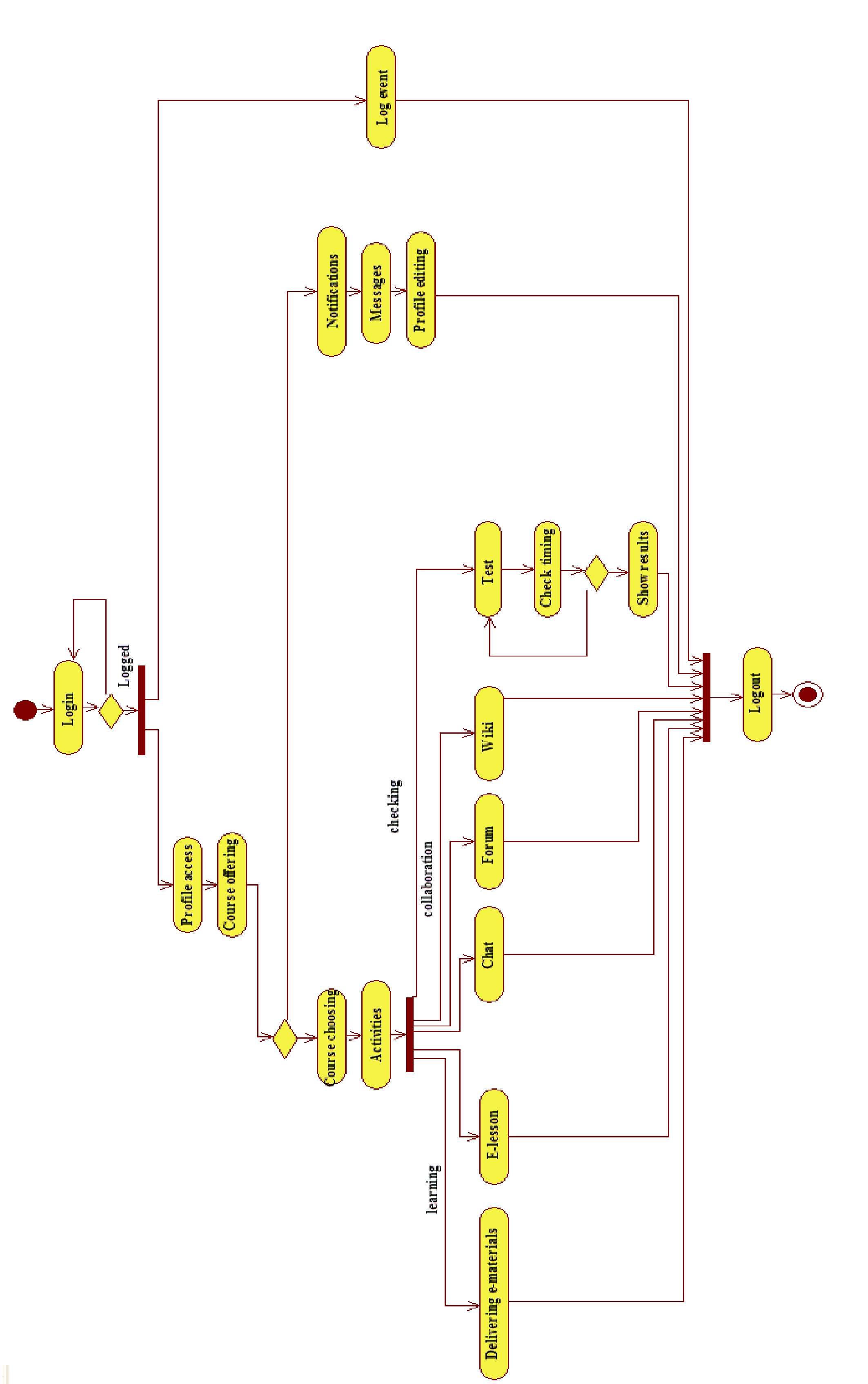


Figure 2: Basic students's activities in Moodle LMS

III PROCEDURE, PARTICIPANTS AND TECHNIQUES

For the purpose of completing electronic courses' evaluation, web mining techniques were used for detection of pattern behaviors through log files. With the identification of pattern behavior, a better understanding of the acceptance of students already based learning can be provided, as for the instruction for better organization of on-line activities [1].

Web mining includes more processes that are taking place according to accurately determined schedule.

A. Selection

Data written within log files related to users' profiles, data about activities and about structure.

Data from users' profile point towards users ID, state, residence, attended courses as well as towards the last access. Those data are being introduced within blog and forum.

The usage of data refers to the access to web pages. These data include IP addresses, access time ...

Data about structure describes connection of contents through links.

B. Preprocessing

Preprocessing includes the process of all records related to pictures since these records weren't included in pattern behavior detection. Moreover, all http requests labeled as 404 (it indicates that the resource wasn't found on the server) should be removed.

C. Transformation

Data are transformed into formats that can be used within different applications. The most common steps in the process of transformation are: user identification, session identification, traversal path completion, and learning activity mapping.

D. Mining

Mining process includes data mining techniques such as: statistics, classification and association rules. After completing the process of mining, obtained information subjects to further analysis. In this research is used OLAP. Also, we used Microsoft SQL Server Analysis Services [9].

Microsoft Analysis Services are a collection of Online Analytical Processing (OLAP) and data mining services supplied in Microsoft SQL server. Analysis services provide managers the possibility to explore a cache of collected and current data, define business trends and patterns and mine data to make discerning business decisions.

Olap (OnLine Analytical Processing) is defined as fast access to large amounts of summarized data.

The study was conducted at the Technical faculty in Cacak. In this case, traditional method of teaching is being combined with e-learning with the assistance of Moodle LMS. This Moodle system and e-courses are designed to provide teaching material to students, and activities that provide collaborative learning.

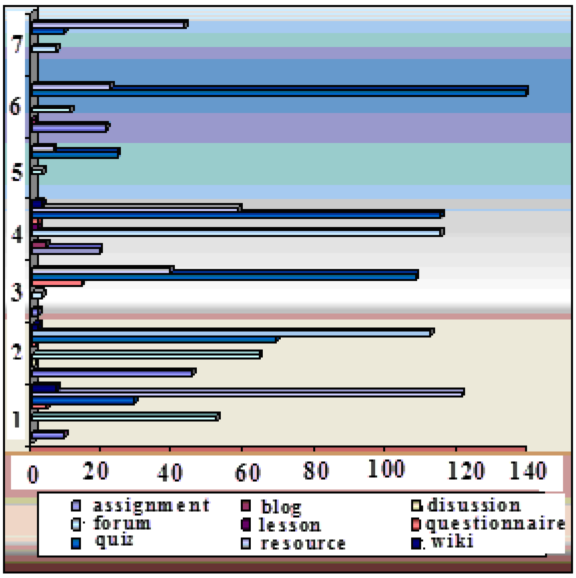
System registered 1789 active users, and 113 courses have been created within the system, and these courses are being used by students and/or teachers as well. More than 50% of courses are from Information Technology field.

For purposes of this research are used Microsoft Visual Studio 2008 [9] and Microsoft SQL Server 2008 [9].

IV RESULTS

In this section are given the result of the research. Visualization of results is done in Microsoft Excel 2003 [9].

Figure 3 shows the activities of the modules during the day of the week. Numbers from 1 to 7 indicated seven days a week and this Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday, respectively. On the x-axis is shown the actual number of activities or access logs of a given module.



Days	**Subjects in classic schedule**	**Activity**
Monday	Programming, Operational systems,	Resource, wiki
Tuesday	Computing networks, Simulations and animations, Software architectures	Discussion, assignment
Wednesday	Software tools, Development of web applications,	Questionnaire
Thursday	Programming languages	Forum, quiz
Friday	Multimedia systems, Information systems	Quiz
Saturday	-	Quiz
Sunday	-	-

Figure 3: Actions by modules in the day of the week

According to figure 3, students spend different time on the different activities. The initial hypothesis is confirmed by this statement.

Also, according to figure 3 we can propose recommendations for designing adaptive e-course. These recommendations are related only to time dimension. The rest recommendations for adaptive e-course demand further analysis.

In the table 1 is given the most accessible activity during the week.

The table is created on the basis of Figure 3. Also, in table 1 is given names of the subjects from classic schedule which could be organized according to given model at the figure 4. Those subjects are form IT field. Based on table 1 is created a graphic model. Table 1 contains recommendations for adaptive application modules within Moodle e-course. Adaptation is reflected in the desired time obtained the distribution of activity from the analysis of patterns of behavior of students. Also, in table 1 are given subjects from classic schedule for every day. The idea is to compare classic schedule with proposed model and see the opportunity for implemented so called “Time model”, given in figure 4. The model relates to the time adaptation of e-course. Model is given in the figure 4 and represents the starting point for the adaptive design of the course.

TABLE I. ILLUSTRATION OF ACTIVITIES AND DAYS

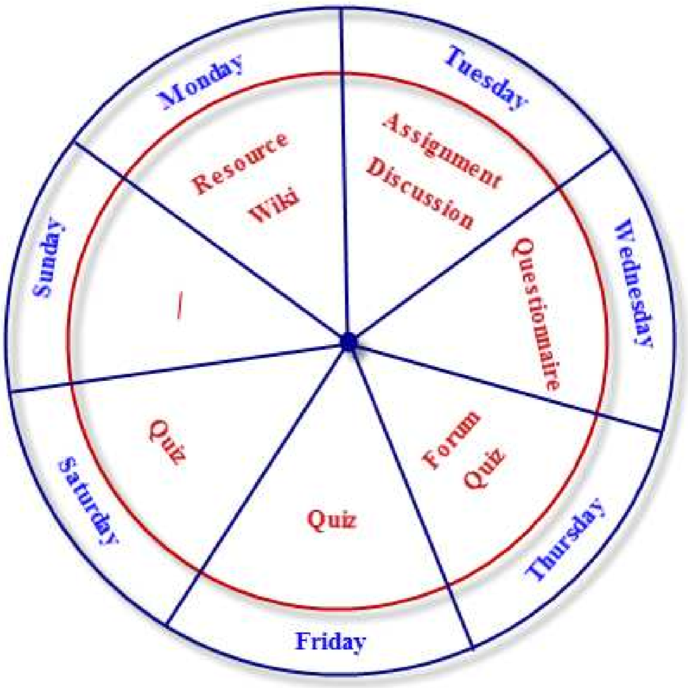


Figure 4: “Time model” of adaptive course activity

According to figure 4 there are “preffered” activities during the every week. For each day in week Figure 4 gives recommendations for activities which should be applied most.

In Monday, educational materials should be given as different type of source. Beside that, wiki should be included as the module for cooperative learning. The main idea is using resources for giving the guidelines and basic resources for learning, and then using the wiki for colaborative learning and further researching.

In Tuesday teacher should give assignemnt and also on the e-courses should be started disscusion about materials and assignments.

Wednesday is day for questionnaire. That is the way for analysis subjective opinion of every student about methods of teaching, and other aspects of teaching. Results give the chance for reorganizing their classes and also use of e-courses in traditional teaching. Also, there is a chance for improving classes, according to results of questionnaire.

In Thursday teacher should apply tests and forum. Test could be applied as the way of teaching and self evaluation. Forum gives the oporttunity for disscusing about tests, questions and possible answers.

Friday is day when teacher could give test to students and see the results of previous work.

Saturday gives the oportunity for the second chance in solving tests. It is optional activity, because Saturday could be inactive day.

According to given shedule, for every day except Sunday, students have certain activities on course.

Beside that, there is lot of other Moodle modules which are not include in this model. That is modules which have the minimum of student's activities. But, teacher could include those activities according to students's interests and needs of educational program. Some of those modules are shown at the figure 2. On the figure 2 is one of the possible examples of student's activities on the Moodle course. The given "Time model" at the figure 4 could improve classic schedule given in Table 1. Subjects who are given in Table 1 are from all four years at department of information technology. In each year number of IT subjects is smaller. So, proposed model ("Time model") could be applied in the way that resources from IT subjects could be given to students at Monday. Also, wiki should be support in that day for collaborative activities. In the other days model proposes other activities, as it is given at Figure 4.

V CONCLUSIONS

With the constant of the improvement of Internet technology, there is a need for their introduction in the educational process. In order to get recommendations for adaptive e-course, and also model of adaptive e-course we applied web mining techniques an Olap.

As it was given in section Results actions by modules are different in every day of week. Based on that result, proposed „Time model" gives recommendations for organization activities during the week. According to given model, every day has the „preferred activities".

Classic schedule in area of IT subject, which were analyzed, could be improved. That subjects could be organized in agreement with proposed „Time model". That is one of the way for improving traditional teaching which includes e-learning through e-courses.

Results confirm the initial hypothesis and indicate students spend different time on the different activities. Results give the opportunity to every actor in teaching process to improve their own activities, and also the whole process.

Also, according to this model is given possibility for improving collaborative activities, applying collaborative module in the day when students are the most active. Model of adaptive course is given in one dimension: time. That is beginning of creating the whole model of adaptive e-courses.

Whole adaptive model must include other important dimensions such as organizations of teaching materials. That suppose adaptive structure of teaching materials at course, and also adaptive format of teaching materials.

Besides that, adaptive model of course should give opportunity for special adaptation for collaborative activities. Those are the steps for future research. All future activity models should be in agreement with „Time model" given in this paper.

The importance of research is an innovative approach for designing model for adaptive e-course. Use of web mining techniques and Olap has many advantages. Some of them are effectiveness and speed analysis. That is very important because of number of activities and size of log files on learning management systems.

Also, the privacy of users is fully protected, which is extremely important and in agreement with ethics in such analysis.

ACKNOWLEDGMENT

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INFORMATION TECHNOLOGIES AND SECURITY TRAINING WITHIN BANKING SECTOR

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Abstract – Basic initiator of business processes within most institutions is IT infrastructure. Without the basic IT grounds, no bank can function properly – data bases, communication flows, instant data processing, constant access to bank's services and products are necessary.

Considering the fact that irregular events in IT functioning can cause direct material and reputation related losses, the use of IT infrastructure within the banking sector bears high risk level. However, the highest level is not exhibited through external attacks toward IT, but internal intentions and/or unintentional abuse.

Therefore, even basic IT awareness is necessary among information system users *i.e.* the bank's employees. The first degree of protection is prevention, and in this case, it is achieved by appropriate training. According to the current state, the Serbian educational system lacks awareness regarding importance of IT security training among pupils, students.

And especially in the era of Facebook and Wikileaks, it represents a great gap between the necessity of IT infrastructure and its security management. The lack of raising awareness regarding IT security during education later affects business operations.

I. INTRODUCTION

Information Technologies have developed in the past year so much that they have become part of our everyday life.

Considering all technical-technological inovations in the human history, human life was the most affect by the discoery of the computer and mobile phones as parts of the complete Information Technology. It is not by chance that the richest people in the world deal with information technologies.

Within modern banking today, there is virtually no activity which does not require the computer as support for jobs and tasks performance in the bank. Banking sector resides on IT, all with the aim to accelerate and increase the volume of business activities. Training and knowledge are necessary in order to work with and handle the computer and IT. Great expectations are directed toward both banking officers and high level management. Great expectations come from clients, firms, companies business partners and the entire public.

On the other hand, IT development is followed by certain negative events exhibited in the domain of hich-tech criminal.

Our educational system within IT domain must take into consideration, thus in addition to education, training and preparation for operating IT, to perform training within IT security.

II. IT DEVELOPMENT AND OPERATION

A. *Training for acquiring better competence and professional education*

Development and availability of Information Technologies have resulted in the presence of IT in almost every domain of life. Availability resulted in the presence, and also the necesseity of these technologies in everday work. All people using IT in their work need to acquire professional knowledge within the domain of security and protection of IT, information and data.

Acquiring expertise and competence cannot be the process of “casual learning”, by observing others who are more experienced or through accidental events and self-teaching. In order for someone to become expert and competent within the domain of security and protection of IT and data, that person must undergo a proscribed system of education and training defined by a program. This expertise and competenc should be realized in practice through implementation of designed and efficient risk assessments and data collection, correlation and valuation.

Training within IT security requires two things as follows: raising awareness and training in order to acquire expertise. These are two completely different things.

Raising awareness is actually the first step which offers awareness about the given matter. Training represents a systematic education realized through a program in which each individual takes active participation.

Presently, there are many agencies commecially offering two-day, and even half-day courses stated as professional training. Therefore, the two abovementioned criteria must be fulfilled, while on the contrary, awareness will be raised, but without the proper – training according to a proscribed program. In order to illustrate, this can be explained through the following example:

- IT specialist can learn a lot about IT security,
- IT specialist can even even talk with someone from IT security who preforms those jobs and tasks at a bank.

However, this can raise awareness at this IT specialist considering the importance of training within IT security, but if the specialist has not taken active participation in such training this does not imply that as a good IT specialist he/she can work as a security officer, perform investigations, computer forensics, etc.

Need for trainings at certain institutions, organizations and for individuals working there must be systematically identified. Therefore, it is necessary to perform the following:

- Identify areas which need IT security training,
- Define one aim which should be achieved through this training,
- Determine methids, means and human resources in order to achieve the desired aim.

B. Importance of IT in business operations

Constant need for data processing, in any form, results in the presence of IT in almost every form of business operations, even if it is only a company's web presentation.

Intereseting example is online bakery, i.e. bakery whose products can be ordered online. This example exhibits very well the fact that even service which do not depend on Information Technologies (pastry, in this case), as a basis for providing service use one form of IT solutions.

Financial institutions, and especially banks, represent an example where provided services are not primarily dependant on IT, but without IT systems, the work of those institutions would be virtually impossible. Data bases and data processing are necessary as well as communication flows. Considering the type of business operations, banks are one of those institutions investing very large amounts in IT infrastructure, either in hardware or software, development and maintenance.

III. IT SECURITY

A. Assiting people toward change

While the educational system gives significant importance to training future/current IT users, dedication to security regarding management of these technologies is lacking. Currently, the main aim within the educational process is the manner of IT management, how to use these technolgoies for own or company's needs, but importance of IT security is not recognized. Especially today, this represents a great shortcoming because possibilities for abuse have significantly increased. Presently, it is not required to be a professional in order to perform an attack toward an IT system, while unintentional mistakes deepen the problem additionally.

Due to IT prevailance in almost all domainy, and due to frequent and easily performed abuse, it is necessary to highlight IT security within the educational process.

Training and realization of training are two completely different things. We titled this under a joint term "problem of knowledge transfer". A lot, if not the most money spent on training withing IT security has been squandered. In a relatively short period of time, upon returning from one short and expensive seminar or professional training, those who are supposed to deal with prevention-repressive activity and IT security tasks resume their previous habits and working methods.

This implies that these people do not change or just slightly change their behavior. All this simply implies that training should be continued. Furthermore, supervision should also be performed and include both observation of task performance and feedback. All this indicates essential importance to assit people to change. Supervision is the only way to ensure transfer of what has been learned during training to the working.

B. Effect of educational shortcoming onto business operations

The lack of paying attention to IT security during the educational process affects business operations later. Information system users during education obtain the necessary, basic education for realization of aims and facilitating business operations, however, it lacks the highlight on security while operating them. This shortcoming is later exploited in business operations.

Not raising awareness regarding IT security in the beginning represents a problem for the later secure operating of information systems at work.

During introduction with new technologies, it is necessary to point to user of IT services risks that they bring, possible threat sources and how to defend against them. Since technology is more available and present, consequently the number of abuse is increasing.

The Internet offers a wide range of different tools for performance of various abuse and criminal acts, even concrete instructions are given how to perform a certain attack. Therefore, it is not necessary to be an expert in order to perform any form of abuse, but it is only enough to be motivated to do such act.

Not many people know that the Criminal Code of Serbia contains a chapter related to high-tech criminal, and that cases of abuse can be proceeded through the High-Tech Crime Department within the Ministry of Interior.

Legislative regulations exist, however, awareness regarding IT security among users is almost nonexistant. And it is here that the educational process of the Republic of Serbia has the most significant role.

IV. IT SECURITY IN BANKING SECTOR

Banks in their business operations use and process sensitive data of high value, i.e. valuable data. IT infrastructure, on one hand, enables banks to realize aims of their business operations, but on the other hand, it also brings high level risks in the view of irregular IT events. Fod these reasons, data protection and sacurity of Information Technologies is necessary.

IT security and data protection are very complex activites and no other area requires such precision and comprehension. Mainitaining one information system secure implies clear concept of preventive and repressive acting. Pressure to act as quickly as possible is constant.

Failure of functioning of the key (“line of business”) IT system causes direct material and reputaion related damages to the bank. Irregular events in the operations of IT system may result in significant loss for the bank, because the bank’s business operations actually reside on functionalities provided by IT infrastructure.

Irregular IT event may be the result of various events, both external and internal, either intentional or unintentional. In order to organiye a logic attack toward an IT system today does not require outstandinf knowledge within informatics.

Tools are more available on the Internet and even with concrete instructions how to perform an attack with given tool. Moreover, it is enough to pay for “ attack services”, without any information regarding the meaning of such attack and how it is performed.

The best example for this are botnets which are the most frequently used for malicious tasks on web servers (DDOS attack) – botnet constitutes of infected computers with some malicious software, and which can be centrally and in synchornized manner be operated in a certain moment owning to the fact that they are infected. Presently, botnets are not created only for “personal needs” but also for “rent”.

Still, the most frequent forms of attack are viruses. Viruses are uploaded to computers mostly through USB flash drives and then from the Internet.

The intent of those malicious programs can be destruction of data, resource damaging, enabling the following processes – sabotage, data theft and extortion. Example for the last case is when a virus prevents access to data files and folders until a certain amount of money is paid to the displayed account.

Even though the most known threat sources come from the outside, the most significant risk is internal abuse. Internal abuse can be intentional or unintentional. Unintentional abuse occur due to ignorance or mistake. Intentional abuse always has the motive of the doer and differs from case to case.

Mostly, it is greed – illegal appropriation of benefit for oneself or another, which in case of a financial institution represents the key aspect. Furthermore, motive can also be dissatisfaction with working conditions, as well as with superiors at work, revenge, demonstration of knowledge, curiosity, etc.

It is the most difficult to predict internal abuse, and it it is internal abuse that bears the greatest risk in the view of threat sources within the domain of IT security.

Protection measures against abuse are preventive and repressive. Considering repressive measures, the given situation is being “treated”, while with preventive, the focus is to prevent uccurrence of irregular events. Preventive measures represent the focus of this work.

A. Security organization structure

According to international standards and established experiences, existence of special organizational unit at the bank is necessary and which shall be responsible for the bank’s security, both for general and IT security. In Serbia, OTP banka currently is the only one with a special organiztional unit dealing with data protection and IT security tasks. IT Security Department is part of the Security Directorate which is directly responsible to the President of the Executive Board of the bank. It is important to emphasize this because it exhibits that IT security is not part of IT and Operations Division, but on one hand it is separated from IT IT, and on the other hand it is independent from it. Actually, this is what standards mention through requiring separation between performing the function of operations administrator and security administration.

Apart from standards and by means of simple logical thinking, it is easiy to conclude that IT administrators cannot control one another themselves and give proposals to one another related to establishing security in their work. IT Security Department acts both preventively and repressively, attends both physical and logical protection of IT infrastructure as well as security of data entering and exiting the bank. The Department adopts regulations related to IT security, perform security monitoring of the system, manages protection systems, follows the trend of threat source and their vunlerabilities, evaluates and manages IT operational risks, gives proposals for increase of security level, and also performs security training for employees at the bank’s headquarter and netowork.

B. Regulations

The basis for existance of IT Security Department lies in the systematization of the bank’s organizational units, and the basis of the Department’s activity lies in regulations adopted by the bank related to all employees at the bank.

Regulations can be separated to first level and lower level regulations. The first level establishes comprehensiona and generality, while details of certain units are further developed on lower levels. Furthermore, regulations can also be separated to rulebooks, procedures and instructions.

Rulebooks define general rules and requirements, procedures define methodologies for achieving given aims, and instructions define concrete steps and measures that are necessary to be taken. In addition, there are also policies and strategies defining short-term and long-term IT security aims and tasks.

The basic and the most necessary rulebook is the one defining principles, directions and general requirements for protection of data and IT security at the bank. Rulebooks for protection of data and IT security define requirements toward access of external entities, autsourcing, obligations related to reporting, data classifications, trainings for employees, physical security of IT infrastructure, managing network systems and IT operating, handling data media, antivirus protections, access management, Internet and electronic mail system usage, working from home, development and maintenance of IT systems, communication flows, managing business continuity and recovery in case of disaster. Furthermore, they also provide definitions for secure management of paper documents and verbal data. Based on this document which is the first level rulebook, rulebooks of lower levels shall be drafted afterwards, as well as procedures and instructions. Thus this rulebook can be concidered as the statute of the bank's IT security, or in other words, the Bible of the bank's IT security.

Also, one of the key regulations is the rulebook on antivirus protection. On one hand, it defines the protection structure, manner and methodology of establishing antivirus system, its development and functioning, and on the other hand, it determines appropriate parties to perform tasks related to antivirus protection – whether they are employees of IT and Operations Division, IT Security Department, or other employees of the bank.

Classification related to data and IT system is also performed based on rulebooks defining such procedures. First, data owner are appointed within organizational units, then through them, secure classification is performed regarding data used by that organizational unit.

Based on classified data classes, classification of IT system shall be performed, in order to provide requirements for the security of those systems in comparison to their classification.

Rulebook on risk evaluation and management provides basics for determining the existing and prevention of potential operational IT risks.

For each threat source in the view of all IT systems, it is observed whether the given threat brings certain vulnerability and how freqent that threat is, as well as what is the effect of exploitation of the given vulnerability. With the aid of mathematics, we get the freqency matrix – effect, where the risk for the given threat is determined in numbers.

Determining importance levels of risks is based on results that exhibit the greatest risks at the bank, which must be decreased urgently, which do not have to solved urgently, and which are acceptable for the security of business operations.

After risk evaluation, the following step is risk management whose goal is to eliminate risk, i.e. decrease of unacceptable risks to acceptable level.

One document related to all employees, and primarily to IT and Operations Division is the instructions for security of IT system development and maintenance.

Depending on security classification, each system must fulfil certain security requirements. These requirements are obligatory both for existing systems and systems that shall be introduced and developed. In the latter case, requirements represent an integral part of project documentation, while in case of systems which are already in the process of production, requirements are applied retroactively.

C. Establishing organization that shall learn

One of the key elements of preventive protection is security training for all employees at the bank. Training decreases the number of irregular events, either external or internal, both intentional and unintentional.

On one hand, employees' awareness regarding security is being raised, and on the other hand, it is clearly and unambiguously pointed where to direct attention.

Furthermore, employees after training are also aware that their work in the view of IT security is monitored, and this awareness especially decreases the number of intentional abuse – they know that they shall be identified and penalized.

Officers at the bank must continue to learn. It is especially important to perform training within IT security continuously.

This shall establish an organization that learns. Continuous training makes the organization and people competent and assured regarding their work.

V. CONCLUSION

Serbian educational system must contain education regarding IT security and data protection. Training is unavoidable requirement.

It is impossible to evaluate all we face at once, but nothing shall be changed until we face it in the most concrete sense.

Through this work, contribution is supposed to bi given in order to achieve the abovementioned aim.

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CONSTRUCTIVIST SEMANTIC ASSESSMENT TOOL FOR TEXTUAL LEARNING MATERIAL

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Abstract – A conceptual model of a pseudo-autonomous constructivist student assessment system is presented in this paper.. This system is based on the existing Drag and Drop Semantic Interface (DSi) and utilizes principles of constructivist learning in the assessment of student's knowledge. Principles and implementation aspect of DSi, as well as the user and implementation sides of the follow-up conceptual model have been described and discussed.

I. INTRODUCTION

Intermingling of learning and assessment in e-earning systems poses various challenges both for system and instructional designers, and represents one of the key values of constructivistic approach to learning. Similarity in nature, implementation and user experience between subsystems for knowledge delivery and assessment may be the key component for meeting this objective. The conceptual model for assessment based on the existing semantic-layered instructional model brings knowledge delivery and assessment close toghether while at the same time providing constructivist knowledge generation environment.

In the second and third part of the paper, theoretical foundation of e-learning and constructivism, with their implications on the system described, are discussed. In the fourth part, the existing e-learning solution (Drag and Drop Semantic Interface) has been described. The fifth part discusses the conceptual model of the assessment system, designed as the follow-up to the described implemented solution, along with the typical user interaction scenario and the scoring methodology. In conclusion, key ideas are summarized and directions for further research have been given.

II. THEORETICAL FOUNDATIONS OF E-LEARNING

Though thoroughly and widely researched, the area of e-learning continuously shows misbalance between pedagogical and technological component. Large portion of literature is predominantly descriptive, formatted as what is done and how it evaluated against defined test cases [1]. This approach does, none the less, yield applicable results. What causes the misbalance is primarily the strong lead of technology over the theoretical foundation [2], caused by current rapid advance of digital learning tools. IEEE Learning Technology Task Force defines a set of fundamental e-learning principles, among which it emphasizes that the choice of e-learning tools must reflect, not dictate, the course pedagogy [1]. However this goal still seems an inch out of reach, after the initial zeal (and subsequent sobering) of the e-learning community, research lent more towards the classic learning theories and the possibilities of their integration in digital instructional design.

The choice of theories revolves around three – behavioral, cognitive and constructivist [3], ordered with respect to the level of sophistication. While behavioral theory suits best the mechanical approach to learning (originated in Sydney Pressy's pioneer learning/testing machine, founded in B. F. Skinner's postulates) [4]. Cognitive theories view learning with slightly higher resolution, through the model of short and long-term memory, analyzing learning material through parameters like cognitive load, providing guidelines for more effective absorption and better retention of the material learned [5]. Constructivism takes another step forward, putting the knowledge source inside the learner, as the agent that creates knowledge within the learning environment.

III. CONSTRUCTIVISM

The definitive choice of learning theory would only impose limitation over the instructional design process; appropriate compound of theories backs up any design of material and delivery. However, if we consider several key aspects of e-learning, as presented by [6]:

- *push*, instead of pull delivery,
- *reaction* to challenge, instead of expectance,
- *unlinear*, instead of linear sequencing,
- *personalized*, instead of mass-produced material,
- *dynamic*, instead of static content etc.,

constructivist approach appears to be best suited for e-learning purposes. This theory sees learning as a dynamic process in which learners construct new ideas or concepts on their current/past knowledge and in response to the instructional situation. Constructivism implies the notion that learners do not passively absorb information but construct it themselves [7]. Brief, still comprehensive summary of constructivism traits is compiled by [8]. Some key characteristics outlined here are the following:

- goals and objectives are derived by the student or in negotiation with the teacher or system;
- teachers serve in the role of guides, monitors, coaches, tutors and facilitators;
- activities, opportunities, tools and environments are provided to encourage metacognition, self-analysis -regulation, -reflection & -awareness;
- the student plays a central role in mediating and controlling learning;
- exploration is a favored approach in order to encourage students to seek knowledge independently and to manage the pursuit of their goals etc.

Push principle means that the student retrieves knowledge from the system according to their need, which fits into the principle that the objectives are set by the student (and the role of the teacher). Since true e-learning systems imply adaptability, it's student-centered and favors independent sequencing and navigation, favoring exploration and independent pursuit for knowledge. Overlapping of e-learning and constructivism principles is hence self-explanatory.

The nature of the assessment system described later in this paper matches key principles of constructivist approach. Before its description, the underlying system, upon which the assessment conceptual model is built, will be presented.

IV. Drag and Drop Semantic Interface - DSi

The idea of an intuitive user interface for accessing semantic layer of a text/HTM-based learning material was first announced in 2007, at [9]. This idea was implemented in form of an *asset* intended for use in L(C)MS systems, though it is equally usable as a standalone system. The system is labeled Drag and Drop Semantic Interface (DSi) [10] and consists of two layers:

1. text/HTML lesson layer, and
2. semantic RDF/XML layer.

Based on the semantic layer (separate text file with, but not limited to, RDF type expressions) the system recognizes denoted words (lexemes) in the front-end textual document (lesson), assigns drag and drop functionality to each and enables the user to, by means of dragging and dropping one lexeme onto another, query the accompanying semantic document for any relations between notions expressed through lexemes.

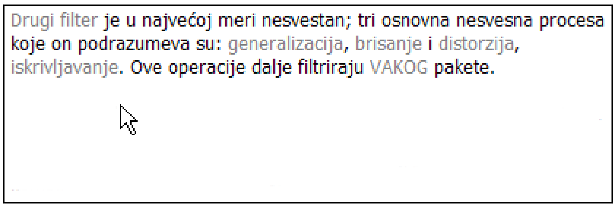

Figure 1. Both Documents Loaded, Draggable Keywords Highlighted.

A. *Front End*

The user interaction scenario can be described as follows. The user/learner opens the instructional page and the lecture content (txt/HTML) gets loaded, as well as the semantic document (itself invisible to

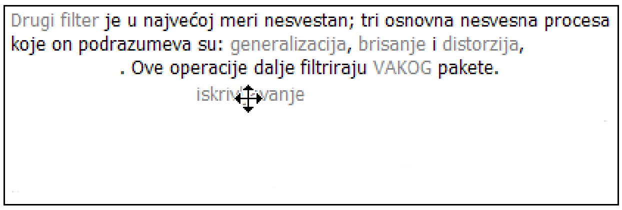

Figure 3. Dragging One Lexeme Onto the Other.

the user). Upon loading of semantics, draggable lexemes are emphasized (with color or any appropriate CSS property) – Figure 1.

When the user gets confused about the relation

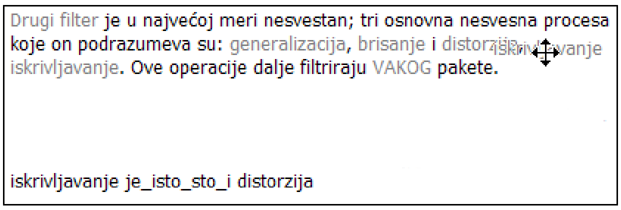

Figure 2. Relation Between Lexemes Returned.

between any two notions, given both are draggable, they take any one of the two (upon hovering, cursor changes), drags it and drops it over the other one (Figure 2).

Upon dropping (on release of the mouse button), any defined relations between chosen lexemes (and notions beneath) are displayed as shown in Figure 3.

B. Back End

Described functionality is achieved in two phases: front end text material preparation (adding drag and drop feature) and event handling. First phase is triggered upon loading of the page. Java Script function loads text material from the server via an Ajax call and buffers the text in a variable. Another function is called to load the semantic file into appropriate data structure (via a JS-RDF query framework [11]). Another function lexically compares all words in the text (broken into spans) with loaded RDF and assigns an ID (and drag and drop ability) to any found.

C. Semantics

Semantic document has RDF/XML format. This structure cannot be labeled as a full-featured ontology (in Semantic web terms) but rather a graph. RDF as a language does not support true ontologies; in order to achieve firm formal semantics, as required by Semantic web guidelines [12]. However, RDF approach offers enough expressiveness and simplicity to be easily adopted by (non-IT based) instructional designers – provided the intuitive enough interface. Moreover, foundations set in this system leave room for further upgrades (towards RDFS or OWL-based semantics).

Though RDF usually consists of triplets, semantic document RDF consists of n-plets (Figure 4). These are triplets in nature (subject, relation, object), but between any two lexemes multiple relations can be defined. The example n-plet in RDF/XML notation is given in the Figure 5.

```
<foaf:Person rdf:nodeID="Robert Dilts">
  <foaf:name>Robert Dilts</foaf:name>
  <eg:je_jedan_od_najznacajnih_za_razvoj_modernog
rdf:nodeID="NLP"/>
  <eg:je_studirao_na rdf:nodeID="University of
California Santa Cruz"/>
  <eg:je_obucena_u_NLP-u_od_strane rdf:nodeID="Richard
Bandler"/>
  <eg:je_obucena_u_NLP-u_od_strane rdf:nodeID="John
Grinder"/>
  <eg:je_jedan_od_pripadnika
rdf:nodeID="metageneracija"/>
</foaf:Person>
```

Figure 4. An Ecample of the RDF N-plet in RDF/XML.

All relations are defined lexically, in natural language, and are intended for human understanding only. Machine-understandable relations require higher level of formal semantics and will be the subject of further research.

V. CONSTRUCTIVIST ASSESMENT - DSIA

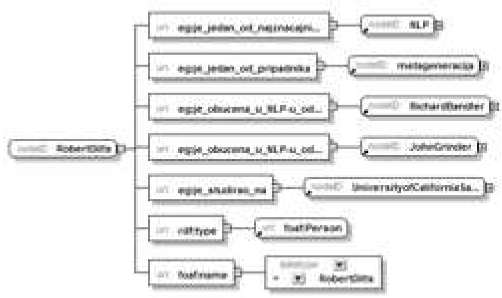

Figure 5. An Example of the RDF N-plet.

The DSi system offers intuitive user interface and semantic layering of text-based learning material. Primarily intended for aiding to delivery of knowledge, this system opened doors for qualitatively new modes of application, one of which is in the focus of this paper. Considering that constructivist approach appears to be the most promising in e-learning, several aspects of it led to development of a assessment system concept model based on semantic layering of material. Some of key characteristics of constructivism particularly suited for this approach are [8]:

- knowledge construction and not reproduction is emphasized,
- knowledge complexity is reflected in an emphasis on conceptual interrelatedness and
- assessment is authentic and interwoven with teaching.

Drag and Drop Semantic Interface Assessment (DSiA) is a constructivist assessment system currently in development. Based on the DSi, this system modifies the interaction with the learner from the reception of knowledge to assessment through construction of knowledge. This assessment method interweaves good with teaching using DSi interface, and is based on detecting (constructing) interrelations between concepts described in learning material.

A. DSiA Scenario

In the DSiA system, typical interaction with the learner is intended to be as follows. The user is given the learning material, through the DSi interface or any other way. In the process of assessment, learner is expected to construct as many relations between the lexemes (and underlying notions) as possible. Since assessment is expected to be time-bound, irrelevant relation creation is discouraged. The more relevant relations the student creates, the higher the score.

B. *Scoring*

DSiA is designed for weighted scoring of student's relations. The more relevant relations is (for the particular context), the higher the weight. Relevance is determined by the teacher/course moderator and is dynamic. Assessment procedure breaks down into two phases: automated and teacher-reviewed phase. In the automatic phase, the system scores student's relations in accordance with the predefined set of relations and respective relevance factors (weights). Learner's relations are compared to predefined ones lexically, with or without a certain degree of lexical freedom (case sensitivity, substitution of letters, deletion of extra white symbols etc.). The second phase occurs when the student provides relations that exceed the predefined relation set. This may occur if the lexical or syntactical form of relation offered mismatches the predefined (despite the same semantics), or when new and yet undefined relations occur. In this case, the system alerts the teacher and offers new relations, any of which they can pronounce synonimical (or in any other relation) to any predefined, or add to the set of predefined as new – for further use of the system. In this way, the system is open to benefit from every new user, adding the Web 2.0 component to its functionality – closely monitored by the teacher/course moderator.

VI. CONCLUSION

The DSiA concept model discussed in this paper represents an attempt to implement several key concepts of constructivist approach within an assessment system. Concept model of this system is based on the existing semantically-layered knowledge delivery system (DSi), with the data-flow reversed – from system to student, to student to system (constructing inter-conceptual relations in a given textual material). The system is aimed primarily to assess student's knowledge, but it also encompasses several Web 2.0 elements – in particular, the potential growth of the relation base with each learner's interaction with the system. However, in this context, close moderation is a requirement.

Further directions for development may include an instructional designer's backend interface, with the intention of intuitive interface for adding relations, primarily for non-IT experts and instructional designers. Formal semantics in relations may be achieved with the implementation of RDFS or OWL framework, which offer more expressiveness but also pose more limitations to semantic layer. Also, automated reasoning may be introduced to the system, reducing the efforts on the teacher's side and swathing more workload to the system (particularly in estimating the validity of any offered relations that don't exist in the predesigned relation base).

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DEVELOPMENT FACTORS OF PREDISPOSITION FOR PLAIN SONG

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Abstract – A possibility for analyzing family factors in development predisposition for choral singing by means of Syntax Systematic Classification of Objects (SSCO method) is discussed in this paper. The main subject of analysis is the influence of family on the development of interest and motivation for participating in choirs in younger schoolchildren, as well as the extent to which this influence can or cannot resist the influence of child’s music that he chooses to listen to and sing, the cases in which the family exerts positive and negative influence on child's singing, and whether or not the children can make decisions in school about musical influence, different from the one they're exposed to at home. Based on the questionnaire the schoolchildren did with the assistance of a conductor the data table was formed. This table was then used to generate decision rules with the SSCO. These rules showed connections between children's responds and experts' opinion. The results obtained have shown the precise analysis of the influential factors and gave contribution to the research of family influence on choral singing in children.

I. INTRODUCTION

This work is a result of the investigation of the influence of family on children's choral singing by using artificial intelligence. Among school children today are less interested in choral singing than in past years and there was a need to analyze the factors that led up to it, and to solve this problem by more thoroughly influence on children.

The second section of this paper presents the influence of family on the development of children's musicality based on the pedagogical work. The third section presents a questionnaire that students were doing. By the questionnaire and with the assistance of conductor is formed a table of data. This table is used for generating of decision rules.

The goal was to generate decision rules that would establish the links that exist in the data table. These rules would determine the exact factors that determine a positive or negative influence on children's plainsong.

The fourth section gives a brief overview of the SSCO [1][2][3] and presents an original method to generate decision rules. The fifth section presents the results obtained by SSCO. Finally the conclusions are set out in the sixth section.

II. FAMILY INFLUENCE

The role and importance of family relationships in child development is emphasized by all authors who work with families, but the nature of these impacts they perceive differently. The child is not born as a formed person, as an active being, but it becomes that in the interaction with the environment, its own activities and in comunication with the environment. What makes the development of personality, as emphasized in contemporary theories of personality development, is learning in early childhood [4].

Process of learning and developing student's interest for singing in class and plainsong, is durable, and requires early influence on the child. One, if not the most important link in this process is the family, then the teacher who assumes the role of parents and from whom depend on the further interest of pupils and development of musical abilities, and we must not forget that in elementary school, if it is incentive for the music development, it creates "nursery" of future musicians and music lovers. The type of activity of the family environment determines childs demonstration of musical ability. If the individual dispositions are innate and are a prerequisite for the development of musical dispositions, and genetic factors also, then it is certain that they can only develop in a favorable family environment. "... Musicality is a result of the interaction between the environmental heritage and favorable macro - and micro - factors" [5].

The family, as one of the oldest human institution, has undergone many transformations at the individual level, which is reflected primarily in changes in lifestyles and family structures. In the family a child receives the first images of art, experiencing the playing and singing of its parents, which form first impressions of music that can later be developed through teaching in school. Through the contents of songs parents "bring up" children and they carry them some aesthetic and moral values.The educational function of family, even though treated differently throughout history - from neglect to emphasize the special role of her, was emphasized as the most important. Regardless of the educational function of families is shared with other community agencies, educational process that it achieves is very special, and it is indispensable. It is based on the specific emotional relationship that the educators who are not their parents can not build." [6]. Older theories have emphasized only the positive role of the family, but today a new understanding of the role of the family go in the direction of highlighting the crisis of the family whose causes are social, and they can not be even solved. In such circumstances, the family does not develop and foster the child's taste in music. It forgets that song educate in the spirit of love, tolerance, mutual respect, introduces us to our culture and other peoples, fosters a positive and cheerful attitude towards the environment and create lasting value.

Researches shows that exposing children early and systematic to a musical experiences contributing to the development of certain aspects of intelligence, better coordination of movements, concentration, memory and development of sensitivity to the understanding and experiencing music [7]. As stated Gembris in [7] development of skills is achieved through just listening to music, and later through joint singing or playing, and through parents support to deal with the music.

Environment influence by Bogunovic [8] takes place in three ways: namely, the child may be able to passively using genetic material and musical favorable environment, when living in a family that provides musical influences (professional musicians, education of family members, musical activities, interests, the presence of musical instruments, listening to the instrumental performance of the parents). Another way is the relationship between innate and acquired, where the child who loves music cause major musical influences of the one who is not interested. The third way is an active association of congenital and acquired, when the child selects the active bids in the region and shapes them according to their hereditary traits. One of the roles of parents towards Juric is and to encourage a child to engage in extracurricular activities in which just one of the choir.

III. QUESTIONARY, MUSICAL TEST AND TABLE

In order to analyze the influence and characteristics of family environment of students, to the development of vocal skills, we have determined the methodology. First we determined indicator of family profile for students of primary school. These are: musical stimulation in the family for singing and incentives for joining the chorus.

The goal of the research came from the indicators of family profiles of students and that is: To determine whether family background affects the development of students' interest for inclusion in the choir - singing and consequently the development of vocal abilities of students?

These are: musical stimulation in the family for singing and incentives for joining the chorus.

Based on the research goal have arisen following tasks:

Task 1. - determine what kind of music students like to sing?

Task 2. - determine how many students are interested in singing in the choir?

Task 3. - to examine whether music plays in the family?

It were tested both sexes aged 7-10 years. The sample included 60 students of third and fourth grade of primary schools in Sombor and Kikinda. The questions were the choice, while the question about musical instruments has an open part for writing a possible musical instrument.

On the first question "What kind of music do you like to sing? ", most respondents chose the answer “Hip - Hop, Metal, Rap, Techno, and Rock”, (43%). Then, follow the answer “fun” (38%). Art music and children's songs sung 15%, while traditional folk music sung only 3%. Girls opposite boys prefer art music, children's songs and traditional folk. These data suggest to us that the artistic and cultural value, have lost somewhere in the development of society. Students do not have the habit of singing children's songs, valuable works of art and of the traditional folk music, because it is not known. We missed the opportunity to be "in time" meet and become interested, because the family has focused interest of the child.

The question: “How much do you interested to sing in the choir?” most students opted for the "yes, I am very interested" (40%). Then the number of responses followed by "moderately interested" (25%), fewer (20%) stated "not at all interested, " while the answer "I do not know" give a small number of students (15%), but not negligible. The answers to this question indicates to us that students interested in singing in the choir, though the percentage of those who were moderately interested (25%) indicates that these students may not be sufficiently informed or motivated to turn the chorus. Family influence is especially pronounced here because the parents are the main actors in routing and encouraging their children to sing and involvement in the choir.

The question: “Does music plays in your family?” offered were only two answers: yes or not, because we were only interested if the family is a stimulating environment for the development of musical abilities, and therefore the vocal. It was not important whether some members of the family play, because we did not go into detailed analysis.

The results showed that in 38% of students playing in the family, while there is the much larger number of those children whose families can not play (62%). Those children, whose families are played, sang well on the test and showed interest in participation in the choir. We supposed that effect of family environment through this component is the most, both in positive and negative sense, because many parents themselves do not sing, especially children's songs that develop musical disposition and aesthetic side of child personality. This assumption and more detailed analysis of the responses we received at the end of the methods of SSCO.

Each child was later tested individually by a teacher of music culture - conductor. Based on songs sung, she concluded if the child has or has not the developed predispositions for plainsong. Her opinion is added to data from the questionnaire as an expert opinion. Tthereby the response of developed predispositions was decision attribute for SSCO system.

IV. SYSTEMATIC SYNTAX CLASSIFICATION OF OBJECTS

SSCO method was used to generate IF THEN rules. As a basis for understanding its results, at the beginning of this section, it was given the basic concepts of the theory of rough sets [9].

A. *Indiscernibility relation*

The indiscernibility relation is the mathematical basis of Rough sets theory. Formally, as in [10], let U be a universe (finite set of objects), $Q=\{q_1,q_2,...,q_m\}$ is a finite set of attributes, V_q is the domain of attribute q and $V=\bigcup_{q\in Q}V_q$. An information system is the 4-tuple $S=\langle U,Q,V,f\rangle$ where $f=U\times Q\rightarrow V$ is a total function such that $f(x,q)\in V_q$ for each $q\in Q, x\in U$, called information function. To every non–empty subset of attributes P is associated an indiscernibility relation on U , denoted by I_P :

$$I_P=\{(x,y)\in U\times U : f(x,q)=f(y,q),\forall q\in P\} \quad (1)$$

The relation (1) is an equivalence relation – reflexive, symmetric and transitive. The family of all the equivalence classes of the I_P is denoted by $U|I_P$ and class containing an element x by $I_P(x)$.

If there is (usually) one attribute called decision attribute while other attributes are called condition attributes, an information system is called decision system. Let X be a non–empty set of U and $\emptyset\neq P\subseteq Q$. Set X is approximated by means of P–lower (2) and P–upper (3) approximations of *X*:

$$\underline{P}(X)=\{x\in U : I_P(x)\subseteq X\} \quad (2)$$

$$\overline{P}(X)=\bigcup_{x\in X}I_P(x) \quad (3)$$

The P–boundary of X is denoted by $Bn(X)$:

$$Bn(X)=\overline{P}(X)-\underline{P}(X) \quad (4)$$

B. *Classification as the foundation for if-then rule synthesis*

Let us choose attribute $q_i\in Q$, where $Q=\{q_1,q_2,...,q_m\}$ is a finite set of attributes. Number of classes generated by (1) performed on this attribute is $|V_{qi}|$, where $|\cdot|$ stands for set cardinality. The *j*-th class ($j=1,...,|V_{qi}|$) of *i*-th attribute ($C_{i,j}$)

consists of those elements of universe for which relation R is satisfied:

$$C_{i,j} = \{x : x \in U, R(f(x,q_i), v_{i,j}) = true\} \quad (5)$$

Here $v_{i,j}$ is *j*-th value of *i*-th attribute and f is information function. If R is relation of equivalence then indiscernibility (1) is preserved [1].

The automated rule extraction technique without previous reduct computation was developed (programming language Pascal, Borland Delphi 2005) using (5) [1]. Now, it is possible to carry the task of state–space search in the manner of depth first search algorithm. This is one of the basic algorithms in domain of complex problem solving [11]. The root of the state–space graph is set $P \subseteq U$, nodes are sets $C_{i,j}$. The arcs (operators) of state–space graph are defined by (5). Proposed iterating algorithm exploits functional dependences between condition and decision attributes which are expressed in form of If – Then rule: $\alpha \to \beta$, where α is antecedent part of the rule formed by condition attributes (without superfluous attributes) and β is consequent part of the rule formed by decision attributes. Under the assumption that decision attribute is the last one, every path of state–space graph which ends with non–empty leaf will produce one decision rule. It is obvious that generated rule includes reduct in sense of Rough set theory because superfluous attributes are omitted from α. The "roughness" is achieved in the case that β is formed by two or more leafs. In general, it is not necessary to compute reduct in advance to rule composing algorithm execution, though reducts are computed as a part of rule induction procedure. Maximal number of nodes in state space is:

$\sum_{n=1}^{|C \cup D|} \prod_{i=1}^{n} |V_{qi}|$, where C is set of condition attributes and D is set of decision attributes. In this case not any info-gain function is applied as in case of C4.5 algorithm proposed by Quinlan [12]. It is obvious that technique proposed in [2] takes into account attribute priorities.

V. RESULTS

Using SSCO methods, results were as follows:

```
1. [2,1]       IF  (a1,4), (a2,4),
   (a3,2) THEN (a4,-2)
2. [1,1]       IF  (a1,4), (a2,4),
   (a3,1) THEN (a4,-1)
3. [7,1]       IF  (a1,4), (a2,3)
   THEN (a4,-2)
4. [4,1]       IF  (a1,4), (a2,2),
   (a3,2) THEN (a4,-2)
5. [1,1]       IF  (a1,4), (a2,2),
   (a3,1) THEN (a4,-1)
6. [5,0.8]     IF  (a1,4), (a2,1),
   (a3,2) THEN (a4,2)
7. [5,0.2]     IF  (a1,4), (a2,1),
   (a3,2) THEN (a4,1)
8. [1,1]       IF  (a1,4), (a2,1),
   (a3,1) THEN (a4,-1)
9. [6,1]       IF  (a1,3), (a2,4)
   THEN (a4,-2)
10.[4,1]       IF  (a1,3), (a2,3),
   (a3,2) THEN (a4,-2)
11.[1,1]       IF  (a1,3), (a2,3),
   (a3,1) THEN (a4,-1)
12.[5,0.8]     IF  (a1,3), (a2,2),
   (a3,2) THEN (a4,2)
13.[5,0.2]     IF  (a1,3), (a2,2),
   (a3,2) THEN (a4,1)
14.[3,1]       IF  (a1,3), (a2,2),
   (a3,1) THEN (a4,-1)
15.[2,1]       IF  (a1,3), (a2,1)
   THEN (a4,-1)
16.[1,1]       IF  (a1,2), (a2,4)
   THEN (a4,-1)
17.[1,1]       IF  (a1,2), (a2,2)
   THEN (a4,-1)
18.[3,1]       IF  (a1,2), (a2,1)
   THEN (a4,-1)
19.[2,1]       IF  (a1,1), (a2,2)
   THEN (a4,-1)
20.[2,1]       IF  (a1,1), (a2,1),
   (a3,2) THEN (a4,-1)
21.[9,1]       IF  (a1,1), (a2,1),
   (a3,1) THEN (a4,-1)
```

Translated into the spoken language, the rules are:

1. If the child loves to sing hip-hop, metal, rap, techno, and rock music and if does not know if they are interested in plainsong and if no one in his family does not play music, then that child has not developed musical affinity of plainsong.
2. If the child loves to sing hip-hop, metal, rap, techno, and rock music and if does not know if he is interested to plainsong and if his family is playing, then that child has developed musical affinity of plainsong.
3. If the child loves to sing hip-hop, metal, rap, techno, and rock music and if does not interested to plainsong and if his family does

not play, then that child has not developed musical affinity of plainsong.

4. If the child loves to sing hip-hop, metal, rap, techno, and rock music and if it is moderately interested to plainsong and if his family does not play, then that child has not developed musical affinity of plainsong.
5. If the child loves to sing hip-hop, metal, rap, techno, and rock music and if it is moderately interested to plainsong and if his family is playing, then that child has developed musical affinity of plainsong.
6. With probability 0.8-generated rule is: If your child loves to sing hip-hop, metal, rap, , techno, and rock music and is very interested to plainsong and if his family does not play, then that child has not developed musical affinity of plainsong.
8. If the child loves to sing hip-hop, metal, rap, techno, and rock music and is very interested to plainsong and if his family is playing, then that child has developed musical affinity of plainsong.
9. If the child loves to sing pop music, and if his family does not play, then that child has not developed musical affinity of plainsong.
10. If the child loves to sing pop music and not interested to plainsong and if his family does not play, then that child has not developed musical affinity of plainsong.
11. If the child loves to sing pop music and not interested to plainsong and if his family is playing, then that child has developed musical affinity of plainsong.
12. With probability 0.8-generated rule is: If the child loves to sing pop music and is moderately interested to plainsong and if his family does not play, then that child has not developed musical affinity of plainsong.
14. If the child loves to sing pop music and it is moderately interested to plainsong and if his family is playing, then that child has developed musical affinity of plainsong.
15. If the child loves to sing pop music and if it is very interested to plainsong, then that child has developed music affinity of plainsong.
16. – 18. If the child loves to sing traditional music, then that child has developed musical affinity of plainsong.
19. If the child loves to sing art music and children's songs and is moderately interested to plainsong, then that child has developed musical affinity of plainsong.
20. – 21. If the child loves to sing art music and children's songs and is very interested to plainsong, then that child has developed musical affinity of plainsong.

Rule number: 2, 5, 8, 11, 14, 21, who have data that the family of the child playing in their IF part, in the THEN part all they have concluded that the child has developed musical affinity of plainsong. Inverse, it is demonstrated the negative influence of all the rules which in the IF part have information that the in family of that child noone plays music. The rules with the number 1, 4, 6, 10 and 12, which in THEN part have conclusion that the child has not developed musical affinity of plainsong, in the IF part all have the information that the family of that child not play.

VI. Conclusion

The results confirm the interest of students for singing and the inclusion in the choir based on the influence of families. In a family where playing an instrument is present, the child receives positive musical stimuli. And in the opposite cases, the effects of negative impacts are to be analyzed.The resulting rules provide a very detailed analysis of the impact. They are suitable for further testing of children without the necessity of checking by an expert (do not need to be further tested to sing a song). Rules can serve as confirmation of the positive impact that the family had, and as an alarm for under-stimulating or bad influence of the family. The resulting rules can be used to classify students on the grounds of questionnaire results and without taking into consideration the music professor. Based on these rules, for any student it could be concluded whether the family has influence on their plainsong or not.

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COLOR MANAGEMENT IN GRAPHIC DESIGN LECTURES

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Abstract - Fundamental principles of color management as one of fundamental aspects of contemporary graphic industry are discussed in this paper. It also describes color management topic as one of the central topics within the course of Graphic Design at the Technical Faculty "Mihajlo Pupin" at Zrenjanin, Serbia, and the role it plays in teaching within this area.

I. INTRODUCTION

With the expansion of international goods and services interchange – and consequent technologies interchange – consuming of non-standardized products and services became increasingly difficult, if not impossible.

If we view a standard as a written document which prescribes certain norms, procedures and criteria accepted by the group of people it applies to, standardization is then defined as the process of developing and adopting these documents, with the aim of rationalization of manufacturing by means of decreasing large amount of variations to a smaller number of typical patterns with non-varying quality [1].

In the process of education in IT there is significant need for understanding standardization, especially in the graphic industry which is nowadays tightly bound with information technologies.

With the advance of technology, in the area of digital photography and print, there have been significant advances – both in terms of quality and speed of production of printed material, and its massification. Massiveness brought about large quantities of non-standardized input and output devices such as digital cameras, still cameras, scanners, printers, plotters etc. Production chain in which such devices are present results in graphic products of unpredictable quality.

The purpose of this paper is to present the role of color management in teaching of graphic design, as well as presenting contemporary color management procedures performed in graphic industry in order for the excellent quality level of digital print, as defined in the ISO 12647 standard, to be achieved.

The aforementioned standard not only does dictate quality control, i.e. the analysis on whether or not the product meets the requirements or not, but also imposes complete quality management – which in turn promotes and stabilizes the production.

The paper discusses fundamental concepts of color management, reference color spaces, color conversion principles, the role the color management plays in the Graphic design course, as well as characteristics of contemporary displays and methods of this calibration, which is to illustrate the one practical aspect of color management. Concluding remarks are given at the end of the paper.

II. COLOR MANAGEMENT SYSTEM

The flood of non-standardized input devices, such as digital motion/still cameras and scanners, has made the difference in digitalization of the same image between different devices a common occurrence.

In the print process unreliability of display colors is also common, both on trial and production prints. Namely, the image on uncalibrated or factory-calibrated displays differs from printed. This is also true for trial printouts on uncalibrated printing devices; colors on the tryout can't predict colors on the actual print.

Repeating the whole circulation also brings numerous risks. Due to differences in toners, paper quality, printing methods, dot gains etc, it is rather difficult to achieve satisfying match between prints from different machines [2].

These manufacturing problems imposed the need for control over all the devices in the production chain in order to increase print quality.

The expression "quality control and management" is often misinterpreted as top quality. Similarly, the notion of color management is commonly misinterpreted. Behind this label there is a set of technologies and methods, devices and software which enable us to predict how a certain job, along with its requirements in qualitative and quantitative sense, will be managed from the beginning (input data) until the final product (output data).

Basic goal is to produce not only technological but also production and financial effects. By introducing standardization we accomplish:

- fewer corrections until desired print colors,
- shorter preparation time, which results in more preparations done in the same time,
- less spoilage,
- smaller dye consumption,
- shorter production cycle due to automated work activities.

Principles of color management introduction are based on:

- development of scanner calibration profiles
- development of display calibration profiles
- development of trial print machine profiles
- development of production print machine profiles
- preparation for print on calibrated display which simulates production print colors
- creating trial print for all orders with which the color quality requirements are strict
- printing plates illumination with the application of profiles.

The idea of color management dates back from 1993. In previous business systems, so called closed-loop systems, images would always come from the same source and experts were operate same, well known devices – machines they knew well and could have perform with highest quality. With the change in business model and introduction of open-loop systems, a field of new problems ocurred. Large number of unknown devices with unknown performance parameters involved in the process of generating graphic products created an environment in which we can no longer rely solely on experts' skills [3].

From this viewpoint, color management could represent a system (Fig. 1) for calibration of all input and output devices in the image processing chain, in order to achieve desired color reproduction regardless of the characteristics of devices involved [4].

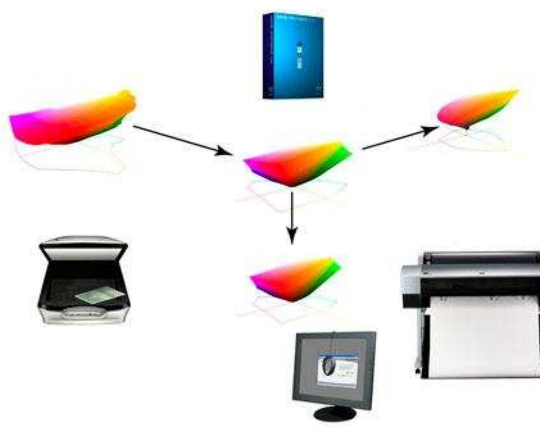

Figure 1. Color management

Color management uses CIELAB and CIEXYZ color spaces by means of which it translates colors to respective RGB and CMYK values.

It is important to know that RGB and CMYK aren't colors but control signals adjusted for various devices such as displays, printers and the like. Color management system must "know" which colors are associated with RGB and CMYK values and assure consistent experience of color, regardless of the device that reproduces it [5].

A. *Profiles*

ICC Profile acts as a link between devices and the reference color space – human and machine color interpretation. It is a file consisting of the header, the table with labels and basic information of labels. It describes the device behavior within RGB and CMYK and color values regardless of device – so called CIELAB values. The device to without an ICC Profile assigned is impossible to include in the color management system.

B. *Color Management Module – CMM*

The notion of CMM refers to a module that literally performs conversion of RGB or CMYK values, using CIELAB color information, contained in profiles. Profiles may not contain PCS for every particular color (due to excessive amount of information), because of which the CMM interpolates color values. CMM operates on the principle of calculating unknown mid-value using two known color values. It can also perform simulation of translation to various color spaces. Most common CMMs are: Adobe (ACE), Microsoft ICM, Apple ColorSync and Apple CMM [6].

C. Color conversion principle

In order for a certain color to be displayed identically on various devices, color management system assigns specific color with RGB and CMYK values and changes those values as the color travels through different devices. With the values defined this way, original image values are joined with the original source values.

According to [7], color conversion is performerd the following way:

1. CMS gathers data from the source profile and creates a corelation table of RBG/CMYK values and PCS with relative colorimetric rendering (adjusting colors that, in process of conversion, appear outside the output color range – gamut).
2. CMS gathers data from the output profile and creates correlation table of PCS and destination RGB/CMYK values using the chosen rendering.
3. With the rendering algorithm i CMM, CMS connects the two tables in on using common PCS values. Newly created table connect input and output values.
4. CMS processes every pixels using this table and in this way the colors are converted.

III. The Role of Color Management in Graphic Design Course

One of the Graphic Design Course objectives is providing fundamental knowledge in the area of color management. Accordingly, every course unit, in more or less depth, tackles this area.

The main problem in the graphic production chain is the difference between colors on display and in print – primarily due to using different color spaces (RGB and CMYK, Fig. 2). Within the lessons "Color Models" and "Overpassing Gamut" students find out that the CMYK color space is narrower than the RGB space, with the clearest and the most saturated colors actually outside the gamut. In the RGB color space the spectrum is formed from three primary colors: Red, Green and Blue. Ba variations in illumination of these, display can produce any color. Absence of light in the RGB system has the appearance of black, while the full presence of all three components equals white. Due to the way of combining primary colors and creating new, RGB system is also labeled as additive.

The problem ocurrs when an RGB image needs to be transferred to paper. Colors on paper do not emit light as on a computer display – on the contrary, they operate through light absorption. For example, red pigment absorbs all the light waves except the red ones it reflects. This is called the subtractive method, in which mixing of colors leads to black and absence of colors to white.

The color system for print is based on Cyan, Magenta, Yellow and by combining two subtractive primary colors it is possible to acheive one additive primary (eg. cyan and yellow form green).

RGB to CMYK transformation is possible but, as stated earlier, it makes the image significantly different, primarily due to the very nature of color creation in these systems. However, this is not the only reason.

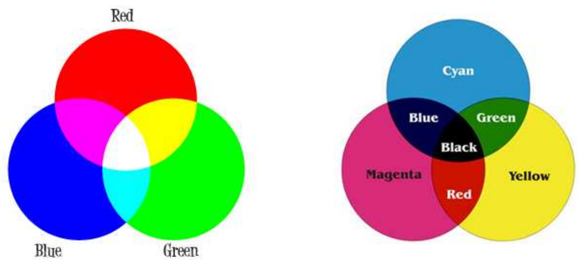

Figure 2. RGB and CMYK

It is crucial to understand that there is no single, fixed CMYK gamut, which will always produce the same color, since it depends on various factors in the print process. Different print dyes from different manufacturers tend to have subtle differences, creating different gamuts. The power of each primary color is determined by its halftone point, so the absorption quality of the paper used must also be taken into consideration.

Both RGB and CMYK can be considered device-dependent. Color spaces depend of the physical components and characteristics of devices on which they are applied. Print dyes are always labeled CMYK, even though any of the primary colors may differ from device to device. Same is true of the RGB devices, where the actual color produced depends on the phosphor layer (in displays) or filters used (scanners, digital cameras). End result is usually a varying-color final product [5][8].

Color spaces that are device-independent define color by human perception. The most important group of these spaces is based on the CIE Commission recommendations from 1931 and 1964. Due to the lack of XYZ color space, CIE Commission has defined CIELAB and CIELUV color spaces in 1976.

IV. Practical Implications

In order for the color management to operate well, characterization and calibration of all devices in the production chain is needed. As an example we will take the display calibration.

Characterization is a procedure through which the device operation mode is registered and profiled, and its behavior is described. The profile contains information about gamut, dynamic range and reproduction of tones the device is able to achieve.

Calibration is the procedure through which the device operation mode is altered in order to achieve the desired device behavior. It encompasses white spot temperature adjustment, light, contrast and viewing conditions. By means of calibration the device is put into optimal state, characterized by maximum gamut and unchangeable color reproduction. Display calibration is not a long term result operation. Displays lose performance in time, due to components aging (eg. phosphor elements in CRT monitors). In order to preserve image fidelity, occasional calibration is required, as long as the device can meet existing standards [7].

Gama correction affects the total illumination of the image and if not properly set, image display is either too dark or too pale. Each pixel on the photography can have illumination value between 0 (black) and 1 (white). These values are sent to the monitor as the input signal. Standard gama values for black and white Macintosh monitors are 1.8 while Windows-based monitors usually have the value of 2.2 (the value of 2.5 is also present in literature).

The white point is one of the basic parameters within the display calibration procedure. There are several standardized tones, measured in Kelvins (5000K, 5500K, 6500K, 7300K, 9300K), choice of which determines the preferred tone of white. In graphical industry usual standards are D50 and D65. Standard D50 (5000K) provides warmer white, with a hue of yellow. Standard D65 (6500K) is a very neutral white and recommended for TV production.

Displays can also be calibrated with so-called ad-hoc method, based on the subjective experience of color – which makes the calibration result relative. Still, this method proved to be usable in practice, at least in the domain of midtones.

The resources needed for calibration are: reference sample (usually printed photo for color matching), gama correction software (which levels the colors ratio) and ICC profile (which describes how a certain device or standard reproduces color based on a crossplatform standard).

Best results are achieved by hardware calibration, for which the special dedicated calibrators are used. These devices break down in two types: spectrophotometers (measuring light intensity at certain wavelengths) and colorimeters (which transform all measurments into RGB values).

V. Conclusion

If we observe the Graphic Design course as a foundation for further work in graphic industry, understanding of fundamentals of color management is essential. Standards in digital print evolve, and a portion of requirements imposed by the ISO 12647 will probably be outdated in the futur, but all contemporary and future standards rely on unchangeable theories, laws and rules that the course tackles. Moreover, with the graphic industry development, the course itself evolves and is tightly bound with color management.

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MULTIMEDIA AND EDUCATION – FEATURES AND OPTIONS APPLICATION

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Abstract - The main topic of this paper is multimedia and its features and options application in various areas of science and life. Multimedia is media and content that uses a combination of different content forms. The term can be used as a noun (a medium with multiple content forms) or as an adjective describing a medium as having multiple content forms. The term is used in contrast to media which only uses traditional forms of printed or hand-produced material. Multimedia includes a combination of text, audio, still images, animation, video, and interactivity content forms. As examples of educational software, MatheGrafix, MathType are mentioned that can facilitate and simplify the mastering of certain topics from relevant scientific field. We discuss some possibilities offered by modern information technology in modernizing education in Serbia. Multimedia as an integral part of educational software is available on the market.

I. INTRODUCTION

Start a new millennium is a very dynamic period in the development of computer science and technology. Digital world is becoming daily life support, and basic factor in the globalization of the world. Computers, on the one hand, integrated into modern culture, on the other hand can be recognized as a leading force in the growing world economy. New technologies are introduced continually, and when it becomes obsolete almost as soon as they occur. On the other hand, the rapid development of computer discipline has substantial effects on education, both in educational content and the teaching methods. Thus, for example, networking and Web become a critical foundation of computer science, and also one of the basic pedagogical resources, uslovljavajući changes in the educational process, not only in computer science but also in other areas. Progress made in technology at the level of multimedia personal computers, as well as in networking technology and particularly Internet and Web, has created new opportunities to transform the teaching process and educational system of significant scale, especially in the developed world and in our country (in Serbia). The teacher's role in this process is changing but still remains critical: although globalization of information technology allows students to visit the distant museums, to make electronic trips to distant archaeological sites and to communicate via video conference, the school is one that students need to learn critical thinking, social behavior, work performance, personal responsibility, which introduces them with models and mentors, develops and supports curiosity.

II. CATEGORIZATION OF MULTIMEDIA AND MAJOR CHARACTERISTICS OF MULTIMEDIA

Multimedia may be broadly divided into **linear** and **non-linear** categories. Linear active content progresses without any navigation control for the viewer such as a cinema presentation. Non-linear content offers user interactivity to control progress as used with a computer game or used in self-paced computer based training. Hypermedia is an example of non-linear content.

Multimedia presentations can be live or recorded. A recorded presentation may allow interactivity via a navigation system. A live multimedia presentation may allow interactivity via an interaction with the presenter or performer.

Multimedia presentations may be viewed in person on stage, projected, transmitted, or played locally with a media player. A broadcast may be a live or recorded multimedia presentation. Broadcasts and recordings can be either analog or digital electronic media technology. Digital online multimedia may be downloaded or streamed. Streaming multimedia may be live or on-demand.

Multimedia games and simulations may be used in a physical environment with special effects, with multiple users in an online network, or locally with an offline computer, game system, or simulator.

The various formats of technological or digital multimedia may be intended to enhance the users' experience, for example to make it easier and faster to convey information, or in entertainment or art, to transcend every day experience.

III. HISTORY OF THE TERM

The term “multimedia” was coined by Bob Goldstein to promote the July 1966 opening of his “Light Works at L’Oursin” show at Southampton, Long Island. On August 10, 1966, Richard Albarino of Variety borrowed the terminology, reporting: “Brainchild of songscribe-comic Bob (Washington Square) Goldstein, the “Lightworks” is the latest *multi-media* music-cum-visuals to debut as discotheque fare” [1]. Two years later, in 1968, the term “multimedia” was re-appropriated to describe the work of a political consultant, David Sawyer, the husband of Iris Sawyer - one of Goldstein’s producers at L’Oursin.

In the intervening forty years the word has taken on different meanings. In the late 1970s the term was used to describe presentations consisting of multi-projector slide shows timed to an audio track. In the 1990s it took on its current meaning. In common usage the term multimedia refers to an electronically delivered combination of media including video, still images, audio, text in such a way that can be accessed interactively. Much of the content on the web today falls within this definition as understood by millions.

Some computers which were marketed in the 1990s were called "multimedia" computers because they incorporated a CD-ROM drive, which allowed for the delivery of several hundred megabytes of video, picture, and audio data.

IV. EDUCATION

Education in its broadest sense is any act or experience that has a formative effect on the mind, character, or physical ability of an individual (e.g., the consciousness of an infant is educated by its environment through its interaction with its environment); and in its technical sense **education** is the process by which society deliberately transmits its accumulated knowledge, values, and skills from one generation to another through institutions. Teachers in such institutions direct the education of students and might draw on many subjects, including reading, writing, mathematics, science and history. This technical process is sometimes called schooling when referring to the compulsory education of youth [3]. Teachers in specialized professions such as astrophysics, law, or zoology may teach only a certain subject, usually as professors at institutions of higher learning. There is also instruction in fields for those who want specific vocational skills, such as those required to be a pilot. In addition there is an array of education possible at the informal level, e.g., at museums and libraries, with the Internet, and in life experience.

The right to education has been described as a basic human right: since 1952, Article 2 of the first Protocol to the European Convention on Human Rights obliges all signatory parties to guarantee the right to education. At world level, the United Nations' International Covenant on Economic, Social and Cultural Rights of 1966 guarantees this right under its Article 13.

V. TEACHING AND TECHNOLOGY

Teachers need to understand a subject enough to convey its essence to students. The goal is to establish a sound knowledge base on which students will be able to build as they are exposed to different life experiences. The passing of knowledge from generation to generation allows students to grow into useful members of society. Good teachers can translate information, good judgment, experience and wisdom into relevant knowledge that a student can understand, retain and pass to others.

Technology is an increasingly influential factor in education. Computers and mobile phones are used in developed countries both to complement established education practices and develop new ways of learning such as online education (a type of distance education). This gives students the opportunity to choose what they are interested in learning. The proliferation of computers also means the increase of programming and blogging. Technology offers powerful learning tools that demand new skills and understandings of students, including Multimedia, and provides new ways to engage students, such as Virtual learning environments. Technology is being used more not only in administrative duties in education but also in the instruction of students. The use of technologies such as PowerPoint and interactive whiteboard is capturing the attention of students in the classroom. Technology is also being used in the assessment of students. One example is the Audience Response System (ARS), which allows immediate feedback tests and classroom discussions.

Information and communication technologies (ICTs) are a “diverse set of tools and resources used to communicate, create, disseminate, store, and manage information” [2]. These technologies include computers, the Internet, broadcasting technologies (radio and television), and telephony. There is increasing interest in how computers and the Internet can improve education at all levels, in both formal and non-formal settings [3]. Older ICT technologies, such as radio and television, have for over forty years been used for open and distance learning, although print remains the cheapest, most accessible and therefore most dominant delivery mechanism in both developed and developing countries [4].

The use of computers and the Internet is in its infancy in developing countries, if these are used at all, due to limited infrastructure and the attendant high costs of access. Usually, various technologies are used in combination rather than as the sole delivery mechanism. For example, the Kothmale Community Radio Internet uses both radio broadcasts and computer and Internet technologies to facilitate the sharing of information and provide educational opportunities in a rural community in Sri Lanka [5]. The Open University of the United Kingdom (UKOU), established in 1969 as the first educational institution in the world wholly dedicated to open and distance learning, still relies heavily on print-based materials supplemented by radio, television and, in recent years, online programming [6]. Similarly, the Indira Gandhi National Open University in India combines the use of print, recorded audio and video, broadcast radio and television, and audio conferencing technologies [7].

The term “computer-assisted learning” (CAL) has been increasingly used to describe the use of technology in teaching.

Educational Programs (or educational software) has long been used in education. These new programs (*smart game*) are interesting to users, especially younger children. Authors of the edu-simulation programs are trying to teach the way of presentations to be stimulating. In the form of 3D interactive simulation, entertainment, games or quizzes, they are offered the very serious subjects.

MatheGrafix is a drawing feature that allows users to print, presentation, or insert a large number of different graphs in a Microsoft Word or OpenOffice. Originally, this application was developed as an school project high school students Martin-von-Cochem, Germany. After several upgrades to improve functionality, became available to the public on 9 May 2008 on the iMedia fair in Mainz, Germany. The program is available as the free software, portable or as the setup file.

MathType, a product of Design Science, is an interactive tool for Windows and Macintosh that allows you to write mathematical notation in word processing, web pages, presentations, and for TeX, LaTeX and MathML documents. MathType is the professional version of Equation Editor in MS Office and many other products. The current version of the tool MathType (version 6) is fully compatible with software packages Office 2000, XP, 2003 and 2007. MathType for Macintosh version 5.1 is compatible with Office 98 software package, and later versions of the same.

VI. EDUCATIONAL THEORY

Education theory is the theory of the purpose, application and interpretation of education and learning. Its history begins with classical Greek educationalists and sophists and includes, since the 18th century, pedagogy and andragogy. In the 20th century, “theory” has become an umbrella term for a variety of scholarly approaches to teaching, assessment and education law, most of which are informed by various academic fields, which can be seen in the below sections.

Computer-based training (CBT) services are where a student learns by executing special training programs on a computer relating to their occupation. CBT is especially effective for training people to use computer applications because the CBT program can be integrated with the applications so that students can practice using the application as they learn. Historically, CBTs growth has been hampered by the enormous resources required: human resources to create a CBT program, and hardware resources needed to run it. However, the increase in PC computing power, and especially the growing prevalence of computers equipped with CD-ROMs, is making CBT a more viable option for corporations and individuals alike. Many PC applications now come with some modest form of CBT, often called a tutorial. Web-based training (WBT) is a type of training that is similar to CBT; however, it is delivered over the Internet using a web browser. Web-based training frequently includes interactive methods, such as bulletin boards, chat rooms, instant messaging, videoconferencing, and discussion threads. Web based training is usually a self-paced learning medium though some systems allow for online testing and evaluation at specific times. Recent years have seen an explosion in online training for educators by content providers such as Knowledge Delivery Systems, Atomic Learning, PBS Teacherline, and more.

VII. COMPUTER-SUPPORTED COLLABORATIVE LEARNING (CSCL)

“Computer-supported collaborative learning” (CSCL) is one of the most promising innovations to improve teaching and learning with the help of modern information and communication technology. Collaborative or group learning refers to instructional methods whereby students are encouraged or required to work together on learning tasks. It is widely agreed to distinguish collaborative learning from the traditional "direct transfer" model in which the instructor is assumed to be the distributor of knowledge and skills.

VIII. CONCLUSION

Today's students require different learning styles. Growing up with the possibility of learning in a virtual environment will become more independent and all ready for self-education and lifelong learning. The digital age will affect the education and will radically change the existing process of learning and teaching. In many countries already have or are being undertaken initiatives that will mark a revolution in the use of new technologies in schools. In this sense it is not good a priori reject all the possibilities that technology brings, and even less uncritically accept all that it offers. Serbia has a long and successful history of development of education and science. Successful development of Serbia in equal measure depends on reaching scientific and technological modern standards and the preservation of the national character of education and upbringing. Openness to international developments in these areas implies the existence of clear national goals and values.

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THE APPLICATION OF INTERACTIVE WHITEBOARDS IN PRIMARY SCHOOLS OF VOJVODINA

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Abstract - The structure of the information society, the growing of "net-generation's" visualization, the way of production and acquisition of information, as well as the dominant pedagogical principles of nowadays (interactive education) make it important to include such an interactive tool in the process of education, which fits these principles and is connected to the virtual space via the Internet. The appropriate technological background, decreasing prices and simplification of equipment, together with the direction of educational goals have opened the door to the use of interactive whiteboards in schools by the millennium. This paper gives a situation analysis of primary schools in Vojvodina, pointing out the deficiencies, opportunities and advantages of using interactive whiteboards.

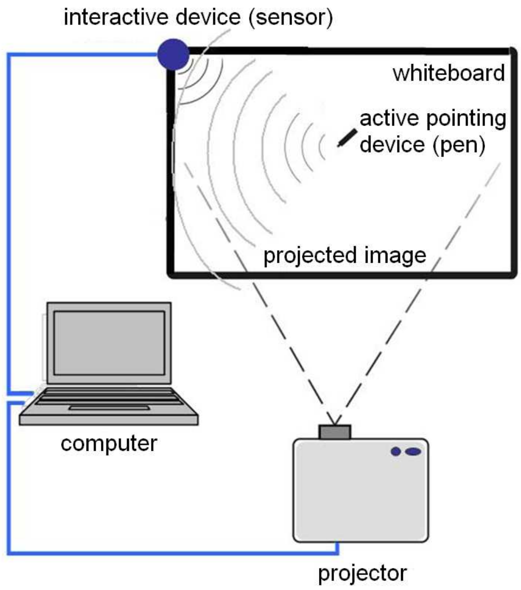
I. Introduction

Looking back at the history of schools and education, it can be stated that the latest technical achievements have inevitably (although with some delay) entered the education process. Examining the background of this phenomenon, it becomes clear that it has happened for two reasons: 1. It was important for students to get familiarised with the use of certain pieces of equipment, to prepare them for carrying out work processes that require such devices; 2. In order to improve the quality of school classes, resulting in more motivated participants and more effective knowledge transfer.

When talking about the education of younger generations, we have to remark that the use of these devices has to appear in an integrated way, primarily based on games and basic skills (digital ink and pointing devices).

II. Appearance of Interactive Whiteboards

The interactive whiteboard is located at the end of the evolution process of education technology leading from chalk and traditional blackboards, over felt-tip pens and whiteboards, then computers, projectors and whiteboards, to computers, pens, projectors and whiteboards (or touch-sensitive surfaces). It is an educational tool that consists of a computer, a projector, an interactive board and the cables connecting them.



Picture 1. Working principle of an interactive whiteboard

If we compare this system with the previous development stage (computer, projector and whiteboard), we can see that the advantage of the interactive whiteboard is in its interactivity. This interactivity could be achieved only in a restricted way at the previous stage, coming near to the computer. While here we have complete interactivity since this device does not ties the user to the computer. Standing in front of an image projected to a touch-sensitive surface we can teach interactively. We can initialise various mouse functions (left click, right click, double click) using a pen or touching the surface. Moreover, with the help of the interactive keyboard and the handwriting recognition system we can input even handwritten texts to the whiteboard without leaving it or losing eye contact with the audience, and not interrupting the natural flow of the class.

Interactive whiteboards first appeared in the field of business at the end of the ‘80s and the beginning of the ‘90s, used for in-house trainings and presentations in certain companies. The especially high price of that time has decreased by the beginning of the 2000’s making this device available for educational institutions as well. This meant the beginning of their use in schools. Beside the price the other obstacles for spreading of this device were the lack of ready contents presentable on these boards and the lack of necessary knowledge. The intensified and centralised utilisation of interactive whiteboards in the field of education began in 2002, first in England, Scotland, New Zealand, Canada and the United States of America.

III. CLASSIFICATION OF INTERACTIVE WHITEBOARDS

There are several classifications of interactive whiteboards, while the most frequently used one is the following:

- Hard boards: Their feature is that we make a suitable surface (mostly a whiteboard) interactive. For the operation of such a system it is necessary to have a suitable projection surface and a pointing device (pen) as well, beside the computer, the whiteboard and the projector. The advantages of these types are that they are easily movable (being fixed to the board with suction-grip discs), their prices are generally more favourable, but they require a special pointing device, which operates with batteries.

Picture 2. mimio Xi, one of the most popular hard boards

- Soft boards: Their feature is that they project the image to a board placed usually on a stand (or built into the wall). This surface is touch-sensitive since numerous micro controllers are mounted on it. As a result there is no need for special pens to use these boards, since this technology senses the touch of our finger, a plastic pen or any other object. We can mention as disadvantages that their price is higher and their movement is more complicated.

Picture 3. Smart SB640, one of the most popular soft boards

IV. OPTIONAL ACCESSORIES OF INTERACTIVE WHITEBOARDS

Producers of interactive whiteboards offer various accessories, some of which are useful, while some are less inevitable or can be only partially utilised by a teacher working in a traditional class. Beside the standard equipment we can choose from the following optional accessories of interactive whiteboards:

- Voting and response system: Feedback from students and the students’ knowledge level are the best and most reliable measures of the effectiveness of teachers’ work. Within the traditional teaching model this feedback is often delayed, occurring usually over certain forms of assessment. Using voting and response systems teachers can get immediate feedback from students about how well they have learnt the subject-matter, and may ask their opinion. They can view the results on the interactive whiteboard (as a chart) after the voting, thus achieving reliable information about the successfulness of learning. This way, teachers get a true picture of the outcome of their work at individual level. These responses highlight the deficiencies and the teaching methods that need to be improved.

- Sketching boards enable students to draw on the projected image, write comments and display explanations. Furthermore, they provide mobility to teachers since they can write on the projected surface from any part of the classroom. This device can be excellently utilised in the education of disabled people.
- Ultra-short throw projector is a special type of projector that unlike the traditional ones projects the image to the surface from a very small distance. Its advantage is that the light of the projector does not irritate the teacher. The same problem can be eliminated with the use of boards mounted on the wall and projected from the back. High prices hinder the spreading of both types, so the existing projectors are usually used for projecting on the sensitive surface of the interactive whiteboard.
- Wireless connection: cables are usually annoying (they are not long enough, teachers may stumble over them). These problems are resolved with the use of wireless connections based on the widely utilised bluetooth technology.

Picture 4. ECDL training where hospitalised students could join via the Internet (Mali Iđoš, 2010). Hardware: computer, mimio Xi, projector, web camera, bluetooth headset. Software: Windows XP, Skype, Excel, mimio Notebook, mimio Tools.

V. Potential use of interactive whiteboards in education

Interactive whiteboards enable the realisation of virtual, multimedia and interactive classes led from a board. Every application that is running on the computer may be loaded and applied on an interactive whiteboard. We can classify the forms of use of interactive whiteboards the following way:

- The interactive whiteboard can be used instead of a traditional whiteboard. We can write on its surface using various tools (felt-tip pen, ballpoint pen, highlighter). This form of use in not only advantageous because we do not need chalk or felt-tip pen, but because it is easy to erase, the image on the board can be saved, printed or forwarded after a few clicks (it can be reloaded at any time). Beside still pictures we can also make motion pictures (videos) about the whole process. Furthermore, we can transform the projected image into a surface with squares, lines or staves for writing musical notations or even to a merils or chess board at any time.
- The use of an interactive whiteboard may be very useful during the presentation of various types of software (operating systems, word processing, spreadsheets etc.), since it enables the projection of not only static images but also entire processes (developing menus and submenus, operations with dialogue windows, dragging various contents etc.). It is very important that the teacher can freeze certain phases of a process and give further explanation. Browsing the Internet on the board may also be very expressive, the points of activity (clicks) can be followed and the explanations of certain parts are also more effective grounded on a big, projected image.
- The interactive whiteboard can be used for presenting previously prepared materials. These can be ready software or supplementary materials made by the teacher. Supplementary educational materials made using whiteboard software (mimio Notebook, SMART Notebook) provide the highest level of interactivity, and with the use of various integrated components (gallery, exercise editor, multimedia, experiments) teachers may get the best use of interactive whiteboards.

Numerous surveys have proven that the use of interactive whiteboards result in more effective knowledge transfer and more motivated students. In addition, teachers also get motivated after a successful class that has achieved its goal and the students have learnt effectively and with pleasure. Although the preparations require careful planning and are time-consuming (and not lastly knowledge demanding), their hard work pays off multiple times, since a properly structured interactive curriculum is fascinating, can be used more times and is easily modifiable.

The use of interactive whiteboards can be incorporated to any of school activities, from certain types of frontal work (as a whiteboard, for presenting multimedia and PowerPoint presentations), over group work (a group prepares a presentation on the computer and then presents it on the board) to individual work (students come out to the board one by one to perform some tasks: drawing, matching, filling in some fields, activating some interfaces), improving the quality of work in the classroom.

An interactive animation available on this link http://vault.smarttech.com/videos/classroomtour/index.html presents the potential use of interactive whiteboards and their accessories.

VI. Interactive whiteboards in Vojvodina

Although a considerable number of teachers from Vojvodina know the potentials and advantages of interactive whiteboards, schools are equipped at a very low level. The main reason for that is in the lack of money. The number of interactive whiteboards in schools not only falls behind an expected level, but also in comparison with surrounding countries, especially Hungary and Croatia (in Hungary according to the National Development Plan II 40 thousand classrooms out of 62 thousand have been equipped with an interactive whiteboard by 2010). Another huge problem is the lack of centralised funds that could be spent on such developments.

Apart from this fact we can see that those types of boards that are popular on the international market are also available in Serbia.

These are:

- Systems based on Wii control: connecting the Nintendo Wii control (that was originally developed for detecting 3D movements) to the computer, adding a projector and using an infrared pen we can create an interactive and sensitive surface. Even a teacher with adequate technical skills can compile this system (commonly the pens are home-made). The biggest advantage of this type is its price since it can be made for a fraction of the cost of an original interactive whiteboard. Its disadvantages are the difficult calibration (the synchronisation of the computer and the projected image – the system works perfectly only with two Wii controls), the lack of software support, the wide dead area in front of the projection surface (the teacher has to pay attention not to hide the light and beams of the two controls and the projector).

Picture 5. The Wii control and the infrared pen with the accessories

- The mimio company (seated in the United States) gives preference to the development of portable interactive whiteboards, which make the whiteboards in schools become interactive surfaces complemented with a projector and a computer. Their best-known product is the mimio Xi, which is 24 cm long when closed and weighs less than 0.5 kg. This way it is easily portable and moveable, its setting-up and calibration is easy, and has a medium price. The software provided (mimio Notebook and mimio Tools) fulfils the needs of an average user.
- SMART (seated in Canada, but since 2009 also producing such whiteboards in Vác, Hungary) is the pioneer of boards that can be placed on stands, mounted on the wall or built into the wall. They not only make whiteboards interactive, but also provide the projection surface with various accessories. Their products belong to the group of soft boards, their movement is difficult or almost impossible (types built into the wall), the prices are the highest from the three mentioned types, however the quality and software support of the devices are one of the best in the market. The software of the board (SMART Notebook), beside different tools, gives opportunity to prepare exercises fast and simply, and also provides interactive games and experiments.

There are very few interactive whiteboard courses in Serbia. Usually dealers of the boards provide trainings and presentations before and after a board is sold. There is only one accredited training about interactive whiteboards in Serbia organised by the Hungarian teacher-training faculty from Subotica with the title: Training of practicing teachers on the use of interactive whiteboards.

VII. SURVEY ON THE PRESENCE OF INTERACTIVE WHITEBOARDS IN PRIMARY SCHOOLS OF VOJVODINA

After our theoretic and methodological discussion we deemed it worthy to survey the situation in primary schools concerning the number of interactive whiteboards and the most popular types.

Our survey involved those primary schools and their departments that operate in Vojvodina.

We have evaluated 88 primary schools from 22 municipalities. The number of schools by municipalities: Apatin (1 school), Ada (6 schools), Čoka (7 schools), Bela Crkva (2 schools), Odžaci (1 school), Kovin (1 school), Mali Iđoš (2 schools), Kula (1 school), Kanjiža (6 schools), Zrenjanin (3 schools), Kikinda (3 schools), Bečej (8 schools), Pančevo (1 school), Subotica (14 schools), Srbobran (1 school), Temerin (3 schools), Bačka Topola (8 schools), Novi Bečej (2 schools), Novi Kneževac (3 schools), Novi Sad (3 schools), Senta (7 schools), Sombor (5 schools).

From the 88 schools there are interactive whiteboards only in 6 (6.83%). There is a slightly better situtation in the municipality of Subotica where 4 of the 14 schools have interactive whiteboards (28.57%).

Analysing the types of interactive boards we have found that various types are present in these schools: Mimio Xi and SMART 64 (1 school), SMART 64 (1 school), Mimio Xi (2 schools), Wii (2 schools).

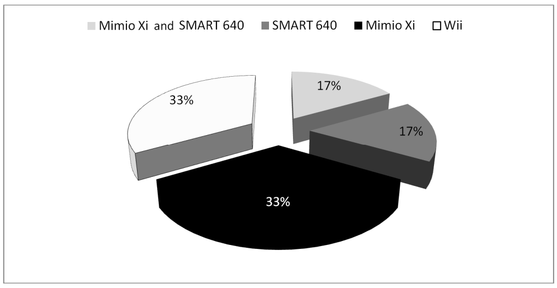


Chart 1. Appearance of certain board types in schools of Vojvodina (Námesztovszki, 2010.)

VIII. SUMMARY

We can state that the appearance of interactive whiteboards in primary schools of Vojvodina is at a very low level. Teachers are moderately familiar with the potentials and efficiency of interactive whiteboards, while those teachers who have already met these boards on trainings or in another schools make efforts so that their school can also get such a device as soon as possible. They mention the bad material situation of schools for being the biggest obstacle of purchasing these boards. According to them the utilisation of the boards would be intensive, firstly instead of traditional blackboards, but there would also be willingness for learning and preparing digital curriculum.

Of course, we also face some opposition. Those teachers who have lagged behind somewhere with the use of computer or the computer and projector, will surely be less motivated for using the interactive whiteboard and for digitalising their traditional (paper based) contents. We can achieve the use of interactive whiteboards among these teachers if we provide them ready and instantly integrated parts or entire contents. However, even then they may be reserved because of the fear from failure that can emerge from the phase of downloading the materials until the time of presentation. We have to know that these failures may be prevented with life long learning, invested time and energy (that pay off later), while technical problems constantly emerge at students, teachers and even IT teachers in every system controlled by a computer.

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USING INTERACTIVE SMART BOARD SOLUTION FOR TECHNICAL EDUCATION AT PRIMARY SCHOOL

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Abstract — An interactive whiteboard is a device that allows teachers and students to physically interact with projected images. Lecturer and students together enjoy using the new teaching tool. Motivation is higher on such lessons. We remember easier things that are presented by nice pictures, or we can move them from its place. It is interesting if we guessed or not the results. The material can be saved, and later it is easy to find it and repeat it. This article presents a low cost whiteboard solution for technical education at primary school.

I. INTRODUCTION

The interactive whiteboard is a large physical display panel that can function as an ordinary whiteboard, a projector screen, an electronic copy board or as a computer projector screen on which the computer image can be controlled by touching or writing on the surface of the panel instead of using a mouse or keyboard. Typically, interactive whiteboards are used in lecture or classroom environments and the technology allows you to write or draw on the surface, print off the image, save it to computer or distribute it over a network. We can also project a computer screen image onto the surface of the whiteboard and then either control the application by touching the board directly or by using a special pen. The computer image can be annotated or drawn over and the annotations saved to disc or sent by email to others.

II. HOW DOES THE INTERACTIVE WHITEBOARD WORK

Interactive whiteboards usually comprise four components: a computer, a projector, appropriate software and the display panel as depicted on figure 1. The computer is connected to the projector and whiteboard [1]. The projector displays the computer screen image onto the board. Action on the surface of the display panel is communicated with the computer over a cable or wireless connection and interpreted via the installed software. Interactive whiteboards are an effective way to interact with digital content and multimedia in a multi-person learning environment[2].

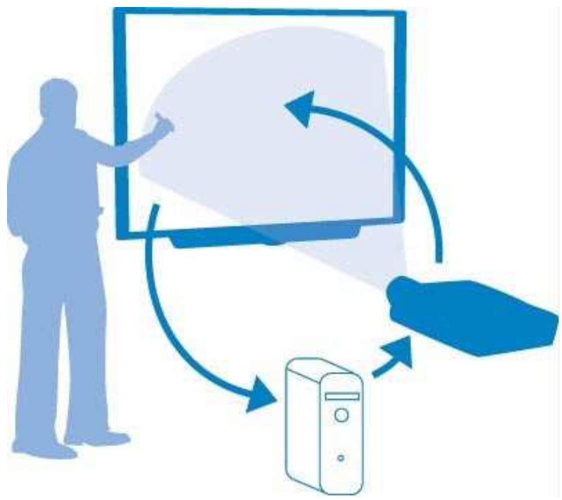

Figure 1. Typical whiteboard configuration

Display panels can be either front or back projection. Additional components are available for some systems, including handheld key pads for gathering individual responses and interactive white board tablets: in effect a small personal version of the larger board [3].

III. SMART BOARD 600

The first interactive whiteboard was manufactured by SMART Technologies Inc. in 1991. The front projection SMART Board (fig 2) interactive whiteboard is very durable. However, sharp writing instruments, such as ballpoint or fine-pointed pens, can damage the surface if they're applied with heavy pressure [4]. It may help you to think of the interactive whiteboard as an input device for the computer, just like a mouse. When we touch the interactive whiteboard's surface, the interactive whiteboard detects the contact's vertical and horizontal (or x,y) coordinates. The computer's mouse driver interprets these coordinates and moves the pointer to the corresponding point on the computer's screen. When all the pens and the eraser are in their pen tray recesses, SMART Board software interprets our touch as mouse clicks and movements. When we remove a pen or the eraser from the pen tray, sensors detect which tool we are using[5]. The SMART Board software then interacts with the computer's mouse driver to change the pointer into a colored pen or eraser, allowing to create or remove colored pen strokes from the computer's display.

Figure 2. SMART Board 600

With a large touch-enabled surface, the SMART Board 600 series interactive whiteboard makes it easy to deliver dynamic lessons. We can present material using large, vibrant images and students can physically interact with lessons by moving letters, numbers, words and pictures with their fingers. In these and other ways, the 600 series meets the needs of both visual and kinesthetic learners. The 600 series interactive whiteboard comes with award-winning SMART Notebook™ collaborative learning software, which is the standard for creating, delivering and managing interactive lessons [6]. SMART Notebook enables you to capture your work as a screenshot that you can edit, or save your notes directly into several software applications.

IV. LOW COST SOLUTION FOR THE WHITEBOARD

Since the Wiimote can track sources of infrared (IR) light, you can track pens that have an IR led in the tip. By pointing a wiimote at a projection screen or LCD display, we can create very low-cost interactive whiteboards or tablet displays. Since the Wiimote can track up to 4 points, up to 4 pens can be used. It also works great with rear-projected displays. On figure 3 is given the most common configuration of the wii whiteboard [7].

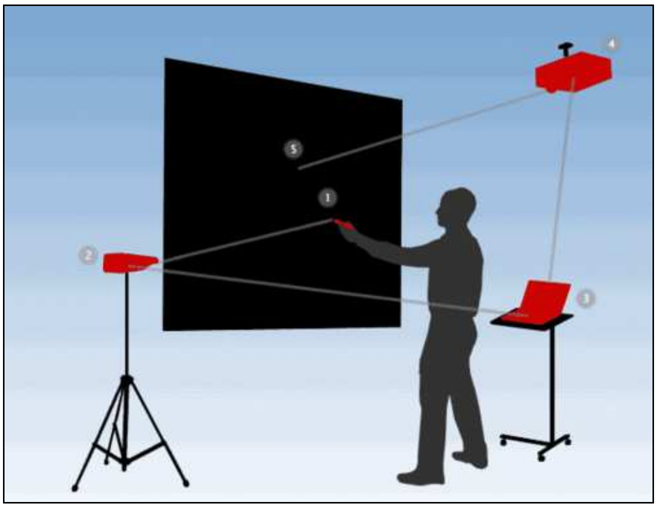

Figure 3. Wii whiteboard configuration

We can connect our wiimote to the PC via Bluetooth. There are a number of tutorials online on how to do this. The Wiimote works with many (but not all) Bluetooth drivers. The wiimote program allows us to use the Wii Remote controller to turn any surface into a Low-Cost Interactive Whiteboard. Figure 4 shows a simple schematic of the light pen. The LEDs that we can use are Vishay TSAL6400s running at 100mA, but lots of other LEDs will work too [8].

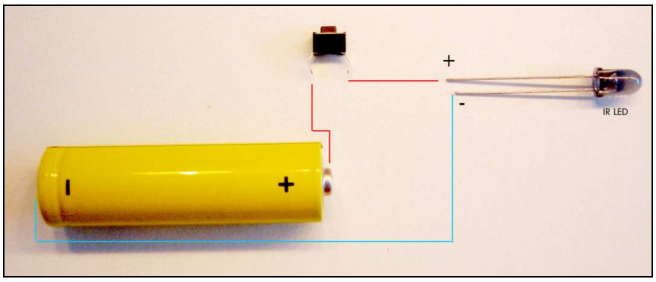

Figure 4. IR pen

When the Wiimote is connected, we may position it so that it can see the entire screen. The camera at the end of the Wiimote has a field of view of about 45 degrees. If we want to check if the Wiimote can see all the corners of the screen, we can use the ir camera monitor. This will show us what the wiimote sees. Moving around the infrared light to make sure the wiimote can see all the corners of the screen. When we have our Wiimote positioned, we will need to calibrate it. This tells Wiimote Whiteboard where the edges of the screen are. To move the mouse, Wiimote Whiteboard will compare where the infrared dot is to where the four calibration points are and move our mouse to that spot [9]. To calibrate, we need to click on the calibrate button. The screen will turn white and in the top left corner a little circle will appear. A Wiiboard is an innovative adaption of a Nintendo Wii controller that functions like a commercial interactive whiteboard for a fraction of the cost.

V. SMART NOTEBOOK 10

The ability to create presentations in an electronic format means that classroom resources can be created on a computer and saved to a portable disk or memory stick. The SMART Notebook™ software can be installed on most computers, even if they are not connected to an interactive whiteboard, and they can then be controlled by a mouse [9]. The Smart Notepad environment is shown on figure 5.

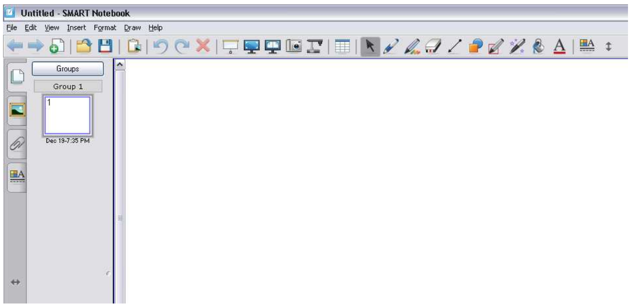

Figure 5. Smart Notepad environment

With Notepad software we can create an interactive teaching material with the following possibilities: [10]

- Allowing notes to be stored and made available to students who missed the presentation or lecture.
- Demonstrating how an educational software programme works, e.g., an art programme with students using their fingers and hands to draw rather than working with a mouse.
- Catering more effectively for visually-impaired students and other students with special needs, using, for example, drag and drop exercises with graphics instead of text to test learning.
- Creating drawings, notes and concept maps in class time which can be saved for future reference or issued as instant handouts for the lesson you have just given.
- Running on-line tests and opinion polls and display instant feedback to the group.

The SMART Board interactive whiteboard supports interaction and conversation in the classroom; it helps with the presentation of new cultural and linguistic elements Interactive whiteboards are an effective way to interact with digital content and multimedia in a multi-person learning environment [8]. Learning activities with an interactive whiteboard may include the following: [10]

- Manipulating text and images
- Taking notes in digital ink
- Saving notes for review via e-mail, the Web or print
- Viewing websites as a group
- Demonstrating or using software at the front of a room without being locked behind a computer
- Creating digital lesson activities with templates and images
- Showing and writing notes over educational video clips
- Using presentation tools built into the interactive whiteboard software to enhance learning materials
- Showcasing student presentations

Perhaps one of the biggest challenges of computer integrated learning has been maintaining dynamic interaction with students while they sit in front of computer screens. Interactive whiteboards help overcome this challenge. Figure 6 shows a test material built in Smart Notepad which is used for teaching technical education at primary school.

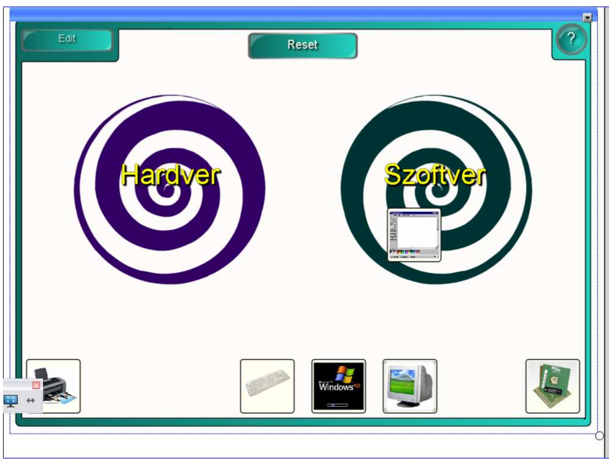

Figure 6. Developed interactive application for the whiteboard

Motivation is best described as a student's drive to participate in the learning process. Although students may be equally motivated to perform a task, the sources of their motivation may differ. Some students are intrinsically motivated to learn because they are driven to understand through self-reflection and participation in learning activities, benefiting self-esteem. Others require extrinsic motivation such as enticements, rewards or educator-defined goals [7].

Interactive whiteboards appeal to both types of students:

- Intrinsically motivated students volunteer to demonstrate knowledge on the interactive whiteboard in front of their peers as a means of showcasing individual achievement
- Extrinsically motivated students are enticed by the wow factor of the technology and can become motivated learners as a result of the enjoyment they experience from using the product

Greater classroom enjoyment and motivation (particularly on the part of extrinsically motivated learners) can in turn lead to fewer student absences [11]. Interactive whiteboards are captivating enough to successfully compete with a student's favorite consumer technologies (e.g., game devices, cell phones and MP3 players), focusing students on task, garnering enthusiasm and providing additional motivation to attend class. More than a diverting gadget or game, interactive whiteboards successfully promote the computer skills students require for success in the twenty-first century.

VI. CONCLUSION

Interactive whiteboards can be used as primarily presentation devices, but in that case you should consider whether a desktop or notebook PC attached to a data projector would do as well at rather less cost. The key pedagogic aspects of interactive whiteboards are: Their size, which facilitates collaborative group working. Their interactivity, which facilitates active learning, not just passive reception of information. Their accessibility, for learners with visual or physical impairment. Their recordability, so that an end product can be emailed, stored for subsequent re-use, or deconstructed to analyze a process. Interactive whiteboards affect learning in several ways, including raising the level of student engagement in a classroom, motivating students and promoting enthusiasm for learning. Interactive whiteboards support many different learning styles and are used in a variety of learning environments, including those catering to students with hearing and visual impairments. Research also indicates that notes taken on an interactive whiteboard can play a key role in the student review process, leading to higher levels of student attendance. In addition to the observed positive impacts on student learning, research shows that designing lessons around interactive whiteboards helps educators streamline their preparation.

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MODERN TRENDS IN HIGHER EDUCATION AND THE FUTURE OF E-LEARNING

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Abstract - Development of modern society constantly imposes the need for changes in educational models, which are often very slow because of the size and inertia of the education system. Improving the quality of teaching and learning through the use of new technology is the primary goal of higher education system. Electronic Education is making every educational program that uses information and communication technologies to enhance the learning process. A common approach is to use e-learning as a supplement to traditional teaching, as an additional component (optional) the process of teaching and learning. This paper presents the current trends prevailing in higher education through the implementation of e-learning and its standardization through the various systems.

I. INTRODUCTION

The Internet has fundamentally changed the practice of teaching and learning during the last ten years, especially in colleges and universities that are well equipped with new technology. This fact is most evident in the transformation of universities which offer distance learning and try to exploit benefits of challenging information infrastructure and communication technology for its core performance, with desire to improve quality and reduce costs of teaching provided to students.

II. E-LEARNING

E-learning with its original name in English has become ubiquitous "brand", the trademark for an innovative approach of teaching new generation of students. Its subset, online learning, is the focus of attention, both because of its increased use at all educational levels and numerous analyses of positive and negative aspects of this teaching method [5].

E-learning usually takes the form of online courses. Element of the course is learning object. Contents of the course are obtained through compiling and organization of learning objects. The concept of objects is standardized in a rigorous form of established procedures of how these pieces of content are compiled and organized into courses and packages for delivery on the Internet.

Learning Management System (LMS) is the dominant technology that is now used to organize and deliver online courses. This software has become an inevitable part of the learning environment (LE).

Companies such as WebCT and Blackboard have installed thousands of products at universities and colleges. Tens of thousands of instructors and students use these LMS systems. LMS takes over the learning content and organizes it in a standard way, as a course divided into modules and lessons, supported by some quiz and tests. At many universities and colleges, LMS has been integrated with the existing information student systems.

A. *Higher Education*

Universities and higher education institutions are key actors in the production and expansion of knowledge, in promoting the social, pedagogical and technological research, training of teachers and instructors, and constant vocational improvement, which is the motto of knowledge society. They use e-learning as a source of additional engagement for their students and to enable campus and off campus, virtual, flexible learning based on the Web resources.

Pilot experiments in the field of e-learning provide a good opportunity to develop organization of universities, curricula or European strategy, to assess the impact of ICT on the interaction between teachers and students, to open universities to a new audience and requirements of continuous and professional development and lifelong learning.

B. *Trends of change in learning*

The introduction of computers into the classroom and the emergence of the Internet have intensified the debate about what improves learning: use of a specific technology or application of appropriate teaching method. For promotional purposes on the Web, online learning must create challenging activities that enable pupils/students link new information with old ones, adopt new meaning and use their cognitive abilities, because it is the strategy of teaching, not the technology, which affects the quality of learning [1].

Specific attributes of computers are required to present real-life models and simulations to students so that the media affects learning. The computer itself is not the one that makes students learn but real life models and simulations, and student interaction with those models and simulations. The computer is more a tool that allows processing and delivery of instruction for students [2].

Online learning allows flexibility of access anytime & anywhere. However, teaching materials must be adequately prepared to engage students and improve learning. Prior to creating teaching materials, teachers would have to explicitly know the principles of learning, especially in this case where teachers and students are physically separated. Creating teaching materials for effective online learning should be based on proven and solid learning theories. As previously noted, the media is not determinative factor in the quality of learning; elaboration of the program determines the effectiveness of learning.

C. Review of LMS development

According to the sources from the Internet that talk about the development of systems for e-learning, we can see that a giant leap forward in terms of functionality and flexibility of the systems has been made. One of these flexibilities is that the system provides management of all capabilities and capacities, that it develops LMS for specific target groups (professions, companies, institutions), integrates it with repositories, and creates a learning object database. It also increases the virtual interaction on social global level, develops advanced searching of LMS database, and increases the balance between control and freedom of LMS users in order to achieve better learning and support [7]. The results of numerous staff training show that LMS provides good results that offer some benefits, but also state that it must be adjusted to provide better monitoring / reporting of non-formal learning – showing the participants who acquired knowledge and not those who have been trained [3].

From the middle of this decade when different distributions of LMS have been developed, their number has increased by 15-20 each year. According to some data, there are about 90 LMS products on the market. Some of them are free, developed within the Open Source community, others are commercial.

This table provides an overview of the learning system from 2000 and the changes that have taken place by 2010.[4].

TABLE 1. EVOLUTION OF E-LEARNING

e-Learning 2000	e-Learning 2010
Distributed established knowledge	Generate new knowledge
Once the e-teaching	In possession of a student
It can isolate students	Creates a learning community
Comes from a provider / institution	Tools to support partnerships
Ignores the context and the student's prior knowledge	Builds on the student's context and prior knowledge
Suppresses the student's creativity	Stimulate students' creativity by strengthening the spontaneous and fun dimension of learning
Suppresses the role of teachers and instructors	It enriches the role of teachers and instructors
It focuses on technology and content	It focuses on quality, processes and context of learning
Substitute for meeting in a classroom	Incorporated into the organizational and social transformation processes
Privileges those who already teach	Project and motivate those who have not studied

III. STANDARDIZATION OF E-LEARNING

The main role of standards in the process of implementation of e-learning is reflected in the effort to develop standardized data models and standardized structure of educational programs and enable their use regardless of the tools that were used to create them and the environment within which they are used [4].

Standardization process provides the following features of e-learning program:

- *Interoperability* which ensures the possibility of electronic exchange of materials among different LMS systems,

- *Multiple use (reusability*), implying the use of educational materials in different courses for different students regardless of the tools used to create them and LMS systems used to deploy them,
- *Ability to manage (manageability)*, where we take into consideration the ability of systems to record relevant information about a student and program content,
- *Accessibility* which indicates the possibility for author and students to access contents of e-learning anywhere,
- *Durability* which provides functionality of the system in case it needs to be updated and improved.

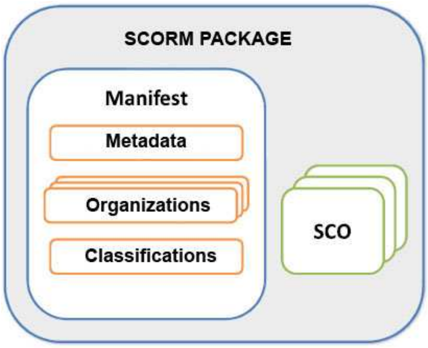
Creating standards is a long-term process which goes through four interactive steps: research and development with the aim of finding possible solutions, development of specifications, testing i.e. activating pilot programs and official accreditation.

A. SCORM standard

SCORM standard introduces the term SCO (Sharable Content Object) which represents basic learning object. SCO is equivalent to a lesson in an e-course. SCO may contain text, images, video clips and even interactive contents, such as flash or java applications (these smaller pieces used to create SCO are called Assets). SCO is defined by metadata which enable lesson to be found according to the different technical and pedagogical criteria.

Every SCO should represent a logical and complete field, not too wide, which can fit into the rest of the course. These lessons may contain a lecture or tests with different ways to answer the questions (single or multiple choice, fill in the gaps, etc.). Process of creating e-course contents is done by choosing SCOs and putting them in a certain order.

Study materials can be displayed in the Internet browser. Term “SCORM package” stands for a collection of at least one or more Web-based contents under the name "Shareable Content Object" – SCO. A complete SCORM package is described in manifest. The following picture shows SCORM package structure.



Picture 1. SCORM pakage

Manifest describes the whole package through XML document. By reading the manifest LMS gets all details about the package contents, structure of layout and collection of resources that it is made of.

Metadata comprises descriptive and administrative package data, as well as the information that define accordance of package with SCORM standard.

Organizations represent one or more activities that can be squeezed. This list of activities is the way and order in which the resources will be delivered to the student. SCORM package has to have at least one layout.

Classifications are attributes that describe the package and with their help it is easy to put the package into a catalogue and globally search for it.

SCO represents the “real” material that is delivered to a student. Single SCO usually comprises multiple databases (html, flash, video and audio, interactive tools…) that the student follows as ordinary or interactive lessons which can be also given in a form of different tests.

IV. PHASES OF E-LEARNING DEVELOPMENT

So far there have been three generations of e-learning technology development, table 2. The first generation of e-learning 1.0 is related to the delivery and experience of online training courses of 60 and more minutes. Those were synchronized courses delivered with use of virtual classroom software or asynchronized courses designed with use of authoring tools and with course contents according to the traditional model of training. Courses were usually led by LMS.

TABLE II. THREE GENERATIONS OF ELECTRONIC LEARNING

	E-learning 1.0	**E-learning 1.3**	**E-learning 2.0**
Main components	Courseware (interactive content of the course) LMS Authoring tools	Content LCMC Rapid authoring tools	Wiki Social Tools Blogs Accessories
Ownership / Disposition	Above, one direction	Above, collaborative	Below, the student initiated, peer learning
Build time	Long	Quickly	No
Size of content	60 minutes	15 minutes	1 minute
Access time	Before working	In the pause of	During work
Virtual Meetings	Class	The working time	Peers, experts
Delivery	Suddenly	In many parts	When you need
Access to content	LMS	E-mail, Intranet	Search, RSS feed
Starting	Over ID cards	Student	User
Content creator	Institution	Organization	User

E-learning version 1.3 has been used to introduce the e- learning generation that has dominated the last few years, when learning was developing faster and was delivered in smaller segments. Learning became available at work and was adjusted to the needs of work so that it had a simple design that could be easily read. This is the reason why learning hasn't been always accessed through LMS, but delivered to the student by email, or was accessed via intranet of a certain organization. E-learning 1.3 contents were usually created by experts for a specific scientific field using backgrounds made in fast e-learning tools or LCMS (Learning Content Management System) [4].

As the number suggests, e-learning 2.0 implies a huge step forward in development compared to the time from 1.0 to 1.3. E-learning 2.0 is based on the tools that combine ease of creating contents, delivery to the Web and integrated collaborations. Anyone can create contents in terms of everyday work. In fact, it is expected from e-learning 2.0 to make transfer and learning action controlled by a student or worker more organic. Learning is a combination of access to contents, mostly performed by students of the same age or coworkers, as well as the access to students of the same age through social software. In addition, many people quote social and network effects to be the most important for learning.

V. FUTURE OF THE E-LEARNING SYSTEMS

We can expect following features from the future e-learning systems:

- Integration of formal and informal methods of learning (formal and informal learning must take place at the same spot). Protection of private data may pose a problem when it comes to this integration. This integration implies integration of LMS with social networks, i.e. giving LMS social functionality.
- Switching from formal ways of learning to collaborative learning
- Poboljšavanje kontrole učesnika.
- Improving control over students
- Greater adjustment of LMS systems in order to make them endlessly adjustable. Modular functions should be loosely connected systems that correspond to each other but keep their unique identity. Each specialized function of LMS would be a separate functional module.
- Unlike these modularized LMS, we may expect introduction of LMS strictly made and designed for specific target groups (professions, companies or institutions)
- In the future it will be possible to connect or integrate LMS with well-known repositories where learning objects are stored. This way we will create a kind of "super database" where LMS would become a type of distribution repository, directly searchable.
- Possibility of complete web teaching materials transfer among systems for e-learning
- Full reusability of web-based learning objects from one learning system to another
- Possibility of creating shareable libraries or media with storages for learning among different LMS environments
- Advanced search through LMS database
- Installation of exterior functions which are not products of the company that owns LMS
- Integration of LMS with ERP and CRM. ERP (Enterprise Resource Planning) is a system that enables integration of engineering, customer services, planning, manufacturing, finance, human resources through one object or at many different places. CRM (Customer Relationship Management) is a system that helps manage relationships with customers
- Improving relationship of LMS with media contents
- Balance between control and freedom of LMS customers in order to provide them with quality access, quality learning, activities and support

- All texts must be in XML format in order to enable reproduction and delivery to other platforms
- Control management – it must raised to a higher level through a more centralized approach
- Workflow management – will require engagement of editors and field experts, especially for specific courses that are going through development stage.

E-learning and Performance support – in the future, LMS should enable teaching contents to be created during the class.

VI. Conclusion

We may conclude that the introduction of more and more powerful communication devices calls forth LMS for more accessibility, independent from dominant or previous set platform for teaching contents and teaching activities access. More present virtual social interaction gets an important place in the process of creating applications supported by LMS. In social interaction users more and more exchange learning resources along with their ideas and opinions in discussions, presentations, blogs, commentaries and similar tools for that purpose. This way, learning shifts from corporative to global level which implies necessary adjustment of LMS organization. According to all of this, we conclude that any present LMS has the need to develop and improve.

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COMPARATIVE ANALYSIS OF THE SUCCESS STUDYING STUDENTS ATTENDING TRADITIONAL LEARNING OR E-LEARNING

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Abstract - In this paper give the comparative analysis of success in teaching materials and given are view by the advantages and disadvantages of the traditional ways of studying and also listed the characteristics of e-learning. The above are the psychological and pedagogical aspects of learning and both are given by actual observations during the research and how that type of learning affects students. This paper presents the analysis of the actual success of students of Informatics at the Department of natural and technical sciences University of Novi Pazar, which are a part of teaching listening through the internet (50% students) and the traditional way.

Included are students from all four school grades. In this study it was found and where higher performance Studying (theoretical and practical) and a better average score.

I. INTRODUCTION

Online teaching and traditional teaching is often viewed and studied as two separate world. In the past, most of these studies was comparable, which raises the question - *"Is online learning a subject more or less effective than classroom teaching the same subject?"*. Although the focus is more on evaluation of each of them within the boundaries. This is progress, but the two environments are always considered separately. However, although teaching in the classroom and online learning really take place in separate environments, social area teachers who held all the more true for both environments.

II. TRADITIONAL AND E-LEARNING

The difference between classical learning and electronic learning (e-learning) is in the perception of education. In the classical teachings have interaction between the student-content-teacher, and in e-learning in the interaction we need to include more and ICT. In countries such as Australia and Canada are the major role played in education technology such as radio and television, and today this is Internet.

A. Advantages and disadvantages of traditional learning or e-learning

As the lack of traditional systems of learning are set out the spatial and temporal constraints. In the traditional view of time is lost in the way to school (time is non-renewable resource and it is necessary to be proficient in its management).

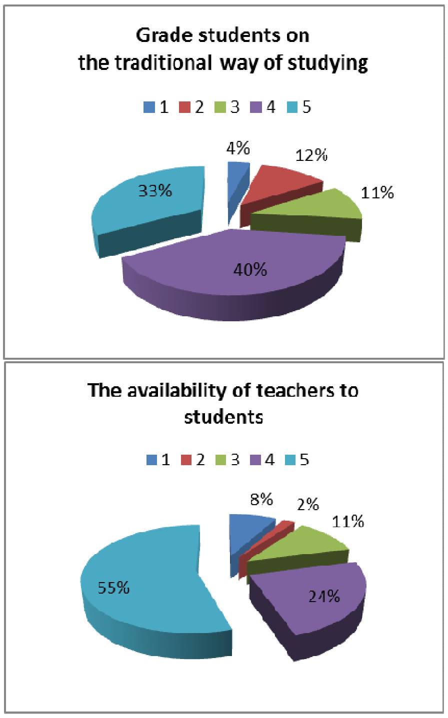

Figure 1. The survey results of students at the University of Novi Pazar - survey relating to students who have studied in the traditional way.

E-learning means using new multimedia technologies and the Internet to improve the quality of learning. Multimedia technologies include text, sound, pictures and movies, which together enhance the knowledge sources. Internet allows us quick access to various services and resources.

E-learning encompasses all learning and, with additional features that make ICT on accelerating the development of distance learning. Learning can be in college, at home, at work or at school [7].

E-learning is based on technology (ICT), but it is pedagogically oriented, a social process that requires interaction and collaboration among people, causes of organizational change and the introduction of a teacher / tutor training.E-learning can be useful in realizing personal potential, also reduces the differences between individuals and groups and offers the knowledge required of employees and organizations. When it comes to e-learning should mention two key concepts, content and control system [1].

The advantages of e-learning benefits are numerous. Time and space flexibility - students learn independent of time and space, and thus education becomes available and those coming into the classroom would not be possible.

Interaction between students and teachers that takes place via computer (e-mail, forums, chat) is often more direct and intense than communication in the classroom. Questions are set freely, without fear of authority of teachers and so can come to the fore and "withdrawn" students who live less communicate. Communication and group work on joint projects between the students with each other thus developing social and communication skills coming to the fore the principle of constructivist learning. The use of interactive learning content and different media (text, image, sound, video, animation, simulation) for the presentation of the content and availability of content 24 hours online. Provides a choice of place, time and duration of individual sessions of learning. Allows large systems compliant training material and it dislocated for many users of the system.

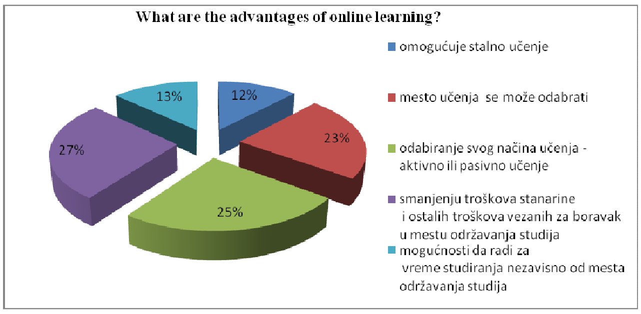

Figure 2. The survey results of students at the University of Novi Pazar - survey relating to students who have studied online.

The biggest challenges or problems in e-learning are that it is difficult to motivate students to enroll in online course or program, actively participate in its execution and successfully complete it and depending on the technology, besides being too long andmaking themselves e-learning content learning. Many e-learning programs cannot succeed, that is, many students give up and never completes the program by the end of [12].

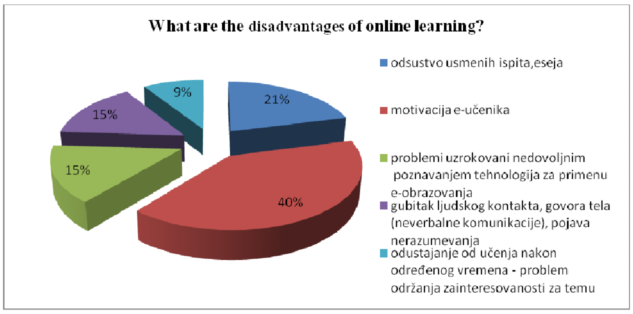

Figure 3. The survey results of students at the University of Novi Pazar - survey relating to students who have studied online.

The motives for which the organization in the West are increasingly using e-learning for educational needs are [8]:

- Organizations want their employees to provide a choice of time to study, they also want to extend the effects of classroom training after the course ended,
- High speed is the implementation of e-learning in organizations,
- the possibility of rapid distribution of the same type of content on the same level within the organization no matter how much certain parts of the organization were spatially distant from each other,
- reduce the costs of travel and accommodation in place of learning and
- possibility of implementing a small e-learning modules, and to multiply.

III. Psychological and Pedagogical Aspects

Teaching is a complex interactive process within which students and teachers achieve a variety of relationships and communication to achieve the objectives and tasks of education.

Multidimensionality of teaching is conditioned by the complexity process of education and sophistication of direct and indirect social interaction. That is why in the theoretical and practical context, the success of the teaching approach as a multidimensional construct. There is no complete agreement on the dimensions and variables relevant educational and formative for the success of teaching [4].

During research we found that students who attended classes in traditional subjects in solving the test occurred concern which is of course affected the achievement of the week. Giving feedback to their task can have a dual impact on students, we noticed that some students await feedback in testing, in fact now they want to know the results and part of where they were wrong in the test. On the other hand some students feedback on the under-achievement can have a negative impact on future work.

The motivation of students attending online classes is far less pronounced than among students who attend the traditional way. In particular we give an example of that in discussions that were part of the activity for each week, said the e-learners are mainly words of other authors that can be found on the Internet. While the traditional students were much better answers and cite students to study material from crossed weeks.

If students are too studied, students may become anxious. Likewise can make a big impact and length, and only the presence of teachers during testing. A good indicator of this finding is that traditional students have achieved better results at the final meeting, although in the previous two weeks, these students had lower average scores.

Also as one of the psychological factors and personality of students here are in the process of e-learning. We've noticed that some students must be assisted by a teacher and expect good organization of items and constantly motivating by teachers (the students prefer the traditional way of studying), while others are less depend to them does not leave a negative impact of lack of organization of the subject or the motivation of by teachers, and by nature are good organizers (the students responsible e-learning).

Communication is another factor that influences the success of student achievements. In conclusion states that the e-students had slightly lower communication with teachers of students who are studying in the traditional way because they also supported the presence of the lectures, and have the opportunity to personally ask a teacher or assistant and on-site reach solution to their problem.

To note and pedagogical aspects of e-learning where we emphasize the flexibility of time and place of attendance. The e-teaching is not necessary that all participants in the educational process in the same place and at the same time [11].

As a second factor listed in the interactivity of communication.

To make e-learning to be successful, must provide some means of communication:

- Forums, discussions, and fast data exchange
- E-mail,
- Audio communications,
- The wealth of simulation and animation.

Individual approach to students the basic features of e-learning is a high degree of individualization of instruction, focusing on developing thinking, acquiring new skills.

Moving students from the traditional classroom, where there are many disturbing factors (for a faster progress and a more slowly), the computer monitor in his natural environment is a radical change in educational philosophy. They are absolutely different psychological, didactic and methodological circumstances. Tempo and dynamics of the individual adapts to, the amount of information per unit time also foreign interference are kept to a minimum [6].

IV. RESEARCH ORGANIZATION

This research should provide answers about the possibility of implementing a system for e-learning on the efficiency of teaching in the Department of natural and technical sciences, University of Novi Pazar. The research problem is by nature complex and reflects the range of processes and phenomena that take place at the university, generally in science and society.

Research problem

The main purpose of the research is to determine which type of learning is more effective. Next, to examine whether at this university can develop e-learning as the whole process of teaching and research, as a separate process of teaching compared to traditional education. Potential for improving the existing educational sistem.

Broader problem in which this research has been done is whether it can create a model of distance learning in the form of e-education, so that significantly affects the efficiency of teaching process in higher education, places special emphasis on natural and technical sciences.

The narrow issue of research shows that you have already established system of distance learning in education contributes to the improvement of professional skills of students in solving real problems, increasing motivation of students in the learning process and motivation of teachers in preparation and development of educational materials for e-education.

Subject Research

Theoretical determination of cases is intended to describe the basic concepts in the problem under investigation. Each model represents a theoretical or practical real system, by which to explore the real system or object. Distance education system and the process of connecting students with distributed learning resources.

Operational determination of the object of research is intended to show the efficiency of teaching that is determined based on the results to be obtained by research and possibilities for improving learning, perceived advantages and shortcomings of distance learning. This paper presents a comparative analysis of the actual success of students studying online and studying in the traditional way at the University of Novi Pazar.

Goal Research

The main objective of this research is that based on theoretical research and applications elektrosnkog learning in higher education, to point to significant opportunities to raise the level of efficiency at the university where we conducted our research.

A secondary goal of this research is used to examine and determine the extent to which distance learning in education affects the development of intellectual skills and abilities of students and to determine where the greater degree and duration of direct knowledge of students in relation to the traditional way of learning for the same period . Specifically in the research will identify where greater success in teaching (traditional or online) and a better average score for the current year 2010/11 year.

The task was to determine degree of of knowledge and knowledge of teachers and students in an e-learning. Also, the task is to study existing models of e-learning how to realize them, as well as advantages and disadvantages that accompany them. Of course the task of research, we can state and determine the motivation of students in the classic way of learning, and to determine to what extent are teachers and colleagues at the University ready for this type of learning.

The main aim is to determine which type of education provides a higher level of achievement in students. Testing was conducted at the University of Novi Pazar, Department of computer sciences, a study group - Informatics. The research was carried out by staff in the teaching of the University. The study included 81 students. Traditional teaching was attended by 41 students and another 40 students attended classes through the Internet-online. Before the start of teaching students who attended classes in the traditional way is completed questionnaire in hard copy, while the online students get the question on the email address and return the completed questionnaire by email to Professor.

Flow Research

1. The first survey is linked to the traditional view - how the students satisfied with this method, which should improve communication with professors and assistants, access to literaturne. Several issues related to the hybrid learning as it is currently at the University this type of learning, and students attend traditional but the complete material, surveys, discussions, tests have on the system for e-learning.

2. The second survey is related to e-learning - how students imagine this kind of learning that the disadvantages and advantages, the reasons for this type of study, etc..

The university has already developed a system for e-learning (Google Edu Applications), and teaching materials for some subjects is already set up since last year. Defines the activities for two weeks (traditional/online) how long this investigation. The research covered by this paper is empirical-theoretical character [10]. This research should provide answers about the possibility of implementing a system for e-learning on the efficiency of teaching in the Department of natural and technical sciences, University of Novi Pazar.

The main objective of this research is that based on theoretical research and applications electronic learning in higher education, to point to significant opportunities to raise the level of efficiency at the university where we conducted our research.

The task was to determine degree of of knowledge and knowledge of teachers and students in an e - learning. The task is to study existing models of e-learning how to realize them, as well as advantages and disadvantages that accompany them. We can state and determine the motivation of students in the classic way of learning, and to determine to what extent are teachers and colleagues at the University ready for this type of learning.

Population in this study are students of the Department of computer sciences, (a program of study, four subjects, four school years). The predicted pattern belongs to the category of induced patterns. The survey was conducted during the summer semester 2010/11 year. The sample was stratified and consists of 80 students.

The traditional way would cover activities on exercises, discussion with his assistant, and colleagues, specific tasks and so on during lectures / exercises. Online mode would include forums, wikis, essays, etc., a student who is studying in this way has a deadline to complete the planned activities by the end of this week. At the end of all work the final test and a practical task in the computer lab.

V. RESULTS AND DISCUSSION

Explore the conducted on a study program for the 4 cases, the four school years:

- a total of 81 students, of which 41 studies and 40 traditional online.
- finally realized annual meeting, where all students are doing the final test.

The results are as follows:

- results for the first two weeks show that the higher average score achieved, students who attend online classes (7.59) while students who attended traditional achieve a 7.18 average rating,
- results for the final meeting shows that the higher average score achieved, students who attend traditional classes and achieve an average rating of 7,50 while students who have attended online achieve a average rating of 7.08. This shows that students who studied in the traditional way still better results regardless of the previous two weeks.
- Finally, The results are summarized from the final meeting and the last two weeks show that students who have studied:
  - Traditionally made about 73.35% of planned activities,
  - Online realized about 73.38% of planned activities.

2 Weeks + Final test				
	Num. STUD.	Subject	TRADICION.	ONLINE
1 ac. year	25	Data structures and algorithms	7.25	7.10
2 ac. year	18	Processes management	7.29	7.28
3 ac. Year	26	Design application software	6.49	6.88
4 ac. year	12	Software engineering	8.32	8.08

Figure 4. Table results for four study years and compare review rafting

VI. CONCLUSION

Although there is extensive literature on the characteristics of successful online teaching and the introduction of good pedagogy in online learning environment, there are still only very few studies on the consequences of online learning on students and teachers, and even less about the ways in which online learning can be shaped in the traditional classroom teaching. Online education is a challenge and a means of improving and upgrading the educational process, and one of the foundations for new and better ways to manage knowledge. Intensive introduction of information technology in education has become apriority for modern higher education institutions around the world.

It is recommended that should be continuously carried out evaluations of the system and its development based on experiences and attitudes of teachers and students in practice. We also think that teachers should be more involved in creating and developing this model of learning where the online learning has improved a lot. As a final result of this researches, we realized that traditional ways of learning and still leads the world in relation to e-learning, and ICT technology can indeed help in the hybrid mode of learning, which is after practice at the University of Novi Pazar.

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DIDACTICAL ASPECTS OF TEACHING COMPUTER SCIENCE AND INFORMATICS IMPLEMENTED THROUGH DISTANCE LEARNING

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Abstract –Distance learning, as a form of teaching, must meet the basic objectives of education - education and upbringing. In order to achieve educational goals and curriculum teaching principles must be properly selected and applied, which affect the planning and selection of teaching methods, and set out the guidelines in their work. Teaching principles applied in teaching Computer Science and Informatics realizable through distance learning in this paper is present, and whether and to what extent they represented. If they are, how it is implemented, and if they are not, what are the reasons and the solutions for their using? The results of a study conducted on the attitudes and opinions of the users after using the system for distance learning, shows that customers are interested in this type of teaching, and that a large number of didactic principles in this way represented.

I. Introduction

Classes is achieved education and upbringing of young generation, as one of the essential conditions for life and work of individuals and the development of society as a whole.

"*Classes are organized education - educational activities that are keeping to the curriculum as a unique social - appropriate document issued by the Ministry of Education of the Republic. This document provides teaching social character and function, specific goals and objectives.*" [1]

The goals of the course are clearly and precisely defined, both from elementary school to the university. To achieve these objectives, the tasks of education must meet, and that the exercise program and implementation plan for educational institutions and implementation of educational plans for each item individually. The basic idea in designing a curriculum subject Computer Science and Informatics is the computer literacy of students. That is, students need to be able to use ready-made programs to solve problems on a computer that they face in teaching disciplines taught in school or who will meet later in the workplace.

A large number of classes from the content of the program are devoted to the use of ready-made programs, while the lower part of the hours of dedicated programming. In many high schools programming language PASCAL is represent, this paper will be addressed realization of teaching computer science and computer science in the study of programming language PASCAL through distance learning.

II. Current problems of teaching Computer Science and Informatics

Although a large number of schools equipped with computer labs, most of them only used in teaching computer science and informatics, basic introduction to working with Microsoft Office - Pack, check the entered programs or extracurricular activities. Teaching is still unfolding as frontal teaching, using various methods and principles, but without sufficient application of information technology. The reasons for this are twofold: on the one hand, pedagogical and methodical requirements of teaching, on the other side of the material and technical conditions in which classes are implementing. How is teaching a certain class - lesson system and a handful of computers, reduces the possibility for an individual work of students, i.e. individual use of computers in education. The curriculum in Computer Science and Informatics, which are realized, through distance learning, provide individualized instruction.

"Such educational programs ensure that each user runs their own path through the educational content, ensuring maximum individual performance. Designing such educational program takes into account their individual purpose for use in the process of self-education, courses or institutions within the education system." [1]

The application of distance learning (DL) would greatly facilitate new approaches to learning and raise the quality of teaching, which is one of the most important goals of education.

”The success of the educational - educational work depends very much on the teaching strategies, and diversity of use of teaching forms, methods, tools and systems. Therefore, it is important to encourage teachers to use instructional technology resources for the greater activation of the students in teaching computer and information and therefore the achievement of social goals and tasks of education in school, whether it is a vocational education or secondary schools.” [1]

In our country, this type of learning is still a little present for several reasons:

- Lack of sufficient equipment of information technology,
- Outdated hardware and lack of support of new applications,
- Lack of teaching time for experimentation with new information technologies,
- In the curriculum Information technology is not integrated or to select the right software.

Distance learning causes a change of roles of teachers and students. In traditional teaching, teachers communicate directly with students. They are preparing content to be teaching, supporting material, notes, tasks, and they control the completely educational process in the classroom. Otherwise, in distance learning, instructors are not in direct contact with their customers in the educational process, but rather passive role, and students play an active role. Through the media is realized communication, the students themselves determine the order of material, mode, speed and level of work.

For all the reasons above, this paper presents the didactic principles that are applied in teaching Computer Science and Informatics on within studying programming language PASCAL, which has been done through distance learning as one of the key factors for successful implementation of instruction.

III. Principles of Teaching Computer Science and Informatics Realized Through DL

In educational work under the principle implies a starting point, a basic rule, the governing rule, guideline in the work, the primary requirement. Teaching principles affecting the teaching plan and teaching approach, and set out the guidelines in the work to achieve educational and instructional goals.

General classification of didactic principles would be the global (related to overall teaching methods or teaching over the years) and local (related to certain classes in school or to teaching units).

Looking at the classification of the following authors: Nedeljko Trnovac, Jovan Djordjevic [2], Kosta Voskresenski [3] and Velimir Sotirović [1], it can be seen that the classification is largely similar, and differ in several didactic principles. Further analysis will be applied didactic principles of satisfaction in teaching Computer Science and Informatics carried by distance learning, will be showing the principles that have been ignored and that should be applied.

The principle teaching of scientific value - a sudden and radical change that take place, affecting the teachers, that despite their desire, not in a position to introduce those changes and bring the right time in the curriculum.

Teaching realizable by DL this problem is reducing, because the student all the knowledge available through the Internet - and, a teacher can change the material in the program, quickly and in accordance with scientific and technical achievements.

The principle direction of teaching to the objectives of teaching and learning (principle of performance objectives) - strategies of teaching are very often problem for successful realization the goals of teaching. Teachers, limited time on the one hand, the other a large number of students, the third large teaching curriculum, are not able to apply various strategies to achieve goals.

UND offers multi-media methods of presentation, using a variety of strategies that respond differently to different users, but certainly to a greater extent to meet the set goals, but the traditional teaching of computing and information technology.

The principle of real structural building (the principle of gradual and systematic) - the realization of this principle the teacher tries to extract what is essential, to systematize, to provide exposure to a plan and establish a logical and ultimately determines the conclusion.

In distance learning, although the contents are design to meet all the rules of gradual and systematic, the student can “wander” through theory, and therefore may be a real or apparent disorientation. How is left to their own ability to cope, navigating, systematic and gradual, it may be that it carries a new theme and the “away” from the real issues. International experience shows that, given that the student is determined by making test following the scheduled and processed materials, disorientation, decreased and increased the gradual and systematic.

The principle of transparency and abstraction - the basic purpose of this requirement is to facilitate students touch with reality, learning things, phenomena, processes, and their understanding of the relationship, be realistic and directly or indirectly, using the different features of their representation.

Sensory experiences provide a transition to learning about general and to the development of abstract thinking, i.e. relationship between individual and general, concrete and abstract. When using the funds for the presentation of evidence, to properly select the facilities and resources, to avoid overcrowding student’s facts, which will reduce the desired effect.

The principle is satisfied through computer images, animations and simulations in distance learning.

“Computer technology enables the simulation and modeling process of teaching and learning, as well as managing and regulating these processes. In addition, it allows the presentation of specific teaching materials to the obvious and optimal way, the selection and adaptation of knowledge and skills of each individual double the flow of information during the learning outcomes, control, troubleshooting, diagnosis and treatment response assessment and ranking of success and their influence on behavior listeners.” [4]

The operating principle - of great importance in learning and developing intelligence operations have thought that the exercise of intuition and the satisfaction of the principles of abstraction. Frontal teaching in which instruction is usually allows teachers to apply different graphs and algorithms, in order to lead students through the process of thoughtful learning.

Structure and organization of DL, to fulfill this principle, it is also possible to apply various computer-implemented texts, images, graphics, animation and simulation, and in much greater numbers, combined, than in traditional teaching.

The principle of the spiral - concluding remarks in processing the material, previously recovered material shall be connect to, making this the “spiral of knowledge”. Traditionally organized instruction prevents teachers to be deep and complex linking new material with previous. Often this is done in a few simple sentences in the introductory part of the lesson, the rapid transition to a new lesson.

Students of distance learning has the ability to not only read or look the part related to the previous material, but may be unlimited time to study, if there are any ambiguities or omissions.

The principle of appropriateness and effort - to ensure their progress, it is necessary tasks to meet them put be appropriate to their capabilities, but also require you to enter a certain level of effort for further development. This means that according to individual students pace teaching should be differentiated.

Teaching through distance learning, is imposed question about information units, i.e. part of the text, images or music seem Information Unit, in the sense that it is the amount of information that is appropriate to the user to be able to grasp, understand and adopt. If these amount of information are very small, could result in a high degree of atomization, which affects the motivation of users. Therefore, it is necessary to be done constantly, gradually increasing the difficulty and complexity of tasks that users solve.

“It is well established that the computer can provide motivation for those students in whom all other methods proved unsuccessful, or less successful. Students who for any reason, could not devote any attention to the task more than a few minutes without direct supervision, will sometimes spend an hour or more concentration on programming and using computers for other purposes. Activity on the computer can increase motivation, which would benefit the other.” [5]

The principle of permanence of learning skills and habits - refers to a firm and permanent acquisition of knowledge in teaching, so that they become a permanent spiritual property of students, it may be renewed when they need it and to apply it in various academic and practical life situations. Depending on the method of organization, the design and direction of the entire teaching process, as well as the quality and efficiency of the acquired knowledge, depends on the durability of knowledge.

Studies investigating the benefits realized through the DL instruction compared to traditional, show that the durability of the acquired knowledge, skills, skills and habits much more realizable in teaching through DL than in traditional teaching.

The principle of stabilization - durability and attainment of knowledge depends on the degree of stabilization material, i.e. it is necessary to acquired cognitive schema occasionally applied in new facilities provided to undertake, in order to observe the mutual dependency and generalization, differentiation and complement the other schemes.

This principle is satisfied through regular tests, in distance learning.

The principle of activity and development of students - the main task of the essence of this principle is that to look at how students acquire knowledge, what is their relationship to continue and what kind and the degree of their own activities in the process of learning the curriculum and its implementation. Since it is the desire for new knowledge, curiosity, motivation, reduced to a minimum, leave to the power and skill of teachers to motivate him.

During the work through distance learning, activities DL always offer something new, different, supplemented with images, animations, sound, praise; criticism, as in switching to another screen, and in solving the task. In this way, students are constantly required activity of most senses, which entail conscious user activity, and therefore comes to development i.e. progress in work.

The principle of individualization and socialization - refers to the adjustment of teaching activities to each student taking into account its individual characteristics. Individualize instruction means orient on real learners, to take into account the differences between them, adjust and vary methods and procedures of educational activities to these differences, help students to progress at their own pace and ability.

In distance learning, the first part of the principle is fully satisfied. Material, pace, interests are adapted to each user. That is, each user can pass from one material to another, according to the degree of their understanding, prior knowledge, experiences, interests, and perceptions of the degree of acceleration. Distance learning is focus on the individualization of teaching, and as such it carries with it the problem of alienation of the protégés of the environment, reduce communication, a belief that all problems are solvable, and so on.

The principle of differentiation and integration - the essence of this principle is based on the analysis and synthesis, and getting to know some basic things about certain phenomena, objects or things, and then integrate them into one entity.

In distance learning, respect for the teaching program that is prescribe, is satisfied the principle of differentiation and the principle of integration is meet through the connectivity with other materials. In relation to the study unit, there are various possibilities of introducing material from several aspects. These capabilities are increase as compared to traditional teaching, because teachers may not have the opportunity to show it from all aspects.

Principle of rationalization and cost-effectiveness - the essence of this principle is that, with the least expenditure of time, resources and power, both teachers and students achieve the maximum possible effect. To achieve this, it is necessary to make proper use of teaching and methodical procedures, and the teacher should assess how long to keep on teaching the curriculum and methodological approaches that will use that occasion.

DL is one of the possible and the best way to achieve rationalization and economy classes. As the DL instruction designed to satisfy the principle individualization - adaptation of the user, thus achieved a high degree of efficiency and rationalization, instructor and the users work and time and resources.

The principle of unity of theory and practice (genetic principle) - connection between theory and practice is based on more complete and holistic work, and the place of theory and practice depend on the general development of science. But, often in traditional teaching, in designing curricula observed weaknesses in regard to this request, because a too stresses the importance of theory and practice for the second time.

Unfortunately the classes is realized by DL does not provide a complete connection between theory and practice. It gives very good effects in a theoretical sense, but it is very important to get involved and applicability of learning in practice. Theoretical knowledge acquired at the same time can in some way, check the presented tasks, pointing to apply knowledge and solve problems in the immediate social, natural, or technical reality.

The principle of historicity and actual (the principle of proximity of life and current) - one of the difficulties in implementing the principles of modernity in the traditional teaching is that the scientific - technical progress significantly beyond the capabilities of teaching. The tremendous development of science and technology affect the growth of the volume of scientific information. In this situation, special importance is the choice of fundamental knowledge that the assumption of efficient modern general education.

Teaching realizable by DL, the material in the program to be present to the user must change the teacher, because the problem is, reduced. Thanks to the increasing development of information technology, higher use of the Internet, the process of change takes place much easier and faster, more centralized the trend with the technical achievements.

IV. RESULTS OF RESEARCH

When students asked in what form and how the distance learning should be used, (Table I), they gave the following responses: students in high schools give priority to the form of distance learning as a supplement to traditional teaching (57.69%), while students at Faculty prefer the form of self-learning system (68.63%). The percentage of users (students) who believe that distance learning should not be use is small: 14.56% for the entire sample, i.e. 19.23% 9.80% users in high school and users of faculty.

TABLE I. “HOW WOULD DISTANCE LEARNING SHOULD BE USED?”

Answer	Individual		Supplements		Should not be used	
High school	12	23,08%	30	57,69%	10	19,23%
Faculty	35	68,63%	11	21,57%	5	9,80%
Total	47	45,63%	41	39,81%	15	14,56%

The reasons why users would like to use distance learning are almost equal, speaking for the entire sample (Table II). 15.53% of users believe that they are so accessible quality information - B, and 26.21% as a reason why you would use distance learning provided easier and faster process of learning - C, 20.39% cited the possibility of study without a physical presence - D. Most users - 37.86% - believed to be that way save the time needed for learning - A.

TABLE II. “WHY WOULD YOU USE DISTANCE LEARNING?”

Answer	A	B	C	D
High school	36,54%	11,54%	26,92%	25,00%
Faculty	39,22%	19,61%	25,49%	15,69%
Total	37,86%	15,53%	26,21%	20,39%

Comparing mutual customers who are from high schools and users are from universities, it is obvious that the savings in time and space and easier and faster method of learning, almost equal numbers as answers, but that significant differences in responses performances in terms of quality information and without studying the physical processes. High school students prefer studying with no physical presence, while students prefer quality information to them so accessible. Distance learning can enhance a learning outcome for 59.22% of users, and partly for 23.30% of users. 12.62% of users believe that DL can positively affect learning outcomes, while 4.85% are not sure the positive effects of using distance learning - (Table III).

TABLE III. “ DOES DISTANCE LEARNING CAN IMPROVE THE RESULTS OF TEACHING?”

Answer	Yes, completely		Yes, partly		No		I don’t know	
High school	29	55,77%	12	23,08%	8	15,38%	3	5,77%
Faculty	32	62,75%	12	23,53%	5	9,80%	2	3,92%
Total	61	59,22%	24	23,30%	13	12,62%	5	4,85%

On the question of how UND improves learning outcomes, users have the right to circle multiple responses that they think are closest to them. For this reason, in Table IV are not given the summary results, only percentages. From Table IV shows that most users a great advantage provides distance learning because learning is so interesting - E (77.67%), followed by allowing the machine to your own pace - D (67.96% of users). Then the second place there is the possibility of providing more information - A (51.46% of users). 48.54% of users believe that by DL - and get only the information you need - B. Interestingly, the relatively small number of users cited the time spent in class - C (26.21% of users), from which it could be concluded that users believe that the time spent in class is not in vain.

TABLE IV. “HOW DL CAN IMPROVE RESULTS OF LEARNING?”

Answer	A	B	C	D	E
High school	57,69%	42,31%	23,08%	57,69%	73,08%
Faculty	45,10%	54,90%	29,41%	78,43%	82,35%
Total	51,46%	48,54%	26,21%	67,96%	77,67%

An opportunity to work and work towards their own pace is probably the reason why even 71.84% of users believe that the material in a shorter time expose than in traditional teaching (Table V). Unlike them 8.74% of users do not share this opinion and are more inclined to traditional teaching, while 19.42% of users think that it takes the same time and does not attach importance to any learning system.

TABLE V. "IS THE CONTENT MASTERED IN A SHORTER TIME?"

Answer	Yes		No		Same time	
High school	36	69,23%	5	9,62%	11	21,15%
Faculty	38	74,51%	4	7,84%	9	17,65%
Total	**74**	**71,84%**	**9**	**8,74%**	**20**	**19,42%**

V. DISCUSSION

The mode of principle, number and satisfaction of the principle, depends on customer success, motivation and success of teachers to bring classroom lessons. Research results showed that met the following principles:

- Is met because the instructor has the ability to easily update the material that is presented to a user via the Internet may increase the knowledge - the principle teaching of scientific value.
- Teaching material is present in a multimedia way, using various strategies. This allows distance learning suit different users - the principle direction of teaching to the objectives of teaching and learning.
- The concept of the content meets the rules of gradual and systematic - the principle of real structural building.
- Computer-implemented image with accompanying detailed explanations, satisfy the principle of transparency and abstraction
- The application of various texts, images, graphics, provides a mental operation to acquire knowledge and develop intelligence - the operating principle.
- User has the ability to read and re-study the above material if there are any ambiguities or omissions - the principle of the spiral
- User can determine the amount of information that can grasp, understand and adopt. It can also gradually increase the weight and complexity of the tasks to be solved - the principle of appropriateness and effort.
- The durability of the acquired knowledge, skills, skills and habits is much more realizable in teaching through distance learning than in traditional teaching - the principle of permanence of learning skills and habits.
- Acquired cognitive scheme is applied in new facilities provided to undertake - the principle of stabilization
- The user is required of a majority of the senses, which makes the user to be active, and thus advancing the work - the principle of activity and development of students
- Learning material, pace, interests are adapted to each user, level of understanding, prior knowledge, experiences, interests - the principle of individualization and socialization.
- All contents are presented in the system of distance learning based on the analysis and synthesis - the principle of differentiation and integration
- Teaching realized through distance learning meets the principle of individualization, and reached a high degree of efficiency and rationalization, and user instructor work, time and resources - principle of rationalization and cost-effectiveness.
- Theoretical knowledge is verified by applying knowledge and solving the set of software problems - The principle of unity of theory and practice.
- Increasing development of information technology allows instructor easily, quickly change the contents of the subject - the principle of historicity and present.

VI. CONCLUSION OF RESEARCH

Given the role and purpose of the research, this study belongs to the group verification research. In this study, fact that educational process and teaching today cannot be imagine without the use of computers, is confirmed and verify by results of research.

Based on the obtained and presented results can be determined that the didactic aspects of teaching carried out through distance learning, are very important and greatly affect the quality of teaching.

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PROFESSIONAL TRAINING AS AN INVESTMENT IN HUMAN CAPITAL INDIVIDUALS

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Abstract - Every system of education as well as education of individuals, depends exclusively from quality of human resources. Using of human potentials and investment in their qualiti present primary factor of development. Sistem of development of human resources includes education of children and adults, informal education, and selfeducation and personal advanced training are given more attention. Investments in teachers and treir personal advanced training raise quality of teaching and education, and together, investment in education is investment in humane capital of individual.

I INTRODUCTION

Organization of modern business, including educational institutions, it is inconceivable without adequate human resources and human capital. Structural adjustments have led to further actualization of human resources as the most important work processes. Modern development is determined by the knowledge, skills and abilities, especially by creative human resources, the only resource with no restrictions. This includes high professionalism, flexibility and dynamism, a willingness to high risks and exploits, the businesses, but also tolerance for individual efforts, and also for teamwork. Modern science and modern organization of are work based on the fact that there are no two indentical men, that we are all mentally and physically different, so schools should be organized with such human diversity.

In many parts of the world there is a lot of work on the decentralization of the education system. Plan for education should include the conversion of a traditional school to life resource centers. No school, lifelong resource center or business center for education and training can not do without skilled teachers. Likewise, no changes in education will be successful if the main emphasis is not placed on education and vocational training of teachers.

II THE IMPORTANCE OF EDUCATION

At a time in which we live learning is personal responsibility. Employees should take responsibility for their knowledge and quality of their work. Modern society is marked by very intense changes that strongly affect on the role, objectives and purpose of education. Scientific and technological revolution and information technology era imposed the new role of education and require that knowledge and science are the new leading force of all changes. Human creativity and knowledge are increasingly becoming the main resources of development and survival in the global market. In order to adapt to these new circumstances, developed countries have implemented major changes in their educational systems, while developing countries still need to change. Great care of professionals is dedicated to changing the concept of classical education system towards flexible. Developed countries set aside great resources and invest in the development of more efficient and more flexible education system that will be able to respond to the needs of modern society. It is believed that the best method for improving efficiency in education is the competence between the institutions of education that involves competition for pedagogical, scientific and technical prestige, as well as fight for survival.

Knowledge and education as the process are very important for improving the quality of life, to improve living standards.

According to statistics, Serbia has a very unfavorable structure of population by educational attainment. 7% of the population has college education, 11% has higher education, 40% has secondary education, 24% has primary education, 14% has completed education from 4 to 7 years of primary school, 2% has from 1 to 3 grade of primary school, and 6% of population has no school education.

The problem in our country is the practice of neglect of intellectual capital, so a large number of young professionals went abroad, where their conditions for living and working are better.

At the end of the nineties the development of European education was given direction, especially for the acquisition of knowledge, strengthening of citizenship and development of skills and abilities. To be able to participate actively in all processes of change everybody need to develop their fund of knowledge, extending and renewing them gradually and continuously. Competence and ability should promote through lifelong education creativity, flexibility, adaptability, learning ability and problem-solving.

Education is a serious investment, and therefore it is important to choose the right education, because investing in education means investing in the future.

III INTELLECTUAL CAPITAL

Intellectual capital can be most vividly and most fully described as intangible resources such as skills, innovation, organizational culture, team work. However, the term of intellectual capital extends more and more, and besides knowledge, experience and skills it is provided by some individual characteristics such as: creativity, innovation, motivation, attitude, diligence, responsibility, perseverance, initiative, communication skills, problem-solving ability, critical thinking, independent learning, flexibility and adaptability.

All these elements are interrelated and jointly contribute to the success of human resources, and motivation and attitude are among the most important factors on the road to success.

According to the most common classification, intellectual capital comprises three categories or groups of intangible resources. These are: human capital, structural capital and relational capital.

Human capital is the ability of employees to use solutions to fulfill the expectations and it includes their competence, or knowledge, skills, experience, satisfaction, teamwork ability, learning capacity, loyalty and education. Professional, creative, innovative, motivated and engaged employees, with the aim of creating value for their educational institution are key creators of value and its greatest asset.

Human capital includes: competencies, relationships and values.

When we talk about competence, this refers to education of employees, to know what, how and when to do something under the certain circumstances. Besides expert, it is also important so-called social competence, which refers to the successful work with other people (for example, behavior, communication, a team work, fitting into a group).

As far as the relationship is concerned, it is clear that if successful employees build up meaningful relations with colleagues, parents, associates and other professionals, it will be reflected in better collaborative relationships. Collective knowledge is much stronger than the knowledge of the individual. One form of rational capital are associations of the best in practice, in other words Cross-Linked forum of experts with the aim of effective exchange of knowledge and experience in the form of solving problems and creating new value for education.

The efficiency of human capital is largely depended on the individual and collective value system. What we are here thinking of are perspectives of employees about things which are valued and realy evaluated in their collective . Those perspectives strongly influence on the ways, models, resources and activities of employees. Value systems are a direct consequence of the way of leadership and management and they create the organizational culture.

Structural capital is defined as knowledge that remains in the institution, when all employees, after work go home. It consists of organizational routines, procedures, systems, databases, and organizational culture. This type of capital means the systems and organization that allows you to use available resources in the best way to create value more effectively. Examples of structural capital are organizational flexibility, general use of information technology and capability of organizational learning.

Rational capital includes relationships of educational institutions with external environment. This part of the intellectual capital involves relationships with the local community, business partners, parents and the perception that they have about the institution.

The success of educational institutions is based on expertise and motivation of all employees, and initiative and independence provide them great freedom to create new ideas, individual and team development. The success of educational institutions also depends on the director and employees, which means, on the intellectuals who have the hidden knowledge. Every employee who is highly educated and continually invest in his knowledge, who is involved in solving problems, who has a high degree of authenticity and responsibility, who is hardworking and highly motivated, flexible and adaptive, self-confident and assertive is a very important intellectual capital.

In the first decade of the 21st century we face a huge problems.It is hard to predict what knowledge and skills will be required and requested in the future. In most professions knowledge is doubling every few years, which means that the knowledge of each of us should double every 2-3 years just to go parallel with the changes, and those who won't do that, will inevitably fall behind. Society in which knowledge is valued as a resource, which invests in education and science, in which is developed information infrastructure and in which is highly priced individuality, ability and creativity of individuals and organizations, is rightly known as an innovative society.

IV Education for the Future

Education has a strategic importance for economic and social development. Higher level and quality of education in society at large have positive effect on productivity, innovation, democracy and social cohesion. If we want education to accomplish such a contribution, it is essential that the education system in one country is a high quality, effective, efficient, accessible and equitable. The fact is that society based on knowledge at the same time is permanent learning society, which implying that education in general must be observed in a broader context. Fundamental task of educational sistem is to develop potentials of each individual, to train them to use their knowledge, to promote, to select what is relevant in the context and to understand what is learned in the way which can be adapt to the demands of increasingly rapid change of environment. Education contributes directly to economic development by increasing and improving the competence of the working age of population, in the sense that it increases employee productivity, and to more efficient transfer of technology and knowledge in the educational system and science, to industry and society.

Education is the driving force of society and as such requires the application of innovation in order to high-quality work, competent teachers and pupils. In recent years, particularly in Eastern and Western Europe, it is promoted lifelong learning, but also learning in different life contexts. Learning society is a set of social and human, which leads to economic prosperity of the state. Some of the activities that turn life into long educational process, the activities which will be back and which would become one's life-ego are presenting permanent education. There are three components of lifelong learning: formal education, informal and non-formal education.

Formal education acquired within the formal education system and takes place in limited, planned and struktural frame. Formal education is acquired in educational institutions which issue documents about acquired education.

Informal education is not planned, it is individually, mostly personally initiated education. It is acquired on the basis of everyday experience, socialization, reading books, internet, communication with other people, monitoring educational programs.

Non-formal education presents organized and planned contents that take place outside the formal system (seminars, training courses). They encourage individual learning, the acquisition of different knowledge, skills, developing attitudes and values, activities that are complementary to formal education.

The dynamic of development of society causes openness and constant readiness to adopt new knowledge and skills throughout life. Permanent learning is especially important for busy educators who have demanding tasks, which are of social interest. Any such determination and phase of education throughout life (lifelong learning) lead us to the professionalization of teachers, to the professional development of teachers.

Following significant changes in the environment as result of development of science and technology, education, and overall educational system is succumbed to the reforms. In this way, the social changes affected on the education reform, which includes changes in the education structure, functioning and efficiency of education, a network of educational institutions, educational programs, forms and content of education, as well as the goals and methods of education. It is necessary to change the strategic direction of development of the system in terms of exercising the right to quality education, to achieve the development of personal skills of each inhabitant. All that should allow the possession of certain skills and traits. Diploma is not a guarantee for a job, if you do not have equivalent personal qualities, such as: the ability for teamwork, sense of responsibility and personal discipline, ability to make decisions, a sense of cooperation and willingness to take risks, initiative, curiosity and creativity, professionalism, striving for perfection and reach the border opportunities and a sense of civic responsibility.

Starting from these attitudes, it is necessery to learn and understand that the essence of learning means teaching people to think, not just to accumulate facts, durin the whole life. Education is undoubtedly of great importance for the development of society in all times of its existence. In modern world education follows the changes caused by their development. So, in the future, education will be directed towards the acquisition of knowledge which becomes an important factor of social development and will have a decisive value for individuals and for civilization. Education will be important for the perception and understanding of global changes in modern society, especially for the problems related to the harmonization of economic development in terms of science and technology, in terms of preserving cultural identity of nations. Knowledge will serve the advancement of humane living conditions, because education will determine the future of each country and the overall future of humanity.

Education has a main goal to increase the man's adaptability to time which comes and to have a significant role to increase those skills which man needs to win the changes and to adapt choices which can be adapted. Changes in education in the future will refer to the changing of organizational structure of the educational system, to the improvement of curriculum and the promotion oriented to the future. Specifically, the current traditional approach will not be able to satisfy the needs that are predicted by changes in the future. Such presentations will disappear and they will be replaced by many other new methods of education based on experience, work, recreation, and entertainment. Much higher intellectual level of the world's population and much higher level of general education and culture are predicted.

V PROFESSIONAL DEVELOPMENT AND ADVANCEMENT OF EMPLOYEES IN EDUCATION

The education system is changing and adapting under reform influential to the requirements of society, schools are becoming more modern and attractive, and teachers continually develop professionally. Most teachers have a moderate attitude towards the innovations. Changes require flexibility, better communication and inevitable education. The most common reasons for not accepting the change is the fear of change itself, changing of the profile, lack of new items , as well as obligations and responsibilities that are imposed by introducing changes. Because of that, the motivation for change, understanding the goals of change and a way of achieving the benefits that will bring change, and trust in a leader who manages change is very important..

The most effective way to track changes and social development is professional development. Society provides the biggest profit by investing in knowledge. Some organizations invest 3-5% of its annual revenue in their own growth and future development. They understand that the knowledge we have gained during our formal education becomes obsolete, it becomes useless, that every five to eight years the whole of human knowledge doubles, as well as that being educated in these days does not only mean a possession of a diploma, but the specific skills and talents (communication, IT, technical, time management, stress, conflicts, strengthening motivation, teambuilding, setting goals). Knowledge is acquired through formal education (seminars, courses, training) and informal education (reading of domestic and foreign literature, exchange of experiences).

The aim of the professional development of teachers is constantly developing of teachers' potentials because of better performance and improving of teaching. To improve teachers professionally, it should be considered all the aspects of their profession during their education and to increse continuously the awareness of the work itself. System of personal advanced training is designed as an upgrade of formal education, innovation of skills acquired during training for the job of teachers, improving the skills and abilities, the application of knowledge and practice.

The Rule of constant improvement and aquirement of rank of teachers, educators and professional services regulates direction, the method of approval and evaluation of training programs. Programs that are approved and which are required for teachers, professional associates and educators are defined by the Minister. Other approved programs are optional. Programs are approved each year. Durinr the first year of running programs are experimental. sa Then its achievement is evaluated, and on that basis it may be granted for a term of two years or its approval could be suspended. During the five year period, in the scope of continuous professional development, the teacher is responsible to attend 100 hours of training, at least 60 hours of required and 40 hours of optinal program.

The Rule of constant improvement and aquirement of rank of teachers, educators and professional services describes the conditions and procedure of progress and gaining the title of pedagogical advisors, mentors, instructors and senior educational advisor. In this way, chance is given to those who want to advance in rank. Progress is gradual. If all the requirements are satisfied, transfer to higher level positions may be requested.

VI CONCLUSION

Educated man is a part of society and should present the center of successful development of a knowledge society. It is important for each individual to be capable to improve and to develop personal development. Education presents one of the important, special and complex segments, on which is, among other things, based management of human resources.

Education should be a social process in which is acquired knowledge and development resource and which should enable the development of personality of each individual. Intellectual capital takes a leading role and center of the process of creating value for success in the future and it presents the foundation on which is based the further growth and development of educational institutions and personalities. The student achievement standards depend on the competence of teachers. Contemporary teaching needs teachers who are motivated, responsible, communicative, and who are willing and open to constant improvement and professional advancement.

It is encouraging to know that the concern for human resources in education occurs through the issues of promotion and acquiring teaching positions more often. Investment in teachers improves the quality of teaching and education, while investing in education is also an investment in human capital of individual.

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ADAPTIVE WEB SITES IN THE FUNCTION OF INFORMATION ACCESS IMPROVEMENT IN EDUCATION

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Abstract - Adaptive Web sites change their structure and presentation based on past behavior of visitors. Sites of schools, libraries and archives of scientific and professional journals contain a number of documents and information relevant to the efficient implementation of the educational process. Groups of visitors with the same needs or tasks often have a need for a set of documents or information. At the same time, a set of documents necessary for the accomplishment of a task is often not in one place and is located in different parts of the website and direct link between these documents often do not exist on the site. Adaptive Web sites, based on information about previous behaviors of visitors recorded in the log files and processed in an appropriate manner, may create new links between the respective web pages. The aim is enabling easier access to the necessary documents in the educational process and also reducing the risk of omitting relevant information or visitor's withdraw from further use of information on the site.

I. INTRODUCTION

In the field of education and science information is increasingly stored in electronic form. Electronic versions of scientific journals are now the rule rather than exception. They can be found in large numbers on the Internet. Internet has enabled a very quick and easy access to large amounts of educational and scientific information. There are systems on the internet that offer many of these articles in one place like the Serbian Citation Index http://www.scindeks.nb.rs.

As a result of large amounts of information in electronic form, the problem of finding and accessing information that users need in order to perform specific tasks, is being actualized. It is often the case that useful information about an issue is scattered across different categories and locations of the web site which contains plenty of articles in various fields.

There are different approaches based on which it is possible to extract useful information from documents and establish connections between documents. Analyzing relationships between documents can be performed by separating hyperlinks obtained from the analysis of source code of Web pages where the documents are on a fully automated way. Log files are especially interesting for analyzing the visitor's behaviour as they are files that are generated automatically on a web server and demands of visitors are placed in them. Based on this information, it is possible, in a large extent, to restore the previous behavior of visitors and the path which they were moving on the web site.

II. ADAPTIVE WEB SITES

Adaptive Web sites could be defined as Web sites that change their organization and presentation based on an approach model created on the basis of information on past behaviors and trends of Web site visitors. The appearance of this Website is affected by all visitors, and at the same time it will be presented to all future visitors in the same look.

The person who creates a web site can have his vision of the optimal structure of the pages, web site documents and optimum navigation, which need not necessarily be the same as the website visitor's vision. However, over time redefinition of the existing navigational structure of web site may be needed no matter how good it was when created. By following the current behaviour of web site visitors, automatic adaption of navigational structure to the visitor's needs and timely noticing of new trends in visitor's behaviour can be enabled by adaptive web sites.

“Visitors to a site do not always have the same conceptual model of the material as the site's designer. An adaptive site can recognize when user expectations differ from the site structure. Although a web site's structure is usually static, user needs change with time. An adaptive site can learn these patterns and decide what information to present when.” [1]

Adaptive web sites are able to, under certain conditions, significantly improve access to relevant information, shorten the required effort and time to achieve the same, and reduce the possibility that a visitor gives up on the web site unsatisfied with the offered information.

III. REQUIREMENTS FOR WEB SITE ADAPTIVITY

In order to create an efficient adaptive web site, certain features of the observed site must exist as well as certain rights over the resources and software support.

Web sites that offer a wealth of information (information on web pages, in pdf documents ...) from different areas are suitable for the application of ideas from this study. For example it could be a site that offers articles from various journals in electronic form, so that the text of the articles are either on the web site, or each article is placed in a separate PDF document that can be downloaded. Journals can be in various areas and for that reason visitors firstly access to the journal, and then to the particular article. In this situation, the web site visitor who is seeking a literature in an area of interest must access to the magazine from the area one by one, then check the contents of journals, and finally access to it, but only if he previously finds the article useful checking its title and summary. An alternative solution would be to search the occurrences of certain words in the title, abstract or text of all articles. The approach promoted in this paper is based on the idea that visitors with similar interests are visiting similar sites, and when a certain behaviour compatibility with the previous visitors is noticed, accesses to those web pages or documents, which were already visited by previous visitors with similar behaviors, are offered to the current visitors.

Data on the behavior of visitors can be found in the log files on a web server of the web site, or it can be obtained by a technique of tagging the pages (page tagging). These two sources of information have some differences, but the key advantage of using log files, at least when it comes to access from this paper, lies in the fact that the log files record access to documents (pdf, doc ...) and media files, while the Page Tagging is limited only to web pages. Limiting the register of the visits only to the web pages would adversely affect the overall efficiency of the proposed approach.

The issue of privacy is very important when there is a need for using the log files. "Privacy refers to controlling the spread of data, information that is intentionally or accidentally discovered." [2]

If the analysis of log files takes place outside the company there may be a fear of compromising the privacy of the web site owner and misusing the information from the log files. This problem can be largely resolved by encrypting the fields from one record log files which are not essential for analysis. For example the values of the IP addresses of visitors are not relevant for the results of analysis and they can be encoded, for example, using MD5 algorithm. Illustration of records in the log files can be seen in [3].

After providing the log files, a software for data analysis is required in order to process provided input data and place analysis results in a suitable format for further use. Results of the analysis should give probability of transitioning to other sites or documents based on the statistics of crossings of the previous visitors for as many web pages as it is possible. As each request for pages and documents of visitors is recorded in log files, it is possible to reconstruct series of previously accessed pages or documents from information in those log files and access time information of visitors. Each visitor's session can contain a page or document of a first visitor's access, then other pages where the visitor has accessed and page or document by which the session is over. It can be said that this series (user path), if it contains more than 2 elements, consists of an initial element, inter-elements and the final element. For achieving effective adaptive Web sites user paths which contain multiple elements are potentially more valuable than those with fewer elements.

It should be noted that not every user sessions has to be completed successfully because a visitors can simply leave the session if they lose their patience and belief that they are on the right track. Those final documents, which are ended by arrival of visitors to a page with useful information and then leaving the user satisfied with the web site, are called the target documents. One method used to determine the list of target documents from the list of final documents is called Browsing Time Method, mentioned in [4].

IV. SHORTCUTS

Adaptive Web sites, in order to improve their navigational structure, mainly use a method of inserting a shortcut to the site where there have not been a shortcut before, and the introduction of shortcuts is intended to shorten user path and increase the efficiency of navigation. In most approaches so far used, shortcuts are created for the target sites (let's call it classical approach).

In the approach that is used in this paper work shortcuts can end in the inter-pages. Although this approach may seem like it does not shorten user path enough, it actually provides a significant advantage. In fact there is an assumption, listed in [4], that some of the pages may contain important information for making a decision about which are the following access elements (sites or documents) These pages are called waypost documents.

V. WAYPOST

„If there are some documents which are often accessed in various paths (more often than in some other documents) before target document has been accessed, then those documents can be considered as some kind of road sign and they are candidates for a status of a waypost document.“ [5]

Use of waypost status of documents can reduce the effort of users to obtain useful information and avoid loss of potentially important information, which could occur as a result of using only those shortcuts that end in the target documents.

„Providing a link (i.e.,shortcut) between these potential wayposts could assist users by reducing the number of clicks they have to make while browsing, pointing them in the right direction towards a specific target document.“, [4].

VI. ILLUSTRATION OF THE APPROACH BASED ON THE EXAMPLE OF COLLECTING REFERENCES FOR TERM PAPERS

The importance of optimization will be explained on the example that includes 5 recorded user paths - the situation is shown in Figure 1. Some pages from the examples contain full-text articles:

- V1 – Sport in Belgrade
- V11 – Sport in Serbia
- V3 – Eternal football clubs derby
- V6 – FC „Partizan“
- V10 – FC „Red Star“

A group of students is assigned to write term papers on sport and the club which they are cheering for. Let each student establishes a user's path, which is recorded in the log file. It may be noted that all students begin the path from the sport pages in Belgrade (V1) and Serbia (V11), and complete their travel on the pages about FC „Partizan“ (V6) or FC „Red Star“ (V10).

According to the classical approach (Fig. 2) two shortcuts could be formed: S [V1-V6] because two of the four paths that begin on page V1 end in site

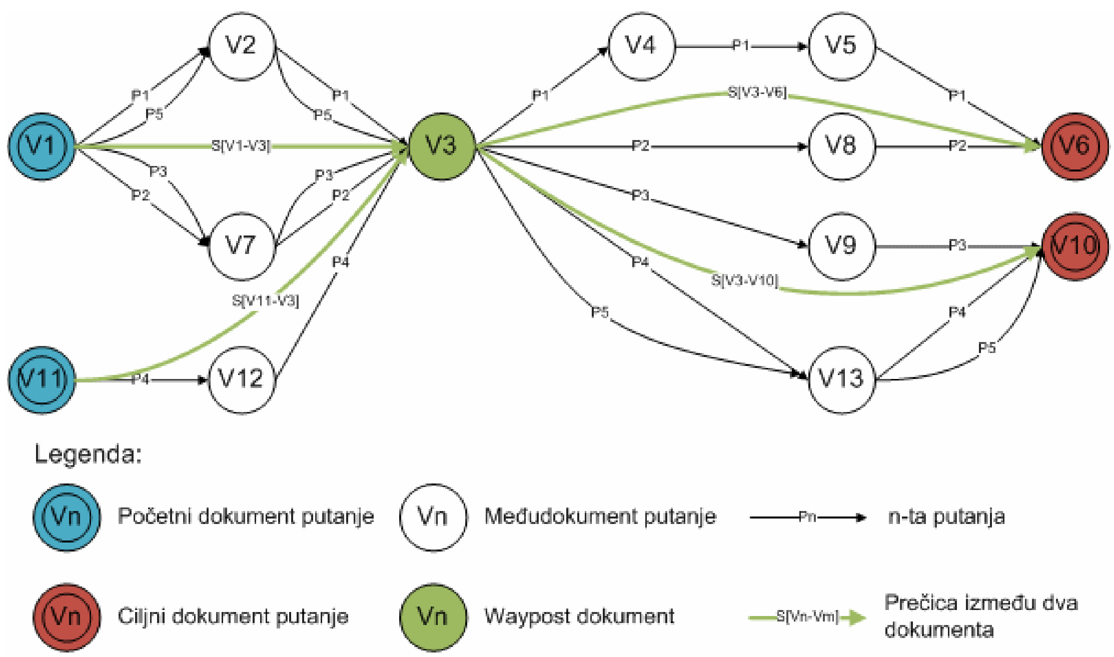

Figure 1. An example of optimization of navigation based on five paths

V6, and S [V1-V10] where also two of the four paths that start V1 end on page on page V10. On page V11 no shortcuts would be added because only one path starting from it, and it ends on page V10. It is still a very small sample of users' path for forming a new shortcut.

This classical approach, which is still widely used, hides a serious disadvantage. Specifically, in Figure 1 it can be seen that all the paths include visits to the page of eternal football clubs derby (V3), which, although not the target document, contains some important information for both FC „Partizan“ (V6) and FC „Red Star“ (V10). The loss of information about the eternal football clubs derby would appear (for example, the ratio of wins and losses of the two clubs), which would significantly reduce the number of useful citations in student papers (if students use the shortcuts suggested in the classical approach), regardless of which team they chose at the end. As a result of the approach that is promoted in this paper, a document on the eternal footbal clubs derby (V3), as a well visited document in the users paths, is given a Waypost status, and the following shortcuts would be formed (Figure 3):

- S[V1-V3], because all four students come directly from the web site about Belgrade Sport (V1) to the page about eternal footbal clubs derby (V3).
- S[V11-V3], because the fourth user's path contains a segment of the initial document (V11) to the Waypost document (V3).
- S [V3-V6], because two of the five user's paths, which contain the connection to the page about eternal football clubs derby (V3), end on the page abou10 FC „Partizan“ (V6).
- S [V3-V6], because three of the five user's paths, which contain the connection to the page about eternal football clubs derby (V3), end on the page about FC „Red star“ (V10).

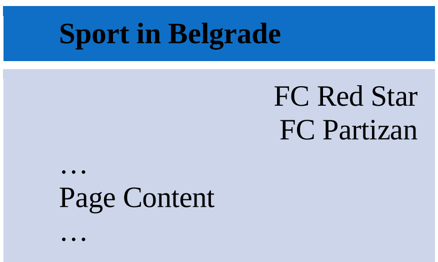

Figure 2. Shortcuts formed in the approach which doesn’t take into account the Waypost document for the given example

In this way, visitors are able to take advantage of the benefits of created shortcuts between the pages of the web site, while the shortcuts are placed in such manner so that there is no problem of exclusion of those sites that carry relevant information.

VII. EFFICIENCY OF THE ACCESS

At the very end, a question of measuring the overall effects of application of such solutions, is set. On the one hand there is a need for easier and more effective information access (with fewer clicks required), and on the other there is a need for avoiding the loss of useful information.

The effectiveness of this approach is seen through the ratio of clicks needed for reaching the target document using the newly created shortcuts and clicks needed for reaching the target document without using the newly created shortcuts. Thus, for example in the path P1, by using the shortcuts the path can be reduced to web site visits V3 and V6, with the initial document V1, while without using the shortcut it takes 5 clicks to access the pages: V2, V3, V4, V5, V6. . So instead of 5 clicks by using the shortcuts it takes only 2 clicks to reach to the final destination. Efficiency of the existing approach in relation to the new approach is 40%. A similar procedure can show that the efficiency of other paths is 50%, so the overall efficiency of all five paths is the average of all paths, or 48%. This means that the web site visitors need only 48% of all clicks if they use the shortcuts of adaptive web site in relation to the number of clicks without using the shortcuts under the condition of losing no potentially important information.

Figure 3.Shortcuts formed in the approach which takes into account the Waypost document for the given example

VIII. CONCLUSION

This paper presents an improvement of adaptive web sites that allows you to, based on the previously recorded behavior of visitors, make proposals for new shortcuts between previously not associated pages and documents. This approach offers the possibility to take into account the important interdocuments and user paths that contain potentially important information. In a situation where there is more knowledge in electronic form useful for the educational process, there is a significant justification for the existence of adaptability on the web sites that offer educational information. Justification for applying Waypost documents is illustrated by the example in this paper. Obtaining the appropriate information from a variety of information available in electronic form is very important on the field of education and science and this paper is a step towards in improving the efficiency of the process.

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DEVELOPMENT OF M-LEARNING PORTAL

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Abstract - This paper describes the research which was conducted at Subotica Tech with the aim of developing and implementing an m-learning portal. The research was organized in three phases. The realized m-learning portal is now in test phase and after finishing this test period, guidelines for further development will be determined.

I. Introduction

In the first part of the paper the definition of the term mobile web is given. The next chapter offers information about m-learning, as well as important advantages and disadvantages of it. Web sites that look good on a desktop computer do not necessarily look good on mobile devices. Because of that the fourth chapter describes detection techiques that were used in the development of system. More surveys were conducted in research. Their aim was to show the percentage of usage mobile web and m-learning services within the student population. Also one part of the research is dedicated to detection tehniques.

II. Mobile Web

The Web has revolutionarized and changed the way of interactivity, collecting and publishing information. Until recently, this information has been available only to users of desktop devices. With the advent of mobile devices with Internet access, the global availability of information has expanded. The mobile phone and smartphone market has advanced so far that even the cheapest cell phones have some form of internet access. This situation opens up a whole new market for internet content that has been adapted for mobile devices.

Mobile Web is considered the seventh mass media. This title was won thanks to the first sold sound (ringtone) to a mobile phone in Finland in 1998. Some of the advantages of the mobile web are:

- The first true personal always-on mass media
- The first portable medium for the masses
- Able to provide access to information anytime, anywhere where there is cellular coverage
- Frees information from the desktop environment and speeds up information download and sharing
- Provides services that can take advantage of mobile devices
- The medium that has a creative impulse

Mobile devices have already surpassed most of the media that are used every day, including computers. Today, most people no longer access the Internet via their PCs but through mobile devices. It is estimated that the difference between these two figures will increase more and more in the coming years (see Figure 1).

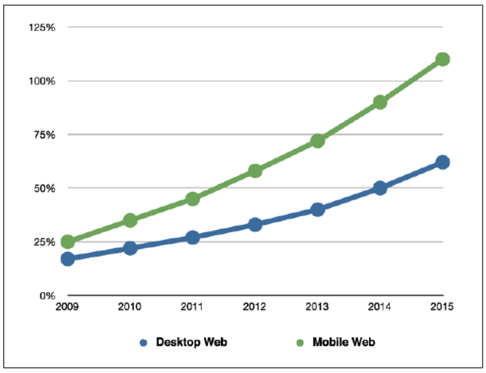

Figure 1. Predicted growth of the mobile web

Although these data confirm the fact that the mobile web has an advantage over the desktop web, one must be aware that in developing countries and countries in transition prevalence of mobile phones with Internet access is still not satisfactory. As evidence for this fact the results of survey will be presented in Chapter 5.

III. M-Learning

While e-learning represents the act of learning or studying from a distance or a location far from the source of learning, mobile learning represents learning, or studying, from any location that has not been previously defined. This brings a whole new playing field for learning. Lehner and Nosekabel (2002) defined mobile learning as follows "*A service* *that gives the student general information and educational content in electronic form, which help the learner to acquire new knowledge at any time and anywhere*."

A. Classrooms

It is important to bring new technologies to classrooms and show students another way for them to use the devices that they are accustomed to using for entertainment and communication.

Mobile learning can replace the act for reaffirming knowledge already gained in the classroom, allowing students to concentrate on gaining new knowledge while in class. This kind of studying gives students the option of learning from whichever location they choose, for instance when they are waiting for public transport, or riding on a train. They can, of course, choose to learn from the comfort of their home and their desktop computers. They will also be additionally motivated by the ability to track their progress. Mobile learning represents a complement and not replacement to traditional studying.

With the introduction of tests customized for different levels of difficulty, all students can be better included in the learning process. This means that students that take more time to grasp some topics can learn at their on pace, without slowing down the rest of the class.

This way of learning can even help those with special needs. Depending on the handicap, mobile learning could make the learning process easier.

B. Mobility

One of the main advantages of a system well adjusted for mobile devices is the ability to access the system from anywhere, and practically any device (with the appropriate optimization of content).

Some of the advantages that are achieved by using mobile devices for e-learning are:

- it enables learning anytime and anywhere
- just-in-time learning – a mobile phone can be used to access data on the ground, for example by following step-by-step instructions to solve some practical problems
- it enables multimedia approach to areas where this is important
- a small device can store numerous data - notes, images, sound recordings, excerpts from books, it makes the movement of students easier
- it allows data input on practical teaching that takes place outdoors where the use of a desktop computer or a laptop computer is not adequate
- it improves interaction between students
- it can be used on the ground in combination with location-based services
- a mobile device is a light portable personal learning tool
- SMS can be used for accessing information such as changing schedules, or similar
- a mobile device is generally cheaper than a desktop computer
- a mobile device is always with the owner and may be adjusted as wanted

The disadvantages and negative aspects of m-learning:

- the existing educational materials and applications are designed for desktop computers.
- as mobile learning can be used in different locations and physical environments, it is subject to interference and breaks the concentration of students
- pressure to learn or train anywhere, at any time
- although they are cheaper than PCs, a computer can be used by more students while a mobile device should be provided for each person.
- security, testing knowledge over a distance can be a problem that can be solved using the camera during testing knowledge and providing links between students and instructors of SSL technology and such.
- for students a physically present controller is always a challenge to find help or a shortcut.

IV. DEVELOPMENT OF THE SYSTEM

In most cases the m-learning portal is a mobile web site which contains learning material in text presentations, some multimedia files, and a testing option. Web sites that look good on a desktop computer do not necessarily look good on mobile devices. The content might be too wide for the screen of the mobile device or it is not presented in the right way and with the appropriate technique.

The first problem that can occur when creating mobile web sites is how to distinguish between mobile users and desktop users? For this purpose more detection techniques were created.

In the development of this portal two detection techniques were used and tested:

- The so-called “Simple detection”
- Detection using the Tera-Wurfl library.

"Simple Detection" is a PHP script that makes a distinction between computers and mobile devices by comparing the user agent data with a specific text values. This technique also determines the priority of hypertext markup language.

The advantages of this technique include:

- no installation process
- there is no need for database
- takes up less space on the server
- fast execution time

Disadvantages of this technique are listed below:

- relatively poor accuracy
- no community that contributes to the development
- limited set of functions to detect more capabilities
- inability to complete the adaptation

Tera-Wurfl is PHP and MySQL based library that uses WURFL to detect individual features of mobile phones. The advantage of Tera-Wurfl and over other systems for the detection devices is that it uses the database to find the possibilities of the mobile phone.

The advantages of this technique are as follows:

- high performance
- accurate detection of mobile devices
- fast detection of desktop vs. mobile devices
- possibility of full adaptation

The disadvantages of this technique are given below:

- the need for a database
- it takes up more space on the server

This portal contains detection techniques and adapts and optimizes the content for the user’s device.

V. Research

The primary goal is the deployment of a mobile learning system that can be seen as a useful resource for students, and that can be accessed and used easily. An important part of the system is the ability of the student to use it on any device he or she might be using during their daily routine. 80 students were involved in this research which was conducted at Subotica Tech in the period of October and December 2010. The research was carried out in three phases.

A. The First Survey

The first phase in this current research was the survey. The survey was made in order to determine whether the students use the mobile Internet, whether they used the service for mobile learning. The survey results are given in below.

1. “Do you own a smartphone?

Yes: 29

No: 27

I don’t know: 24

2. “Have you ever used a mobile web?”

Yes: 43

No: 37

3. “How do you primarily access the internet via mobile phone?”

GPRS: 33

WIFI: 10

I don’t use the mobile internet: 37

4. “What do you use the mobile web primarily for?”

Downloading multimedia files: 6

Browsing the Web: 28

Reading e-mails: 9

5. “Have you ever used an m-learning portal?”

Yes: 0

No: 80

6. “If you knew about an m-learning portal would you use it?”

Yes: 33

No: 19

I don’t know: 28

Based on the findings shown above, the previously given statement regarding how the majority of people access the internet, this assumption does not quite hold true in this country. The number of tested students that use the mobile web is only 43 or 54%.

B. Detection Techniques

The aim of the second phase was to check how exact the used detection techniques were. Each student had access to web pages via mobile phones. One page used "Simple Detection" technique and the other used detection based on Tera-Wurfl library. The results are shown below.

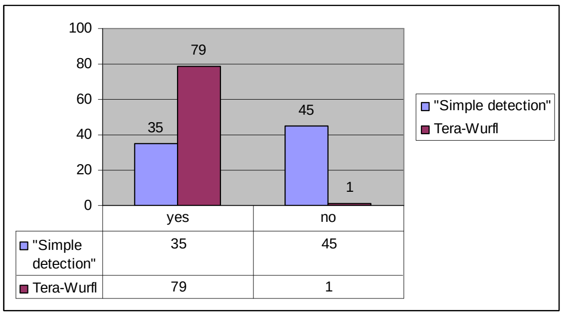

Figure 2. Result of accuracy of detection methods

The results in Figure 2 show that the first technique detected correctly the user agent in 35 cases (44%), while the second technique was successful in 79 cases (99%).

Based on these results, it can be seen that the detection technique using the Tera-Wurfl library is more accurate and more suitable for implementation in this m-learning portal.

C. *Use of Portal*

In the third phase the students were given a chance to use the m-learning portal. After the student registered on the system, they may join and test their own knowledge through testing options. This system takes an adaptive approach to the creation of tests and generates random questions for every test.

Under the heading "Tests" several areas of the subject "Internet technologies" are covered. However, there are plans to expand the list of areas covered to other subjects and even to topics outside the college curriculum. The test is a multiple-choice test consisting of 10 questions. Every question has various levels of difficulty.

After completing the test the system provides the results and displays the questions with the correct answers to which the user has given the wrong answer. The aim is for students to learn from their own mistakes. The user is not able to initiate a test within the next 24 hours. During this time they will be able to learn the material.

The system archives all the testing and follows the progress of the users. If the user shows progress in a given period of time, in the next test they will receive questions with a higher level of difficulty. By giving the user insight into their own progress, the system stimulates them to try and do better the next time.

Figure 3. Login page of the portal displayed on Nokia E51

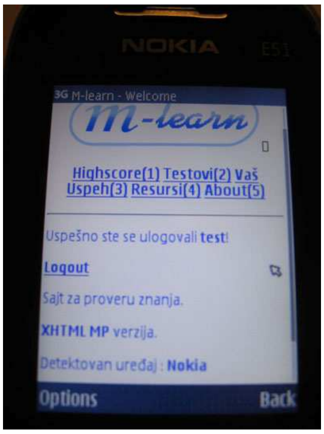

Figure 4. Index page of the portal displayed on Nokia E51

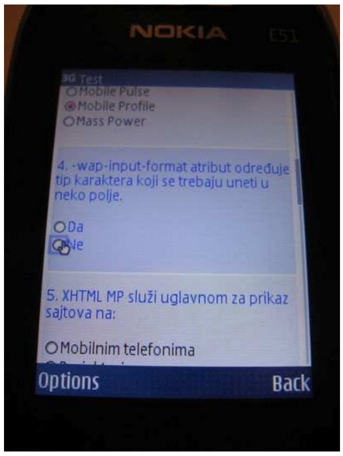

Figure 5. Test page of the portal displayed on Nokia E51

D. *Administration*

The system is controlled and monitored from the administrator panel. From here a user with administrator privileges has an overview of all the content on the site.

ID	*Username*	#	**Prosek**	**Grupa** - *Godina*	opcije
12	snowsu90	1	8	1051 - *2010*	(i) (e) (x)
13	looool	0	0	2051 - *2010*	(i) (e) (x)
14	bob	0	0	1051 - *2010*	(i) (e) (x)
21	cinger	5	6.4	3051 - *2009*	(i) (e) (x)
22	Toni	2	7	3031 - *2010*	(i) (e) (x)
23	Kastar	0	0	1051 - *2010*	(i) (e) (x)
24	Bibo	1	6	3061 - *2010*	(i) (e) (x)
25	123	1	5	1051 - *2010*	(i) (e) (x)
26	erolsk8	0	0	3061 - *2010*	(i) (e) (x)
27	ruski	3	6.33	3061 - *2010*	(i) (e) (x)

Prev -1 2 3 - Next

Figure 6. Statistics page

The administrator has following options:

- manage existing content of site
- manage tests and questions
- monitor statistics
- manage users and groups

With statistic information the system can keep track of which mobile devices are the most widespread among our students, and could make changes to the site accordingly. There is also a table of the time of day and the day of the week the visits took place, providing further insight into the learning habits of the system's visitors.

VI. CONCLUSION

This paper describes the research which was conducted at Subotica Tech with the aim of development and implementation of the m-learning portal. This research was organized in three phases. Based on the research results the adequate detection technique has been identified, the pilot version of the m-learning portal has been created and is currently in its test phase.

This current project will lead to further research regarding the applicability and success rate of learning and testing via this m-learning portal. Also learning materials and tests in other college subjects are expected to be added in the future

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ACHIEVING OBJECTIVITY AT ELECTRONIC ASSESSMENT OF KNOWLEDGE AND GRADING OF STUDENTS IN ELEMENTARY SCHOOLS

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Abstract - In this paper the review of the research related to possibilities and application of electronic technology and WQC in education shall be presented as well as its impact on objective assessment of knowledge and grading. Herewith, benefits and effects of application of educational technology in the teaching process have been presented and pedagogical-psychological and information justification for the use of modern electronic technology in the process of teaching have been explained.

I. INTRODUCTION

New generations of students, so called net-generation, require a new approach to teaching of “a focused student”. It is more than a mere adjustment to different styles of teaching; it is handing over of command of teaching itself into the students’ hands. This type of teaching is characterized not only by a greater autonomy of students but also a greater emphasis has been given to active learning where key roles are given to creation, communication and changed roles of teachers to such extent that the difference between the teacher and the student disappear completely[1].

The issue for now is that schools are not equally well equipped with information-communication technology and it is impossible to introduce standards and work according to regulations, but all is left to the will of a teacher.

Electronic technology and educational computer software would provide for good interactivity and quality of material along with multimedia contents (text, sound, video materials, animation, graphic) and all that would contribute to recognition [1].

This pedagogical and technological field is relatively new, insufficiently examined so that this research shall contribute to the improvement of both the teaching and learning process. In the paper, it has been emphasised and proved that information technology increases rationality of the educational process, efficiency of the learning process and grading, it increases the role and significance of a

teacher and teaching vocation and leads to the change of the whole system of realization of the contemporary educational process.

The intention of this research is to make comparison between different types of tests in electronic form, on the basis of which the conclusion will be drawn as to whether and which type of tests have given the most objective results. Previous average grades shall be compared with the grades achieved at electronic test (according to formed groups and according to levels and classes) by which the feedback information will be obtained as to what extent previously obtained grades are objective/subjective. Also, the same grading criteria for all examinees-students shall be applied. Tests compiled by Wondershare QuizCreator – test version every 30 days. After working version the test Wondershare QuizCreator has converted the document into the flash executive version opened by Macromedia Flash Player 9.

II. OBJECTIVITY AT ASSESSMENT

As the most objective means for measuring the knowledge, tests of knowledge and achievement have been proposed. They are sometimes called as training tests. Tests of knowledge and achievement are used for assessing the quantity of knowledge an individual has acquired through certain activity or during a certain period of learning. They are composed of tasks (given in special forms) by which the knowledge of students is tested related to the whole material of a subject.

A Types of tests of knowledge

Tests assessing students' knowledge or training tests can be divided on to actual ones, calibrated and non-calibrated tests of knowledge, that is a sequence of tasks of objective type. The second ones are called informal tests of knowledge. According to their external form these two types of objective measures do not differ. The first tests of knowledge, however, have all measuring characteristics of tests in general; they are calibrated and usually composed by a team of experts. They include the whole program for one course and they are used in the larger number of different educational institutions. Sequences of tasks of objective type are composed of tasks of the same type as the tests of knowledge but they are usually composed by a teacher for his/her needs. They are not calibrated and do not have certain measuring characteristics, so that they cannot be used in a larger number of schools and only comparison of knowledge of students within one class or several classes in which the teacher teaches the same subject can be carried out. Even though sequence of tasks of the objective type do not have the value of actual tests of knowledge, they can be very useful for the teacher to objectively follow up the progress of both some students and the whole class, they can check up whether students have understood a certain portion of the course or they can check up the use of a method applied in processing certain portion of the course, examine previous knowledge of students required for acquiring new material etc. They also can comprise the whole course, but they usually comprise only a certain part of the course. A teacher is never in doubt whether an answer is correct or not since there is the determined measure for assessment of every task. On one hand, tasks of objective type, composed by teachers themselves, have certain advantages over actual tests of knowledge. Since they are composed by the teacher, they can include all particulars and finesse the teacher has processed within the course. Tests of knowledge, however, are composed according to general program for one class and they are intended for a larger number of schools, therefore they can include only those basic issues which have to be treated in all schools and all details which are supposed to be omitted are actually omitted or have been treated in somewhat different manner in different schools.

B Online tests

Systems for testing, assessment and taking examinations online have become a usual form of testing even in the countries which are not classified as developed ones. In Serbia, also, there are more or less successful attempts to introduce such practice into several faculties. Systems for electronic testing significantly contribute, above all, to the quality and efficiency of assessment and evaluation of knowledge in general, as well as to economic viability in the realization of the program in this domain.

Online testing represents, in the broadest sense, the use of information technologies for any activity related to the follow up and assessment of students' achievement. Online testing can be efficiently used for assessment of knowledge, skills and practical abilities of students.

Knowledge and skills are assessed by the use of e-tests, while practical skills are assessed most often by the use of appropriate programs simulating different practical situations.

Online tests are composed of two components: (1) online testing system and (2) the bank of questions. The software itself does not include questions but is leaning on the data base of questions and tests as well as of their characteristics. Online testing should enable us to arrange the bank of questions, create tests and testing itself as well as the elementary analysis of the test results. [9]

The most objective means for measuring knowledge are tests of knowledge or achievement. They are sometimes called as training tests too. Tests of knowledge or achievement are tests for assessment of a quantity of knowledge a participant has acquired through certain activity or during a certain period of learning. They are composed of tasks (given in a special form) by which students' knowledge of all material from one course is tested [20].

Objectivity is possible to achieve by frequent tests related to smaller portions (lessons). In such a way the habit and commitment of a student is created to learn constantly and increase the level of adopted knowledge. Unbiased frequent assessment by e-tests shall motivate students and shall create working habits.

III HYPOTHESES IN RESEARCH

On the basis of past observation and investigation related to the subject of this research which is ‘’Achieving Objectivity at Electronic Assessment of Knowledge and Grading of Students in Elementary Schools’’ the following can be set:

A Main hypothesis

- By electronic assessment of knowledge and grading of students in elementary schools objectivity can be achieved.

B Auxiliary hypotheses:

- By electronic assessment of knowledge and grading of students in elementary schools saving of time is achieved.
- By application of electronic assessment of knowledge and grading of students the possibility of error is reduced;
- Electronic type of assessment of knowledge and grading of students increases students’ motivation in the training process.

C Research Methods

The set goal, subject and tasks of the research, set hypotheses and source of data determine the application of research methods. In this research a questionnaire as the research instrument shall be used and in processing of obtained data the statistical method and descriptive analysis of obtained results shall be used.

Methodological concept of the research has comprised contemporary research methods and techniques and has been carried out in the following way:

- Experimental method shall be carried out by Wondershare Quiz Creator,
- Students shall be informed about e-testing a week before electronic testing of knowledge,
- Testing of objectivity in electronic assessment of knowledge and grading of students in elementary schools in the class of technical and information training shall be carried out by e-tests,
- Students shall be divided into several different groups on the basis of average grades in the past period,
- Testing shall be carried out by systematic observation, e-questionnaires and e-tests during the experiment;
- In processing of obtained data the statistical method shall be used.

The research shall be carried out in the elementary school ‘’Marija Trandafil in Veternik and the elementary school ‘’Desanka Maksimovic’’ in Backa Palanka with students of the sixth grade in the class of technical and information training. Students shall be divided into four groups (Table 3.1). In a group students of approximately the same grades shall participate and every group shall have similar number of students. Every group shall have different type of e-test, and data about achieved results shall be gathered.

Table I. Division of students according to groups within schools and classes

Location	Grade	No. Of st.	Gr. 1	Gr. 2	Gr 4	Total
Backa Palanka	VI 1	26	6	7	6	26
Backa Palanka	VI 2	24	6	6	6	24
Backa Palanka	VI 3	24	6	6	6	24
Veternik	VI 1	29	7	7	8	29

D Scientific and Social Justification for the Research

Rapid development of technologies caused numerous changes in the training process itself-assessment is insufficiently examined field in pedagogy and still the effects of this method of checking up students’ achievements are not known. E-test is not the only one and non-replaceable method of assessment of students’ achievements, but it may help in the process of training. Students gladly accepted this method of testing.

Advantages of e-tests are as follows:

- Every student does the same test but different combination; e-test generates a random order of questions and random order of answers;
- By introducing student’s number, code, name and surname- the student can work out the test only once,

- Using of code instead of a student's name in tests is avoided so that a teacher can be objective,
- E-test is a contemporary means for quick and objective assessment of students' achievements excluding the error originating from the proposer,
- E-test objectively assess a student's achievement,
- Cheating at test is not possible,
- Criteria are the same for all students, regardless of a teacher's like/dislike towards a class, group of students or individual student which means that a social issue of student's discrimination is eliminated,
- Students get a feedback to every question,
- Students get feedback about their achievement immediately after completion of a test,
- During tests participants learn,
- Students learn more by using multimedia material in e-tests without being conscious about the process,
- Knowledge acquired in such away is long lasting because theoretical part is supported by audio/video material.
- Acquired knowledge is quantitative and qualitative.

All above stated has been supported by experiment conducted in classes of the sixth grade in the elementary school ''Desanka Maksimovic'' from BackaPalanka and in the elementary school "Marija Trandafil'' from Veternik.

The issues we encounter are different:

- Information cabinets are not standardized,
- Inadequate equipment in schools with information equipment,
- Lack of financial resources for the procurement of new technologies in sufficient quantity so that every teacher can use these devices regardless of the subject taught,
- Teacher's work in several schools requires adjustment of schedule which additionally leads to the ''rush'' on the information cabinet ,
- Teachers also need to know new technologies which means teachers need to improve their knowledge, however, this requires financial resources which superiors are more and more frequently unable to provide for.

Contemporary education imposes the need for creation of better conditions in order to achieve a higher degree of efficiency of schooling by using appropriate training technology. Scientific and social justification of the research has been confirmed and described in sections above where advantages and issues of e-tests have been described. A measuring instrument (e-test) has been created for objective assessment of students' achievements in elementary schools. In the research e-test for the course technical information training for the sixth grade has been created. E-test has been created for the field of civil engineering – basic sorts and application of construction material.

IV EMPIRICAL RESEARCH

Population and sample of the research. Testing of students shall be announced and carried out in the information cabinet in the elementary school ''Marija Trandafil'' from Veternik and in the elementary school ''Desanka Maksimovic'' from Backa Palanka in the academic year 2009/2010.

Instrument of the research: e-tests and-questionnaires shall be applied-by appropriate hardware and software. Each of these instruments shall be used during tests. Criteria for the assessment of the results of applied instruments shall also be determined as well as statistical methods for their processing.

Organization of the research shall be carried out during academic year 2009./2010. 103 students shall be included in the research attending the sixth grade of the elementary school ''Marija Trandafil'' from Veternik and the elementary school ''Desanka Maksimovic'' from Backa Palanka.

Experimental method shall include the technique of parallel uniform groups and four groups shall be formed. The first group shall work out a e-test with the model of alternating type (yes-no, correct-incorrect) of questions. The second group shall work out the e-test with the model of matching questions. The third group shall work out the e-test with the model of multiple answers. The fourth group shall work out the e-test with combined model of questions. In the fourth type of e-tests there is a mixture of questions from mentioned three tests. By experimental method the model of e-test shall be implemented and check up of students shall be carried out in relation to the previously achieved average grade by traditional assessment.

In the research the questionnaire shall be used as the instrument of the research and at processing obtained data the statistical method and descriptive analysis of obtained results shall be used.

V Results of the Research

A Testing

Testing has been carried out in three schools with 103 students arranged in four uniform groups (Table 6.1)

Table II. Groups of students

Grade	No. Of st.	Gr. 1	Gr. 2	Gr. 3	Gr. 4	Total
VI 1	26	6	7	7	6	26
VI 2	24	6	6	6	6	24
VI 3	24	6	6	6	6	24
VI 1	29	7	7	7	8	29

At forming groups care was taken both of the number of students and their average grade in the previous period (Table 6.2).

Table III. Average grades achieved for the previous period according to groups

Grade	Group 1	Group 2	Group 3	Group 4	Total
VI 1	4,11	4,10	4,10	4,06	4,09
VI 2	4,00	3,94	4,00	4,00	3,99
VI 3	4,06	3,94	4,06	4,00	4,01
VI 1	4,19	4,24	4,19	4,21	4,21
Total:	4,09	4,06	4,09	4,07	4,07

Obtained results by e-tests (Table 6.3) show that there are certain differences related to grades achieved in the previous period.

Table IV. Achieved average grades by e-tests according to groups

Grade	Group 1	Group 2	Group 3	Group 4	Total
VI 1	4,33	4,00	3,71	3,83	3,97
VI 2	4,33	3,67	3,67	3,83	3,88
VI 3	4,33	3,83	3,83	4,00	4,00
VI 1	4,14	3,86	3,57	4,00	3,89
Total:	4,29	3,84	3,70	3,92	3,93

V Conclusion

The studies in this paper may contribute to the objectivity at electronic assessment and grading of students in elementary schools all over Serbia. In such a way the quality in educational process would be increased.

Applied e-test models in this experiment shall ideally measure and assess the quantity of acquired and reproduced knowledge according to earlier set criterion, without impact of the human factor, which means in an unbiased way and objectively.

Objective assessment can stimulate students for more quantitative and qualitative approach to learning. E-tests are excellent educational means that can be applied for the improvement of education.

By subjective assessment of students discrimination may occur, which may become a social problem. E-tests yield the results which point out to the fact that approach to methods and way of check up of knowledge should be changed.

In order to achieve objectivity at electronic assessment and grading it is necessary to implement e-tests in elementary schools as the objective way of check up of students' achievements, which again compels teachers to constant education and training in the fields of pedagogy, informatics and course he/she teaches.

Advantages of e-tests should be used and they are: cost effectiveness, availability, simple modification, quick access to results and appeal (information can be presented in precise and interesting way thus increasing attention of participants).

Assessment is one of crucial factors influencing the formation of a person's characteristics and grades have a long effective social influence (since they determine the possibility of choice of certain school, college or vocation...), social and financial standing of an individual. Electronic way of assessment and grading makes grading more objective thus excluding existence of privileged students.

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INDIVIDUALIZATION AND DIFFERENTIATION OF TEACHING TECHNICAL EDUCATION

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Abstract – The paper presents research of the significance of individualization and differentiation in teaching technical education. Because of the importance of this issue, and the fact that in practice non-systematic approach with plenty of improvisation is present, a research was conducted in order to determine the possibilities of individualization and differentiation and their effects on education. Eksperimentally was found that the introduction of individualization and differentiation in limited conditions gives better results than the frontal teaching. Because of its big influence on development of the individual and the society, individualization and differentiation of technical education should be more in use.

I. INTRODUCTION

Techning of technical education has very complex and significant asssignment in primary school. In the very process of teaching technical training and education different psychological, pedagogical, sociological and economic phenomenon are present. They have influence on the whole personality of the student, on his beliefs, interests and attitudes, they improve acquisition of technical knowledge and skills and the forming of character, will and other important aspects of personality. Many influences that are present in the process are interchargeable with the acting in many directions.

Teaching technical education as part of the education system must adapt to changes in environment and to change itself. Traditional education is characterized by frontal forms of work, chalk and blackboard (as primary, and sometimes the only means), the class-hour approach to student of "average" skills, is present in teaching technical education in many primary schools.

The new goals of education, which no longer require encyclopedic knowledge, prepare an individual for permanent education and the use of Know How system. They can not be achieved using traditional teaching and require continuous improvement of educational activities.

Depending on the correctly determined content of the task and the organization of educational work, these influences produce positive educational effects. The importance of technical education is reflected in the adoption of positive educational effects and their direct and indirect impact on scientific - technological and social development . Therefore, special attention should be paid to teaching of technical education in order to maximize the possibilities it offers in the process of education and to enable the development of the individual and the society.

II. TEACHING OF TECHNICAL EDUCATION

A. *Characteristics*

Main characteristic of technical education is reflected in the integration of intellectual and working education, which of course contributes to business education. Therefore we can say that technical education is a form of business education in schools. Unlike other subjects, the implementation of technical education draws out the theoretical and practical sides of educational activity. In the theoretical part the student is able to acquire knowledge and in the practical part of teaching can apply existing knowledge and improve it. It is important to note that these two parts are connected, interrelated and together they represent a unique educational process.
Educational tasks define directions for the development of personality. Educational tasks form

the right attitude towards work, develope an interest for work, intellectual and physical abilities, personality traits, esthetic values, etc. Educational objectives form the concepts of technique, technology, manufacturing, reveal their importance for the living, do the training to handle a variety of tools or devices, form the technical habits and the like. Easier realization of these tasks enables diverse course content.

B. Current problem and intentions

Technical education as part of the education system on a daily basis is influenced by environment. One way of adapting to the environment is the change of technical education programs in 1995. Modules, which were new at that time, offered great opportunities for the development of the individual, because they allow different ways to achieve the desired objectives of educational process. The advantage of this approach is to precisely enable the development of desirable individual predisposition by adapting teaching to the student. All this creates illusion that all the requirements for teaching are fullfiled. Is it really so? Analyzing the general situation in primary schools and their impact on teaching of technical education, the following problems are present:

- Unpopularity of course - prejudices about courses that appear in teching of technical education are the first stumbling block of the course;
- Lack of professional staff - unpopularity of the course results in a small number of enrolled and graduated students of this profession, as well as the disinteres for teaching training and permanent education because of the old plans for improvement;
- Poor financial situation of teachers is certainly not a desirable work motivation.
- Lack of material resources - poor equipment of cabinets significantly complicates the realization of teaching;
- Curriculum of technical education is not sufficiently defined; it is overloaded with irrelevant details and not modern contents; innovation of the program is needed;
- Correlation of teaching technical education with other subjects in primary school is not entirely consistent, there is a doubling of the material or the lack of correlation where it is relevant;
- Obsolete technology of education - traditional teaching is still too frequent;
- Disinterest of students for work. The crisis of society and family is reflected in the behavior of students;
- Individual differences of students-that increase their interest for school

We can conclude that a number of obstacles and problems appears that affect the realization of the aims of teaching technical education. Mains difficulty that appears is the impossibility of realization of educational goals. Some of the students required goals completely realizes, some partially, and some fail. From the above we note that one of the options for the problem solution is individualized teaching.

C. Individualization and differentiation as possible ways of solving problem of teaching techniques

Teaching should be planned so that students acquire knowledge, skills and habits available to them at their level of complexity. When planning teaching, individual needs and abilities of students must be taken into account, otherwise students will lose interest and motivation for learning and will experience failure at school. Respecting for individual differences is possible if the start is at differentiated teaching. Therefore, the modern school and its teaching need to have their claims based on objective abilities of each student.

When we speak of individualization and differentiation of teaching we must start with the differences that occur among students, because they reflect on teaching and school organization. Differentiation implies different ways and educational opportunities that enable individualization, and the socialization of students, such as differentiated teaching at several levels. The reason for the application of individualized and differentiated teaching is the development of student's personality and therefore the overall social, economic and cultural development. Scientific and technological development requires creative and talented individuals, which needs to be identified and developed. If the country has human resources, reveals them, develops and shapes into competent experts from different scientific fields, then its

capabilities in the race for better life and standard are certainly commensurate with the number of its experts.
Educational effects that arise during the implementation of individualized teaching are: increasing of the educational effects of teaching in general, rapid progress of the individual, the ability to predict the outcome of learning and teaching, reducing the number of repeaters, and so on. The aim of the individualized teaching is that students achieve their qualities, to be able for independent and creative learning. This can be organized using different models of individual courses (problem of teaching, discovering learning, experimental learning, computational classes, etc.).

Differential teaching is one way to solid the support for learning that enable the development of all students. Differentiation implies organizational and educational measures that try to provide the optimal development of the individual. The purpose of differentiated teaching is primarily in the fact that it is directed towards students. It comprises a wide range of strategies, techniques and procedures that teachers use to approach and help each student regardless of whether it is more or less capable, to achieve high goals and to realize their potential. Differential teaching recognizes that students learn in different ways, ie. that exist between students and capture the understanding and application of differential teaching is acceptable with the premise that every teacher has to work towards continuous improvement, development and maintaining the achieved range of strategies, techniques, approaches, and to know when and with who and how to use a specific strategy and technique or approach.

III. RESEARCH

The research has empirical and theoretical character. Objective of research: it needs to provide answers about the importance of individualization and differentiation of teaching and technical education with the goal of modernization and rationalization of the educational process.

The research of this problem was carried out within the regular school of technical education in primary schools “Dositej Obradović” and “Đura Jakšić” in Zrenjanin in 2010. The study sample includes 152 students and 5 teachers.

The aim of research:

- to carry out experimental research to determine whether differentiation and individualization of technical education influence the effects of teaching
  - to determine wether differentiation and individualization of technical education strengtens motivation.

D. Methods, techniques and instruments

During the research we used the following methods, procedures and instruments:

- The experimental method (for determining the impact of individualization and differentiation of teaching technical education to the realization of its objectives, i.e. whether the success of problem solving through individualization and differentiation teaching is higher than with the traditional approach. The experiment was performed with parallel groups: control (class is realized in the traditional way -frontal method of work) and experimental group (individualization and differentiation of teaching in three levels). Based on the differences between the experimental and control group will be determined whether the individualization and differentiation of teaching technical education has positive effects on teaching. Before the experiments were carried out preliminary research were conducted where are determined by the abilities of students, students' success in semester from technical education, and knowledge of necessary content for the realization of the experiment. Control and experimental groups are formed based on these data.
- Surveys (by this procedure data is collected about student performance and success of overcoming the teaching material)
- Testing (this procedure has been established: percipivne, spatial, verbal abilities by using a battery of tests KOG3, level of knowledge, understanding and mastering the material necessary for the realization of the experiment-Pretest TO01 and to determine the differences in the effects of teaching experiment between control and experimental groups by control test TO02).

- Ranging (for spotting the difference between the success of the control and experimental group and the impact on motivation).

For statistical analysis percentages, hi-square, the correlation coefficient and t-test were used. Testing of the significance of differences between data obtained in research is conducted this way for the following reasons: the data that we have available belong to improperly allocated or discontinuous facts; two best performing variables are compared by their deployment, rather than through a reduction to normal distribution, then the comparison and obtaining results. For the purposes of this paper forms of statistical analysis are quite satisfactory.

The problems that appeared during the formation of the groups:

- Ratings in teaching technical education are generally reduced to 5 (62%), 4 (19.4%), 3 (11.6%) and 2 (7%). We see that students with high marks are most present, followed by a very good, very good and satisfactory students. Considering the distribution of student achievement, we can see that there is a deviation in our sample. The question is: whether the evaluation marks of technical education are measures of students' real capacity for the chosen subject? If so then in our sample there are many talented students. If not it is necessary to make changes in the way of grading.

- The research of students' skills with KOG3 battery and comparing the results with the success of technical education, reveals big differences. E.g. There are students who have high success in engineering education and very high perceptual and spatial abilities, and vice versa, with big achievement in a technical education and low skills.
- Pretest TO01 was conducted to determine the knowledge necessary to perform the experiment, also has a different performance when compared to students grades and their technical capacity.

All the above mentioned made difficult to form groups. They are formed by aligning ability, success and results of Pretest. Original sample of 152 students during the formation of the groups decreased to 113, because the equation of groups was possible only in this way. Considering the limitations that were caused by the timetable, time and space groups were formed as follows: the primary school "Dositej Obradovic", where we were participated in three departments with the subject of the teaching of technical education the groups were restructured by the given criteria (depending on success, ability and results of Pretest) and thus within each department the control and experimental groups were formed. In primary school "Djura Jaksic" the teaching of technical education is done with the whole department, so we specified one department as control and another as experimental, with a reduction in the number of pupils in order to equalize the departments.

Importance of the research is in the expanding of knowledge from the field of technical education, which is reflected in the rationalization and modernization of teaching technical education, the possibilities of successful teaching and the achievement of goals and objectives of technical education through individualization and differentiation. This is accomplished by the very direct impact on teaching and student and indirect by influencing the scientific and technological development and society. This paper will determine the dependence of the students' achievement and the effects of teaching technical education, forms of work and methods used in the realization of the class and that is the individualization and differentiation of teaching technical education strengthen motivation.

IV. Results of Research

A. *The influence of differentiation and individualization of technical education to the effects of teaching*

For establishment of the differences in the effects of teaching technical education between the groups, we used the control test TO02. By testing the significance of differences between arithmetic means of the control and experimental groups we got the following results:

TABLE: THE IMPORTANCE OF DIFFERENCES BETWEEN THE ARITHMETIC MIDDLES OF CONTROL AND EXPERIMENTAL GROUPS

	N	M	σ	σ_z	t	The level of the importance
Control group	57	14,6	2, 9	0,57	11,10	0,01
Experimental group	56	20,9	3,1			

Based on the obtained results we can conclude with a 99% probability that the difference between experimental and control groups is significant.

B. The influence of differentiation and individualization to strenghtening motivation in technical education teaching

When observing the entire sample the following differences in ranking between the control and experimental group exist:

- The largest share of the group of the first rank in the acquisition of knowledge in the control group is the influence of possibility of the application of knowledge, and in the experimental group is the *influence of the forms of work.*
- The lowest group when considering the first rank on the acquisition of knowledge in the control group is *the effect of the quality of lessons*, and in the experimental group the effect of the *quality of lessons*.
- *The largest share* of the group when considering the second rank on learning in K group is the influence the quality of lessons and in group E is the *influence of the form of labor*.
- *A minimum share* of the group when it comes to second rank on learning in K group is a form of *the influence of the form of work*, and in the E group is the *impact of quality lessons*.
- The largest share of the group when it comes to the third rank on the acquisition of knowledge of the group K is the *effect of the form of work*, and in the E group is the *effect of the quality of lessons.*
- *A minimum share* of the group when it comes to the third rank in K group was the *influence of personal interests*, and in E group *the influence of the forms of work.*
- *The largest share* of the group when it comes to the fourth rank on the acquisition of knowledge in K group is the *influence of personal interests*, and in E group is the *influence the quality of lessons.*
- The lowest group when considering fourth rank on the acquisition of knowledge is *the impact of quality lessons*, while in Group E is *the influence of labor.*

C. Discussion

Based on a review we can conclude that there are differences between the experimental and control groups. For the control group the most influential in the acquisition of knowledge was the possibility of its use (41.7% with a rank one), while the experimental group on the acquisition of knowledge was influenced by the form of work (44.6% is ranked with one, and 41.1% with two). In similar work on the impact of learning can be seen that the groups are inversely proportional to the benefit of the experimental group. Display of results in ranking between the groups by gender, when it comes to the influence of forms of work (with minor differences in percentages) coincides with a group that includes both sexes. We conclude that the experimental group was satisfied with the way in which the class was realized. This means that the individualization and differentiation of teaching units had a positive impact on strengthening the motivation in the teaching of technical education, which affected the results of the control test and the effects of teaching.

V. CONCLUSION

The application of individualization and differentiation of teaching is not new in the world, but is still poorly represented in our country. This paper examined possibilities for differentiation and individualization in teaching technical education and its impact on the effects of teaching and strengthening motivation.

To establish the differences in the effects of teaching technical education between the control and experimental group, the control test had been used. By testing the significance of the differences between arithmetic means we have established based on the results that with 99% probability is to conclude that the difference between the experimental and control groups is significant. Despite the poor conditions in which the experiment took place, we can say that the individualization and differentiation of teaching technical education reflect the effects of teaching.

According to the ranking factors that influence mastering the material in class students in experimental group werenvery pleased with the way the class had been realised. This means that the individualization and differentiation of teaching improved how strenghtening of motivation in the teaching of technical education, which effected the results of the control test.

The difficult situation in the teaching of technical education is not satisfactory. Poor material conditions of schools are reflected in the classroom. Classrooms that are used do not meet the required conditions, availability of resources, tools and equipment is unsatisfactory. Conditions for differentiation and individualization almost do not exist. It is necessary to improve work conditions, because it is the only way to enable the individualization and differentiation. Research has proved that the individualization and differentiation positively influence the effects of teaching and strengthen motivation. The need for the individualization and differentiation of teaching is high, because of its great opportunities and impact on the development of individuals and thus society. That is why we wanted to point out the necessity of changes in the teaching of technical education and the need for differentiation and individualization of teaching.

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DISTANCE LEARNING AND ITS SIGNIFICANCE

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Abstract - The aim of this paper is to present the development concept and importance of this global media phenomenon, which is assumed to be in the near future developing rapidly as an alternative form of education. It points to the impact of new media and the latest information technology to education and its extensive transformation of the comparative forms in the global knowledge economy and modern information society.
Distance-learning system is perfected with the development of technology. First, they are learning how to use printed materials. Development of technology enabled the introduction of new instructional media such as pictures, slides, films and presentations. The popularity of this type of learning crucially contributed to the electronic media - radio, television, interactive computer technology and dynamic Web sites.

I. INTRODUCTION

When it comes to distance learning is often used in a number of terms: Distance Learning, Distance Training, Distance Education, eLearning (e-Learning, "E" Learning), online (Online) Education, Virtual Instruction, Virtual Education, Virtual Classrooms, Electronic Classroom, Blended Learning ...

Understanding of these terms as synonymous is not accidental. All of them together is to assume a learning process in which the knowledge source and recipient are separated by physical distance and in which their relationship is mediated by using ICT, and reflect the nuances of individual options within the process of distance learning.

The U.S. competitive market in electronic learning and education. The experience of America, Canada and Australia have asked me in this field dates back to the eighties of the nineteenth century. Today's e-learning quite normal and at major universities (Harvard, Stanford, MIT) in their virtual classroom provides a diverse range of accredited academic courses [1].

Political and public interest in e-learning becomes larger especially in areas where the student population is quite diverse (Au stralija, Canada). Motivation is great for the implementation of this new educational model, where there is no way to increase the capacity of existing educational institutions or the budget is insufficient to implement new educational programs. Many academic institutions already have made smaller or larger step in the application of virtual classrooms.

Distance learning enables continuous learning (lifelong learning), students are professional, independent advancement on the time and location of their choice, going through the learning material as fast and as many times as they want [2].

II. CHARACTERISTICS SYSTEMS FOR DISTANCE

The basic characteristics of this model of learning [3]:

- Education or training that is offered to students at a different place from the teacher or sources of information
- programs or distance learning courses can be adapted to the different characteristics of students, and they differ in the technology used, the structure of the program (course), the degree of supervision of students
- Participants in distance learning: people who create and distribute learning materials to students
- organizers of courses or programs: education and scientific institutions for their students (and others), companies or their parts for their employees, individuals: consultants, teachers, ...
- Course participants (program):
    1. Adults - "nontraditional students"
    2. employees unable to attend classes
    3. people who require more activity and interaction in learning
    4. persons with physical limitations or disabilities
    5. persons geographically distant from educational centers.

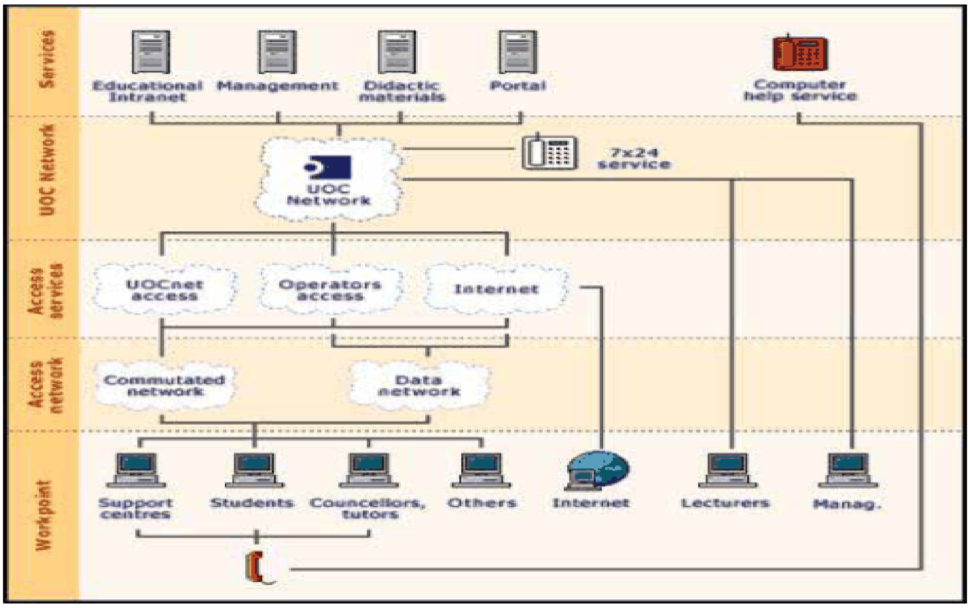

Figure 1 Technical model of the system of distance learning

III. Forms of electronic learning

Electronic learning (eLearning) is a relatively new term in world media distance learning. It is variously defined, for purposes of this paper will mention some of the definitions. Brovn (2003), under which e-learning means any form of education where the educational content delivered in electronic form.

Keegan (1986) believes that e-learning communication between mentor and student supported by a technological form. Some authors suggest that e-learning is a combination of quality and progressive educational achievements of technology, which is based on the principles of free learning, the use of computers in education programs and modern telecommunications (Internet) for teaching. Learning is organized as a process of dialogue in the virtual classroom, which means that the mentors and students are separated in space and / or time.

The problem of defining e-learning at a distance is the difference in the understanding of this complex forms of learning and attempt of classification of many of its solutions. New internet technologies provide users of various media (text, audio and video), which combine the multimedia content and present students [4]. Learning is a process that involves a whole range of possible activities, from simply reading the text to more complex structures such as the perception of audiovisual content, active participation in teaching, cooperative learning, etc. Some of the solutions e-learning can be classified as follows:

- E-mail learning
- Electronic books
- streaming media
- Educational Programs
- on-line courses
- Web log.

E-learning is one of the most famous computer-generated communications services. As a useful tool has found its place in educational programs. E-courses through the list of electronic addresses (mailing list) are the simplest form of delivering educational content of the student. Materials required for the course are delivered via e-mail, if necessary, daily, weekly or on a specified schedule. Student does not need to visit web site of educational institutions. All correspondence regarding the e-mail.

Electronic books are used in the system of e-learning as one possible solution. E-books can be a manual and complete the course. It is possible to combine graphics, audio and video. Depending on the software that was used for the implementation of e-books, there are options to search and protect e-books from copying or printing. It is possible to also define an end date for the e-book you can not use. Digital Signature (Authenticode Digital Signatures) is used for providing security to the contents of e-books has not been altered since it was signed, and that e-books has not changed, but in its original, authentic form.

Streaming media can be one way that e-learning and makes it unique and appealing. The use of multimedia technologies (audio and visual synthesis of communication) allows the presentation of educational content in a dynamic and explicit manner. Attending lectures or live exercises using these media allow the student to the events related to e-learning followed although dislocated. In the e-learning lectures are organized in the form of web conferencing (web conference), the web transfer (Webcasts) or web seminars (Webinars). The presence is enough to have been granted access to administrative and be within the scheduled time in a virtual classroom. These technologies allow for participation in discussions, interactive real-time.

Educational programs has long been used in education. Applied in e-learning get a new and dynamic form. These new programs (smart game) are interesting to users, especially younger children. Tori and edu-simulation program and are trying to teach the method of presentation to be stimulating. In the form of 3D interactive simulation, entertainment, games or quizzes, they are offered a very serious subjects.

Online courses (Courseware) are probably the most popular form of e-learning. Many educational institutions have in their online course offerings as a solution for students who are unable to attend classes in a school or university classroom. With the new concepts they guide the learner through the content in a way that enables them to progress. Through various workshops conducted exercises and acquire the necessary skills. At the end of course exam is taken at an educational institution. It allowed the student to gain credit for deposited items or diploma if they pass all the prescribed examinations of a university.

Web log (Web logging, blogging) short blog, like any new concept, it is difficult to define while I do not crystallize. It is a web site that you arrange yourself. We describe the blog as a diary of an individual or interest group. Blogging site that is used in e-learning is an interactive exchange of knowledge, communication between the students and interest groups. Some authors explain the weblog as a personal publishing on the Web and part of the community. Blog visitors can enter their comments directly on a web page, for a link or send e-mail.

All the above solutions have their advantages and disadvantages. Integrated into a well-planned distance learning course, virtual schools can provide good result.

Virtual Classroom e-Learning System Terms often used in e-learning are:

- Virtual classroom
- a graphical interface.

Virtual classroom teaching environment is located in the computer-generated and supported communication systems [5]. It is not built of steel and concrete, it consists of a set of communication groups, work areas and rooms that were constructed from the complex and intuitive software.

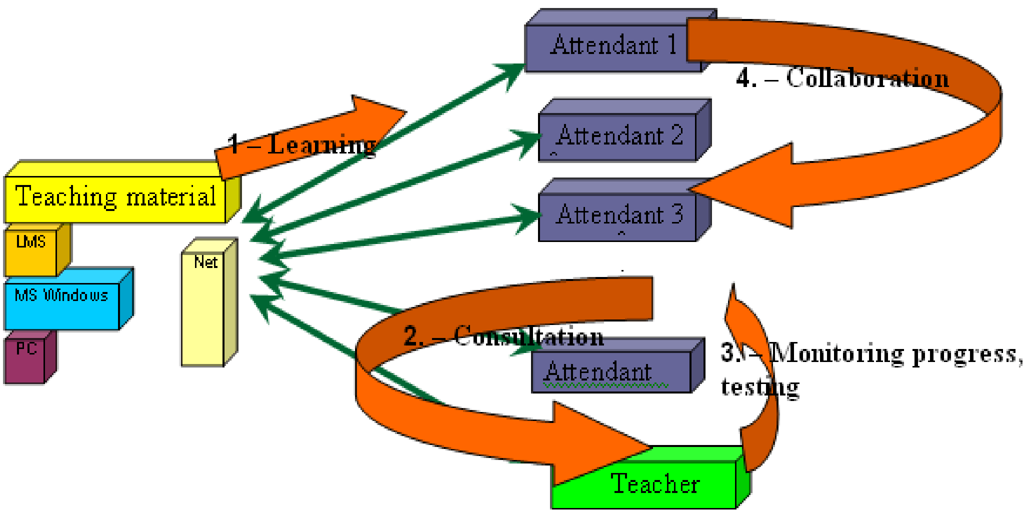

Figure 2 Types of interaction in online teaching

Graphical interface (Graphic User interface link and, in short GUI) is a system of software components (icons, menu, command line) as the user uses to interact with the operating system. This user-computer communication is via inputs (keyboard, mouse or sensitive device). Feedback from computer users by the screen monitor.

Depending on the graphical user interface, virtual classroom receives one of my particular physiognomy. Careful development of multimodal interactive interface can offer a new graphical interface with 3D environments. Modern 3D technology solutions provide the ability to move and explore space with no direct presence. The ability to virtuelizuje classrooms, classical, modern or by choice, is now a reality, as the existing computers have powerful graphics processors, with which it is possible to realize extremely demanding 3D graphics. So a student can have a real virtual world before us, that the world generated by computer technology. Interface creates the illusion of space and depth. Student moves through virtual rooms, (amphitheater, library, classrooms). This interface enhances the feeling of belonging to, or presence, and thus increases the involvement and participation of students.

IV. ADVANTAGES DISADVANTAGES OF DISTANCE LEARNINING

As an advantage of distance learning according to the reduction of space and time constraints. Students can learn from home and to actually attend school in another place. When learning distance is not lost during the way to school (time is non-renewable resource and it is necessary to be proficient in its management). This reduces the cost of transport and accommodation.

In addition to gaining information about what they are learning, students work with various technologies which adopt additional knowledge and skills about their use [6].

Students master the material by setting your own pace of learning which enabled them at times that suit them during twenty-four hours a day seven days a week. In addition to determining their own pace, they were also able to choose the way of learning by determining the level of interaction with teachers and other students. So changing habits of both students and teachers.

Distance learning is a challenge and the availability of learning is continuous learning and professional development [7].

Of course that this concept has its drawbacks. Most often mentioned lack of social contacts among the participants as individuals are not accustomed to such isolation and is going to give up.

The disadvantages are related to the technology. Not all are able to have adequate computers and do not know sufficiently how to use them.

Frustrating delays and can affect faults. It should be borne in mind that the Internet environment is not regulated and that problems can make viruses and hacker intrusions.

Need a great motivation for students who once in a position to independently assess their need for learning.Higher the load of teachers in preparing teaching content as the need to invest twice as much time than traditional learning.

V. CONCLUSION

Distance learning is not a new concept in education. Over time, the changing means of distribution, channels of transmission, course materials and facilities [1]. In today's information era of distance learning is becoming increasingly popular in the world. Many forms of learning help overcome spatial distance students and teachers. Distance learning is becoming a powerful tool to improve education [8]. Insufficiently developed by us and used by a small number of higher education institutions. It appears to us in due course no threat of an epidemic of distance learning but we must be prepared for this challenge.

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MULTI-FRONTAL TEACHING WITH A MOODLE SYSTEM

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Abstract - The paper presents how Moodle-based multi-frontal teaching is organised in order to overcome traditional frameworks of teaching. Starting from the basic features of multi-frontal teaching (MFT), students' activities and the altered role of a teacher, and bearing in mind possibilities provided by the Moodle System, the students of the third and fourth year of grammar school are taught Logic and Philosophy. Due to the organisation of the contents which requires thorough preparation and professional competence on the side of the teacher, it is possible to have different approaches with regards to students and teachers. The teaching material in the electronic form is at disposal to be applied in MFT and can be used when organising E-learning.

I INTRODUCTION

Petar Savić (1910 – 1993), pedagogue and founder of MFT initially wanted to change the traditional roles of students and teachers, trying to individualise teaching and make a step out of the ordinary, traditional framework of teaching. The basic principles, which the author of the MFT model and his followers decided on, are also the particularities that make this concept stand out. According to Savić, Guteša D. (2001), the model of MFT is based on the following principles – the contents of the subject matter are processed in a new way – namely, the students study independently for the most part, using the literature and receiving teachers' assistance:

- Students have are under the obligation to present a review of the entire subject content that has been foreseen by the national curriculum for a particular subject during a particular school year.
- The teacher does not call out individual students for oral examination. Instead, they decide, what unit they will present and when.
- Before their presentation, they will say what mark they are ready for, and they will prove that they deserve it with the quality of their presentation.
- When they show that they have adopted the entire subject matter, their school year is over as far as this subject is concerned (More: Gajić, et al. 2006)

When organising the work, during the first month the teacher introduces his students to the aim, requirements and contents of the subject content, points to a relevant literature that is available and readily divided into the subject units. The teacher also introduces the students into the ways of studying according to MFT and its techniques. Each unit contains theses, explanations, examples for practice and questions. The students prepare themselves for the presentation and apply in accordance with their individual capacities, tempo and in following their plan and calendar of work. The students have the opportunity to evaluate their wn work, which is an exceptional value of this model, if we take into consideration that self-evaluation is more often more valuable and more objective than somebody else's evaluation. The very organisation of a teaching unit differs significantly from the classic one, above all due to the active role of the students. A class in MFT is dynamic because the students who have not applied their presentations actively participate in the presenters Q&A time and in the follow-up discussion.

Among the authors who have dealt with the MFT model and examined and surveyed the effects of its application, you can find dilemmas as per how innovative this model is, considering that didactic approaches and schools from as early as the late 19^{th} and early 20^{th} centuries emphasised the importance for the students' activities and individualisation in their work and the need for a different role of teachers. However, regardless to them, it is indisputable that the MFT supports the autonomy of students, enables them for independent acquisition of knowledge and lifelong learning, develops a sense of responsibility to oneself and to others, teaches her or him what decision-making involves and what the basic principles of democracy are.

The exceptional value of MFT is the altered role of the teacher. All of the competences of the teacher, pedagogic, professional and personal have the same priority – they are conditioned with each other and are equally important in all of the phases of the teaching process. According to O. Gajić (2006) the teacher prepares the teaching material, has discussions with the students during their presentations, evaluates and marks their achievements. Also, he or she gives answers and additional explanations regarding the subject content if the students require so. It is considered that the teacher has now taken up the roles of a mentor, co-operate, partner and coordinator.

The MFT model implies, with all of the necessary competences, the teacher's immense engagement in the preparation of the learning process. The issue that cannot be avoided is whether the responsibility and the positive attitude towards this work, professional curiosity, wanting to advance the work is the sufficient motive for teachers, or should they be additionally encouraged so that the MFT can be present in schools to a greater extent.

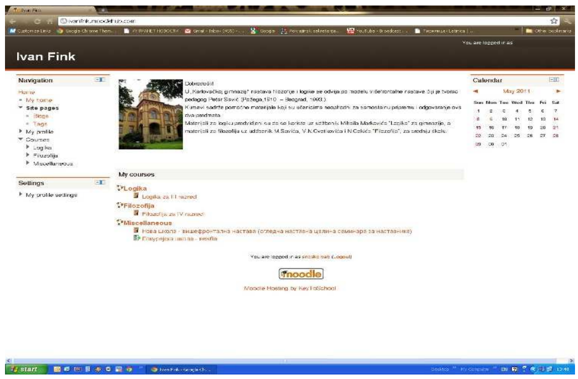
II ORGANISATION OF MFT WITHIN A MOODLE SYSTEM

Moodle (*Modular Object-oriented Dynamic Learning Environment)* is a flexible and fast system for distance learning (in the widest sense of the word) and electronic learning, which provides full computer-based support to teachers in the teaching process. We shall mention but a few possibilities that Moodle offers: creating a large number of courses (e.g. teaching material classified according to classes, topics and units) on one system; a calendar and schedule of activities; follow-up of the students' activities; work with the existing contents and resources; communication; testing the acquired knowledge; self-evaluation, evaluation, marks et al. In other words, Moodle is a standardised tool that enables active studying, communication between the teachers and the students and the enrichment and development of the contents.

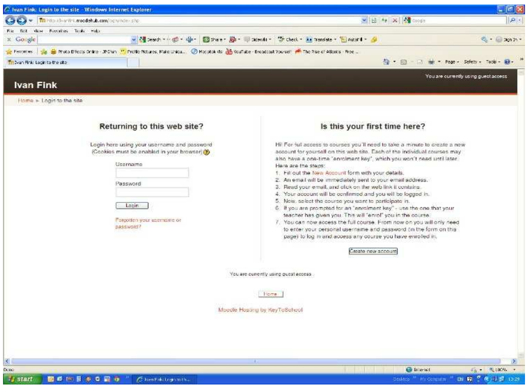
The opportunities that Moodle offers are exceptionally important for the organisation of work using MFT. The contents of the subject can be created in one system and divided according to the classes, units and activities of both the students and teachers, or according to the stages of the teaching process. The teaching material is always at the students' disposal on the internet, so that they can plan how to master the content and the process of acquiring knowledge, self-evaluation and evaluation and in addition to these they can 'go back' to the previously acquired content, following the principle of gradual learning and systematising the content acquisition.

We started teaching Logic and Philosophy in the third and fourth grades of the Karlovačka Gimnazija grammar school in Sremski Karlovci, based on features of MFT, activities of the students, the altered role of the teacher and due to the fact that it is possible to utilise the Moodle system. The teaching content and the material for the students' work have been set on http://ivanfink.Moodlehub.com .

The homepage contains basic data about Karlovačka Gimnazija grammar school, the courses, the MFT model and the materials necessary for the students for their independent preparation and presentation of the two subjects. It has been planned that the materials for Logic should be based on the Mihailo Marković's 'Logika' textbook for grammar schools, and the materials for Philosophy are based on the textbook 'Philosophy' for secondary schools by a group of authors (M. Savić, V.N. Cvetković and N. Cekić). The right column contains the work planning calendar.

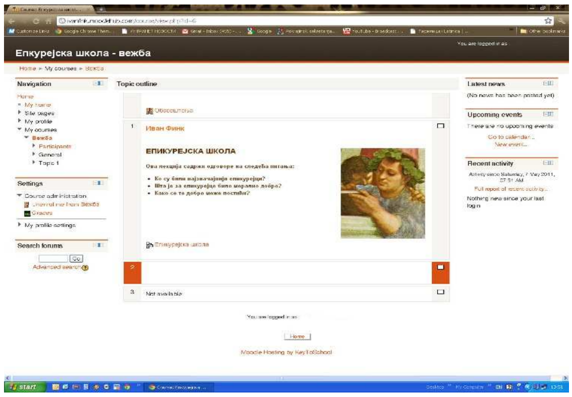


The left column contains links to courses with teaching materials. There is also an option so that non-registered users can have access to them, too.

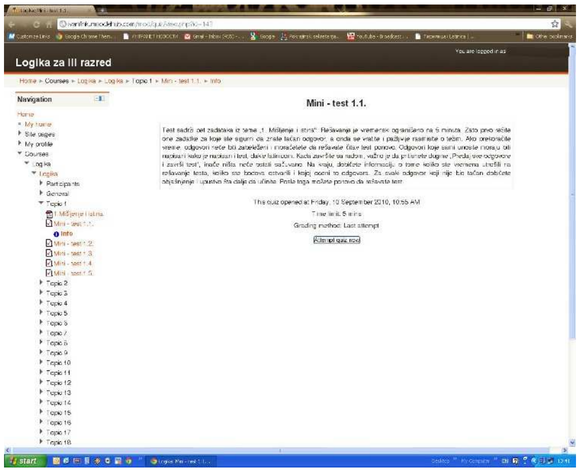


Interface for access by registered users.

In the central part of the screen you can find instructions and information for the students on how to use the materials available on the interface: materials in PDF format have been prepared for the current school year, the rest are from previous years and can be used by the students who advance faster than others. During the year, these texts will, too, be changed or additional text will be written. At the same time, each topic will contain the tests planned for the exercise and the control of how well the knowledge has been acquired. Below are the tests for checking the acquired knowledge and evaluation, on the left side is information on various events.



Homepage for the unit on the Epicurean School



Besides the tests for each unit the interface for testing the knowledge and self-evaluation, contains the index of follow-up, evaluating and marking each student.

Pages intended for the professional improvement of teachers who wish to work using the MFT model add to the quality of this presentation. It also contains a glossary of didactic terms.

III Conclusion

Activities in overcoming the traditional, classical forms of teaching, which are still dominant in this country and in educational systems in the neighbouring countries, are directed towards the activities of the students in school. The model of Multi-Frontal Teaching by its author Petar Savić, encourages the students' autonomy and enables them for the independent acquisition of knowledge and lifelong learning, develops the sense of responsibility towards themselves and others, and teaches them the skills of decision making and basic principles of democracy.

The exceptional value of the MFT is seen in the changed, non-traditional role of the teacher. All of the teachers' competences are they pedagogical, professional and personal and have the same priority, they condition one another and are equally important in all of the phases of teaching. The teacher is not a mere lecturer, but primarily a mentor, co-operative, partner and co-ordinator. The MFT model involves a changed engagement of the teacher in the preparation for a unit. One of the possibilities provided by the modern development of the information technology is the preparation, organising and managing the teaching process in the Moodle system. Organising the contents, which requires the teachers' thorough preparation and professional competence enables varied approaches in the work of both students and teachers. The teaching material is available in the electronic form and can be used in a Multi-frontal Teaching, and offers a possibility of E-learning.

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LEARNIG OBJECTS-WHICH ONE TO CHOOSE?

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Abstract - In this article the authors have tried to shed light on the following problem: "When designing and creating simulations or interactive animations there is an overall lack of well-defined developmental guidelines and of models which provide satisfactory/effective results."

I. INTRODUCTION

Software visualization (SV) is "the visualization of artifacts related to software and its development process" [1] and is used in the presentation, navigation and analysis of software systems. Price presents the following general definition of software visualization: "Software visualization is the use of the crafts of typography, graphic design, animation and cinematography with modern human-computer interaction and computer graphics technology to facilitate both the human understanding and effective use of computer software."

Given that the underlying purpose of algorithm visualization is to be educationally effective, it is noteworthy that eight extant taxonomic reviews of algorithm visualization and software visualization technology have focused largely on system expressiveness. In particular, these taxonomies have focused on three main questions [2]:

- What kinds of programs can be visualized with a given visualization system?
- What kinds of visualizations can a given visualization system produce?
- What methods can one use to produce and interact with visualizations?

The primary goal of visualization is to convey information. It should convey this information in an understandable, effective, easy-to remember way.

II. THE SOFTWARE VISUALIZATION

The lack of well-defined development guidelines and evaluation systems in the creation and design of software simulation and interactive animations may often result in the fact that the time spent with design, development and creation will be lost [3]. Namely, if the resulting interactive animation is given low from the users marks for usability, resulting in their not wanting to continue using the animation, the project can be deemed a failure. Similarly, if the animation's role of knowledge transfer is not fulfilled, one can hardly talk about a successful project.

One possible reason for this could lie in the fact that many authors did not pay enough attention to the fact that the Computer Based Learning (CBL) is essentially a different learning environment from the classical frontal type of teaching setting [4], and there must be different approaches. There is some evidence [5] that very few e-curricula can overcome the negative effects which are likely to result from studying in an isolated and stand-alone environment.

In many cases the experts have focused on their own needs when planning and designing the animations presenting their own learning material [6]. Researches dealing with learning styles have established that there are differences regarding in what shape the learner is, how well they have acquired the material, in what pace the information is being provided [7]. If these factors are not in to the learner's preferred style, the learning process will not be effective. This is proven by feedbacks from those users who study in this so-called Computer based education, they speak about whether or not the users are satisfied with the quantity and variety of e-curricula, but not with the quality.

The aim of this article is to focus on this problem. In this phase of the research the goal is not to evaluate other people's work or to develop the missing guidelines necessary for successful development. The problem described in this work is not only one of the developers of learning materials, but of those teachers who would like to incorporate already existing animations into their own electronic learning material. Learning object (LO) databases (CodeWitz project, Sulinet etc.) whose contents are readily available are quite common. Teachers can browse and freely choose from the Learning Objects for their own teaching materials. The basic questions remain the same: what factors should be taken into consideration when choosing the appropriate LOs? If the right choice is made, the learning material will be effective, in other cases not so much.

The reality of the problem is presented with an interactive animation. The animations deal with the same topic but they were developed by different people and according to different the development aspects. Two factors have been left out of the comparison, namely the amount of time and money spent on the development. Although it is difficult to present an interactive animation in static images, the screenshots below may be enough indication for the reader what great differences there are in the simulation representation of the same process. It cannot be determined which learning material is better or worse. All of the approaches have something positive about them. The authors of this work mean to indicate that the development of a convenient evaluation system is vital. If there were a way of telling or evaluating the impact that the interactive animation has on the teaching process, the developers and users would surely find those are extremely valuable pieces of information.

The first example presents a unique approach. The authors have done away with previous guidelines which can by and large be defined as follows:

An animation should have a great amount of

- multimedia elements
- interactivity
- information communication
- elements drawing the student’s attention.

The starting point for the creation of the development of the first presented animations was the authors’ experience described in the previous paper [8]. The following development strategies have been defined:

- The created examples have to be short program code sections, ones that are considered basic operations (e.g. function call, pointer arithmetic, storage allocation)
- The authors made an effort to minimize text elements and information: the program code should only contain the vital parts needed for the process to be visualized.
- The message of the animation needs to be illustrated graphically, keeping in mind that a single image speaks more than a thousand words.
- Animated elements ought to be used to point to those parts and processes where the changes happen.
- The level of interactivity needs to be reduced to the “absolutely necessary” level. This ensures that the user does not lose track of the main message of the animation.
- Control of playing the animation has to be provided: play, stop, and replay.
- The interface has to be consistent with every animation.

By keeping these guidelines in mind the authors aimed wanted to create such visualizations that carry the optimal amount of information while constantly keeping the student’s attention on the message. It is true that one of the most useful options of interactive animations is for the user to learn through experimenting, however a different approach was chosen for this project. All elements which would obstruct the message or highlight something else were strictly left out. The option for speed control for playing the animation was not incorporated. The authors believe that when animating a sufficiently simple and short program code, speed will not play such as an important or useful role.

Data entry by keyboard was incorporated only in the animation where it was absolutely necessary, but where it was not absolutely vital for understanding the message, it was left out. The reason for this is the data entry option may at some point cause the user to try to crash the application by entering invalid formats and values. Further, the number of visual elements is also reduced, thus making it easy to follow the presented process.

The newly defined guidelines state that the animation ought to be:

- Only the necessary number of multimedia elements.
- Minimal amount of lateral information used solely for presenting the essence as simply as possible.
- Elements drawing attention that only point out the changes that have taken place.

The first animation which will be presented is from Subotica Tech. Generally it can be said that the part presenting the program code is situated on the left hand side, while on the right there is a box showing the status of the memory.

Colors play an important role in creating an order within a given amount of information. At the beginning of the animation the entire program code is grey, as if melting into the background. As the program is executed, each program line turns into black, and an animated hand appears showing the currently active line. This serves to highlight the places where the changes occur. If there is an output the hand will point to the output screen, where the color will turn from grey (as if it were in the background) to black (bringing it to the front) and the output value will appear. The memory is represented by a simple ladder-like structure. By default all elements are grey, though once they become active they will turn into black (when e.g. a value is added in the section). The only memory cell presented by name and address is the one used by the program code. A further attention-grabbing element is a small sparkling green sphere which appears next to the active memory cell.

This animation presents how the parameter copies its value to the function's local variable with a function call. The message of the process is that there are two separate variables, and if the variable changes within the function, that does not affect the parameter in the function call. The two parameters are visualized and colors are used to point out that they do not exist simultaneously, and also the copying of value is presented.

Play controls (play, stop, and replay) are presented with three buttons. The screen showing the program results is a clearly defined box (see Fig. 1).

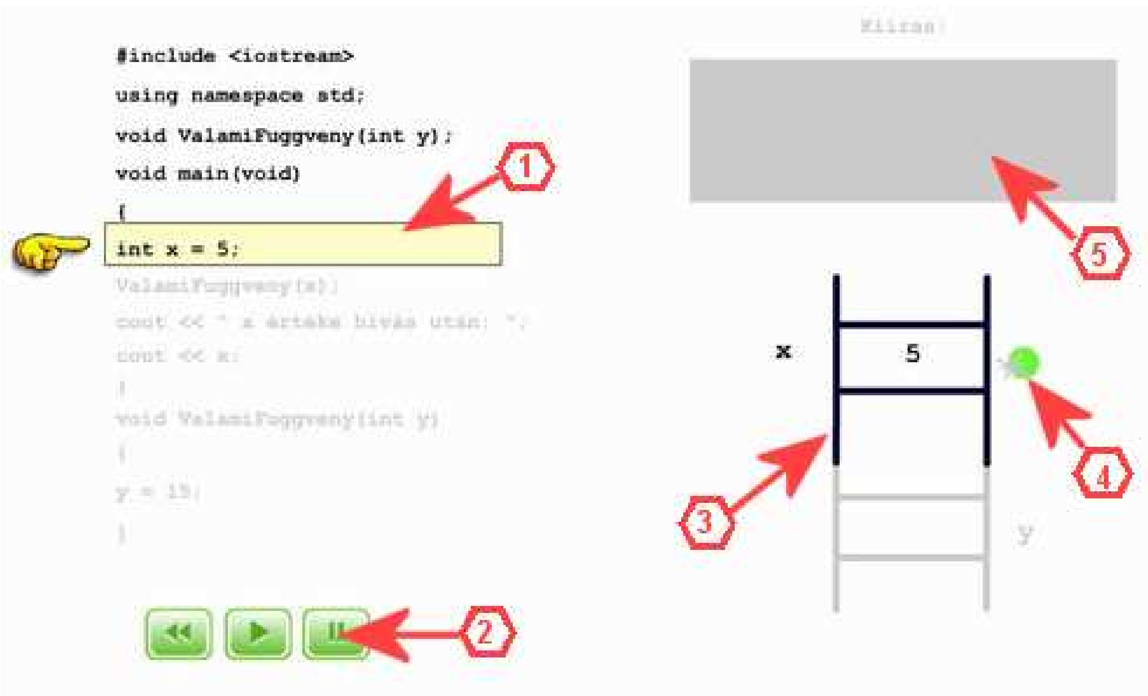

Figure 1. Screenshot of the animation from Subotica-Tech

Below is a description of the content and functions of the elements on the screen:

- Executed line of code
- Play control elements
- Simplified representation of memory
- Alterations marked by animated green sphere (e.g. writing in the memory cell)
- Space for presenting program output values

The other animations have been taken from the CodeWitz project's LO database. This project incorporates a collection of interactive animations developed at several European universities and colleges. Each author designed and developed their own auxiliary learning materials. Among others, the aim of the project was to make Learning Object from the database available for other educational institutions, as well, thus making their developing of electronic learning materials easier. The common feature in the following animations is that in the order of their presentation the amount of information contained is increasing, and is their scope of applications.

The following animation (by Esa Kujansuu, Institution: Tampere Polytechnic, Finland) portrays a different approach: the colors have the role to highlight the source code. Besides the window that contains the source code (1) three more windows provide the necessary information: the window presenting the output (2), the window showing the state of the memory (3) and the window portraying the results of the evaluation (4). In window (1) there is further information to each line of instructions.

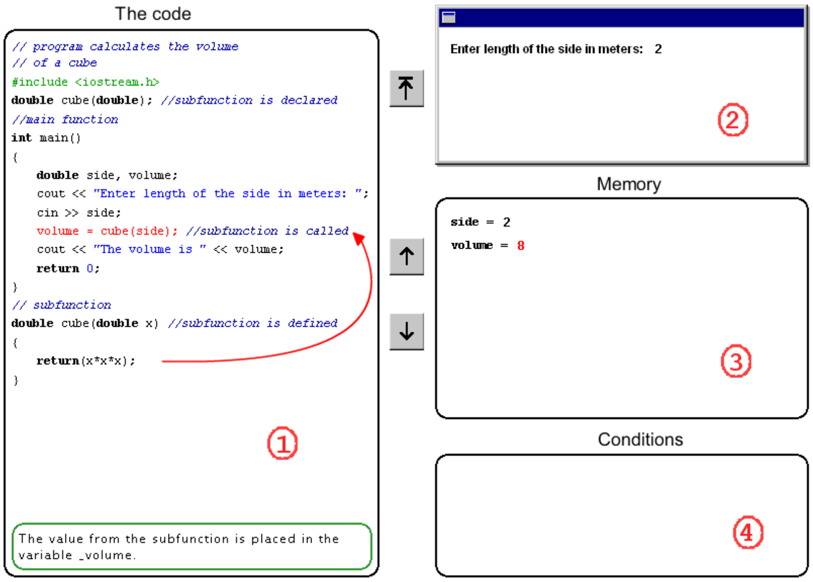

Figure 2. Screenshot of the animation from Tampere Polytechnic

In the next animation (by Julius-Christian Silard, Institution: Fachhochschule Furtwangen, Germany) the user interface consists of four dialog windows, the explanation of the exercise (1), a view on the source code of the example (2), the feedback window (3), where the LO may display the reaction of the LO to an input of the user, and finally the dialog window (4), where the user of the LO may input a reaction to a challenge of the LO or controls the LO [9]. In this application the besides the presentation of the main task, there user can also find and solve further sub-question connected to this topic. The authors have made this a condition of the further use of the simulation. For example, in window (1) the user is asked to correct a syntax error in the program before running the simulation. There is a unique 'hint' option that will provide help with the solution of the subquestion.

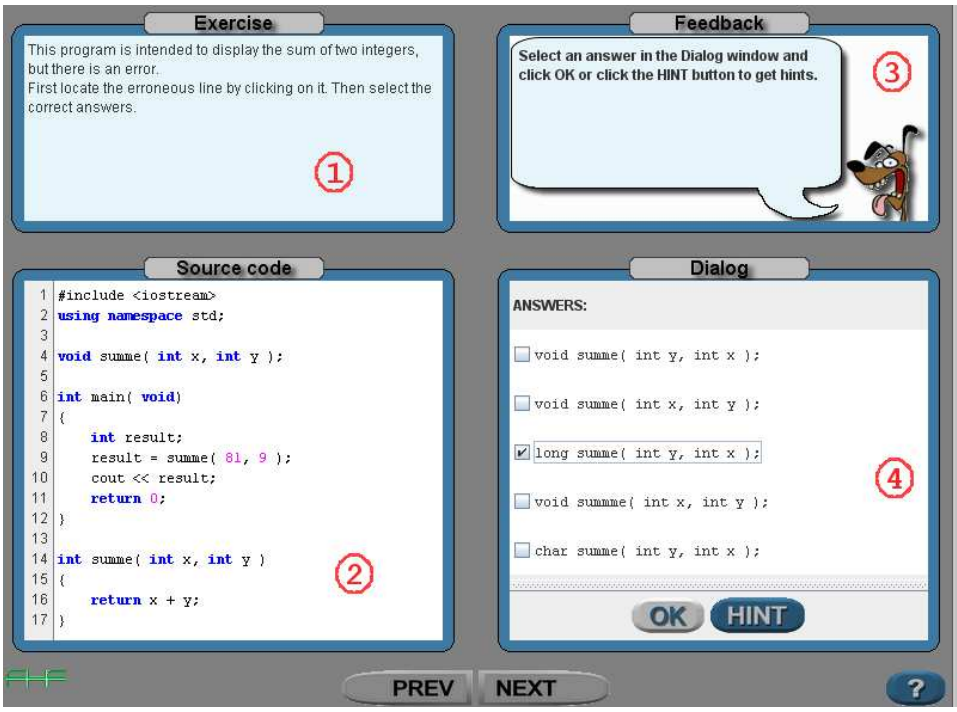

Figure 3. Screenshot of the animation from Fachhochschule Furtwangen

The next animation (by Tuukka Ahoniemi, Institution: Tampere University of Technology / Institute of Software Systems, Finland) also presents a Learning Object that is equipped with highly complex options. Similarly to the previous applications, this one contains the following:

1. the explanation of the exercise,
2. a view of the source code of the example,
3. the output window,
4. the window for presenting the variables
5. the window for presenting the result of the evaluation

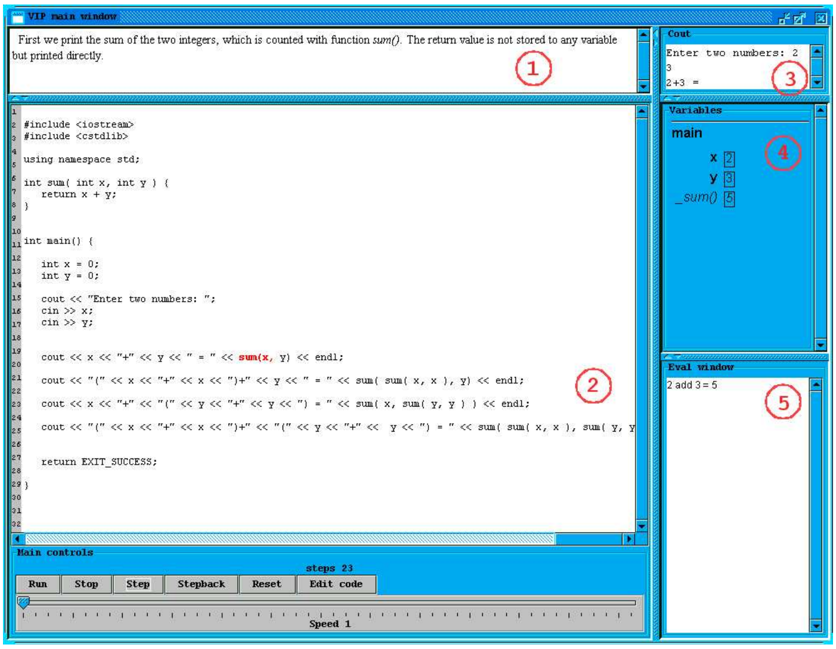

Figure 4. Screenshot of the animation from Tampere University of Technology

This application has the most options for controlling the simulation process. The user can “run” or “step-by-step” execute the program code. Further, they can edit and recompile the source code; while another interesting option is the ability to set the custom simulation speed.

III. CONCLUSION

The main claim of this paper is that in order to investigate this complex domain, multiple perspectives and methodologies have to be compared. Many research articles mentioned advantages of using interactive animations in education, but this only holds true if the design of the animation is satisfactory and the topic is adequate for presenting it in a dynamic form. This paper describes the problem of how to define the quality, or in other words, how to measure the effects of interactive animation on the learning process. The authors of this paper analyzed 4 interactive animations presenting the same topic: function call in C/C++ programming language. The animations were developed using different IT techniques and different approaches in the software visualization. One cannot determine beyond any doubt which the best is or the most effective in the learning process is. However, these animations raise a series of questions:

- Is the animation with a simple interface more effective in terms of learning than the one with numerous options? To what extent should the animation stick solely to the given topic? Or will a broad presentation of the topic provide better learning results?
- Can an order of importance be created among the software visualization options? E.g. how vital is the speed of the animation or the possibility for the user to enter various data into the program?
- Besides the visualization of the process, how much additional information is required for better understanding? In terms of presenting the source code lines, how much text and detail should it contain?
- What visualization methods are most effective? What methods are the best for presenting the execution of the program in an efficient manner? How best to focus the students' attention onto the message of the animation?

Due to the lack of a standard in creating successful and effective visual applications, the authors of this paper suggest that a evaluation and marking options ought to be integrated into the LO database. The ranking of Learning Objects created by the users, as a form of social navigation support may help answer the questions listed above. The experiences gained from well-accepted electronic materials may serve as guidelines for defining a methodology, which, if applied in the design of animations and simulations, will lead to greater effect and efficiency in the learning process.

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CONVERSION OF TRADITIONAL COURSE IN ELECTRONIC BUSINESS INTO AN ONLINE COURSE

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Abstract – University of Novi Sad, Faculty of Technical Sciences, presently is delivering blended learning course, for students, that is using web based learning platform Moodle, which is easy to use and offers a high degree of flexibility and many possibilities for customization and professor-led instruction. An existing course Electronic Business was completely redesigned to fulfill the requirements of an online course. The current paper describes the method used and experience. Studying online is a difficult task. In many cases students tend to assume that online course need less effort than similar traditional course. This misbelieve can lead to very early drop outs. When designing a course much care has to be taken to present the content in a motivating way. Also the content has to be structured to support learning principles of humans.

Each of the in-class lecture phases is followed by another online phase in which students participates in online assignments, assessments, discussions or takes online tests. The final assignment is in form of an individual project and presentation.

I. INTRODUCTION

Industry and economy are more and more looking for graduates with third level education. According to reference [1] every country in Europe needs to provide environment for better educational attainment – in particular at least 40% of the younger generation should have a tertiary degree. In Serbia this figure is 30% [2]. The dramatic increase in the use of Internet and IT in the last decade has helped grow the business competitiveness of companies that use their power. The increase in the use of Internet and IT also affects the productivity of organizations, governments and individuals. As the internet become irreplaceable part of students' life, Universities needs to make sure that their staff has the skills and the competences needed to select and use educational technology in an effective way. Acquaintance of lecturers with the Internet is fundamental for their future profession, and for lifelong learning in general [3]. It is a necessity for a university to offer online courses to allow different types of students to participate. Online courses also play an important role in the lifelong learning approach.

Based on situated learning and constructivist learning theory, learning effect resulting from interactions among students and between students and tutors has been examined and validated in online courses on various occasions [4]. Online courses are offered in different settings, with no on-campus phases or with limited on-campus phases. Online courses, with no presence phase allow offering these programs worldwide. This setting requires a huge number of examiners at all locations where students are from. Serbia has low level of technology adoption and leaders of educational institutions still do not have consciousness that pure online educational programs can create value to their organization.

This paper will present positive experience with blended learning model of delivering course Electronic Business to the student of Faculty of Technical Sciences in Novi Sad, Serbia.

A. *Electronic Business course*

The University of Novi Sad, Faculty of Technical Sciences is delivering blended learning course for master students and students at Specialist studies. The already existing course Electronic Business has been completely redesigned to fulfill the requirements of a blended learning model course with on-campus lectures and work in online environment. The curriculum offers the combination of technology and business knowledge, small group work, on-line learning, and an individual project. Case studies, group exercises, individual activities, and the Participant Workbook help participants apply knowledge learned to real-life situations. This model enables regular contact with students and allows quick reactions, in case of problems.

Switching to a more distance learning approach has created a new situation. Now students have opportunity not to attend practical lectures; this part of the learning is done via Internet at home.

The schedule for each semester is divided in fifteen classes. During the first lecture the program and the organization are introduced, the curriculum is explained, learning objectives and teaching methods are discussed and the learning platform is explained. Once they have access to the learning environment further communication is exclusively held online. In online learning environment students have opportunity to discuss and interact among each other's and to ask for a help from teaching assistant who has a role of e-tutor. Each week students have to pass online-quiz, hand in written reports or cooperate in group assignments to monitor and support their study progress. Handing in reports should be done on time; a +/- 1 day tolerance time is accepted. This frequent contact between students and professors allows a good feedback and can be used to stimulate positive experiences.

The final examination is taken during the final week and it is held on-campus in the form of presentation.

II. Transformation of the Course

Traditional course on Electronic Business was organized only in the classroom and required from students to move step by step through exercises with increasing difficulty. Electronic Business is best learned by learning trough practical examples, and therefore exercises in online learning environment always form an essential part in Electronic Business course. In an on-line part of the course, the students' progress can be easily brought to a halt if they misguide themselves into a direction where they believe that a certain solution to an exercise cannot be achieved. In this case, starting a new discussion will allow to student to seek the solution from peers and from e-tutor, as shown in Fig. 1. In this way redundancy of same problems is avoided and solutions can be easier applied since new entry to discussion forum is immediately sent to all participants, students and professors.

Figure 1. Screenshoot of discussion forum in online learning enviroment

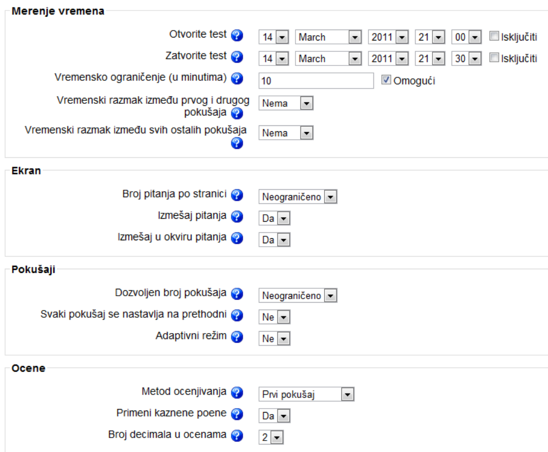

Figure 2. Screenshoot of online quizz settings

Another worthwhile tool that is providing instant feedback to students represents online quizzes. We therefore support students in judging their own progress by offering an automated testing environment that performs an instant response of their work. Learning environment is providing opportunity to instructors to define numerous features regarding setup of quizzes, from timing, display settings, attempts, grading options, and review options that control what information users can see when they review a quiz attempt or look at the quiz reports, as shown in Fig. 2.

A. Assignments

The combination of providing well selected course assignments and providing online submission through uploading electronic files in the space provided contributed significantly to the satisfaction of students and their performance (see Fig. 3).

Students now have opportunity to be framed and by knowing rules from the beginning they are eager to accept them and organize their time more efficient.

Naslovna ▶ IEv306231 ▶ Zadaci

Ime	Vrsta zadatka
Izjava	Postavljanje datoteke
Zadatak "Trendovi"	Napredno postavljanje datoteka
Zadatak "Organizaciona spremnost"	Napredno postavljanje datoteka
Poslovni predlog	Napredno postavljanje datoteka
Prisutnost	Aktivnost van mreže (Offline)
Prezentacija	Napredno postavljanje datoteka

Figure 3. Screenshoot of assignment list for course Electronic Business

The exact descriptions of assignment with specifications of the in/output behavior of the assignment form an essential part in overall grade. After submission each student is receiving a feedback in the form of comment and grade. The grade is becoming an integrated part of overall course grade and can be accessed through logging in the account of student.

Each of the in-class lecture phases is followed by another online phase in which students participates in online assignments, assessments, discussions or takes online tests. The final assignment is in form of an individual project and presentation.

The hand-ins were weighted with 20% of the course grading, quizzes weighted 20%, whereas the other 60% can be achieved by submitting business case explaining implementation of ICT solution and presentation of it. That the hand-ins allow to achieve 40% of the overall points of the course was crucial for motivating a timely hand-in of assignments.

B. Blended learning and Moodle

Blended learning is defined as learning systems combining face-to-face instruction with technology [5].

References [5] and [6] argue that there are different types and levels of mixing in blended learning:

- activity level blending,
- course-level blending, and
- program-level blending.

At the activity and course levels, blended learning can be used to design learning activities, interactions among students, and interactions between or with instructors. Program-level blends tend to be more administratively than pedagogically driven. It is further suggested that blended learning environments vary widely according to the following goals: pedagogical richness, access to knowledge, social interaction, personal agency, cost effectiveness, and ease of revision.

The entire course Electronic Business is organized with technology that is using Moodle platform in combination with in class instructions. Moodle is a Course Management System (CMS), also known as a Learning Management System (LMS) or a Virtual Learning Environment (VLE). It is a free web application that educators can use to create effective online learning sites. Moodle is an acronym form Modular Object-Oriented Dynamic Learning Environment and has features that allow it to scale to very large deployments and hundreds of thousands of students.

III. Conclusion

Distance education is not a new attempt; this kind of education like traditional systems of education has its own barriers and necessities which should be considered for achieving learning outcomes.

Designing an online course is a complex task. Ones should be aware that courses can succeed only if the initial effort in the design phase is sufficiently high.

In order to accomplish fully utilization of all features that online learning is offering it is necessary to develop well-defined syllabus which will be a guideline for students.

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THE SOFTWARE TOOL FOR TEACHING BASIC NEURAL NETWORK CONCEPTS

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Abstract - The paper deals with a specific software tool for teaching basic artificial neural network concepts. The new technologies based on neural networks have found their way into numerous domains, there are many applications of neural networks. This particular work presents a software tool for a single layer neural network design as well as three learning algorithms: perceptron learning algorithm, normalized perceptron learning algorithm and Least Mean Square error (Widrow–Hoff) learning algorithm. It is shown how to create a single layer neural network, train a network and perform some given task. The practical value of the software tool is evaluated by a case study.

I. INTRODUCTION

Over the past two decades, artificial neural network technologies have found their way into numerous domains: from financial markets, real estate to medicine and technical applications. Many software tools have been developed [1]. As in [2] "neural networks can solve prediction, estimation, classification, clustering, forecasting, control and decision making problems accurately and quickly". The fundamental property of neural network (NN) is the ability to learn from its environment and improve the performance through learning. The procedure used in the learning process is called a learning algorithm.

According to [2], there are many NN applications:

- Engineering and industrial applications.
- Business applications.
- Medical applications.
- Military applications.
- Financial applications.

NNs are commonly used in areas of:

- control, monitoring and modeling,
- process engineering,
- technical diagnosis,
- nondestructive testing,
- power systems,
- robotics,
- transportation,
- telecommunications,
- remote sensing,
- image processing.

Useful properties of NN are [2,3]:

- Nonlinearity.
- Input/output mapping.
- Adaptivity.
- Evidential response.
- Contextual information.
- Fault tolerance.
- VLSI implementability.
- Uniformity of analysis and design.
- Neurobiological analogy.

Given the long–run history of growth in education, it is important to observe the variety of applications of NN in numerous domains as well as methods to learn and teach basic NN concepts. This paper deals with methods and software tools, which were developed with an aim to demonstrate basic concepts in the field of artificial neural networks.

The paper is organized as follows: Section II contains the basic concepts of artificial neural networks, some learning algorithms are described as well. Section III contains a brief description of the newly developed Neural Network Interface software tool for teaching basic NN concepts. In section IV there are results of evaluation of Neural Network Interface software tool when used in practice. Section V contains conclusions, remarks and future work.

II. BASIC CONCEPTS OF NN

Artificial neural networks are composed of biologically inspired simple elements (neurons), operating in parallel [4]. The network function is determined by the connections between these elements. Neural network can learn (train) and perform a particular function by adjusting the values of the connections between elements. These connections are called weights. Trained neural networks are adjusted, so that a particular input leads to a specific target output.

The input p is transmitted through a connection that multiplies its strength by the weight w, to form the product wp. Then, the bias is simply being added to the product wp, shifting the function f to the left by an amount b. The bias is much like a weight, except that it has a constant input of 1. A single layer network with R input elements and S neurons is shown on Figure 1.

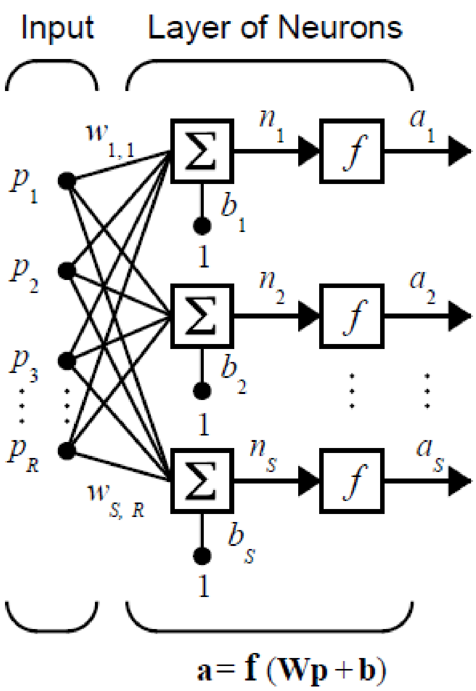

Figure 1. A single layer neural network

The sum of weighted input wp and b is the argument of the transfer function f, which produces the output a. Many transfer functions have been used, but three of the most commonly used functions are [4]:

Hard limit transfer function

$$f(n) = \begin{cases} 1, & n \geq 0 \\ 0, & \text{otherwise} \end{cases} \tag{1}$$

Linear transfer function

$$f(n) = n \tag{2}$$

Log–sigmoid transfer function

$$f(n) = \frac{1}{1 + e^{-n}} \tag{3}$$

A. Learning Algorithms

The learning algorithm (learning rule) is a procedure for modifying the weights and biases of a network, and is applied to train the network to perform some particular task. Learning rules fall into two broad categories [4,5,6]: unsupervised learning and supervised learning. In unsupervised learning the weights and biases are modified in response to network inputs. In supervised learning, the learning rule is provided with a set of examples (the training set or training data) of proper network behavior:

$$L = \{p^k, t^k\}_{k=1}^{K} = \{(p_1^k, p_2^k, ..., p_n^k), (t_1^k, t_2^k, ..., t_m^k)\}_{k=1}^{K}$$

Here, p^k is an input, while t^k denotes desired output, for some k. Set L consists of the pairs (p^k, t^k), actual input and desired output respectively. The supervised learning algorithm is graphically shown on Figure 2.

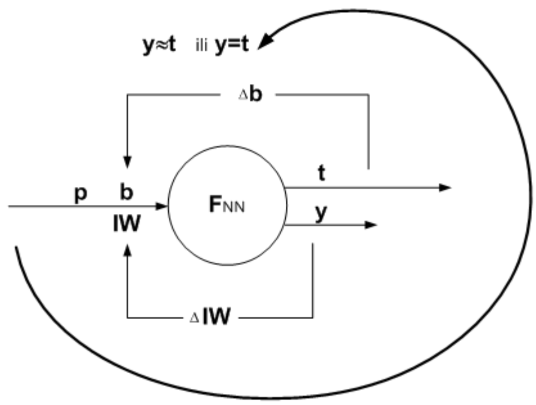

Figure 2. Supervised learning

First, the input p is presented to the NN, then output y is calculated. The difference e between actual output y and desired output t is used to calculate changes to bias b and input weights IW:

$$\Delta IW = (t - y) \cdot p^T = e \cdot p^T$$
$$\Delta b = (t - y) = e$$

Here, p^T denotes transposed input.

Second, new values for IW and b are calculated:

$$IW^{new} = IW^{old} + \Delta IW$$
$$b^{new} = b^{old} + \Delta b$$

The algorithm terminates when condition $y{=}t$ ($y{\approx}t$) is satisfied.

This kind of a learning algorithm is known as perceptron learning rule. The perceptron is a single layer NN with hard limit transfer function. The perceptron was originally discovered by Rosenblatt [7].

In some cases long training times can be caused by the presence of an outlier input vector whose values are much larger or smaller than the values of the other input vectors. An input vector with large elements can lead to changes in the weights and biases that take a long time for a much smaller input vector to overcome. The variation of perceptron learning rule, named normalized perceptron learning rule normalize the input values, so that effect of each input vector on the weights is of the same magnitude [4,7].

Furthermore, Widrow and Hoff [4,8] had the insight that they could estimate the mean square error by using the squared error at each iteration of the learning algorithm. The LMS (Least Mean Square) algorithm or Widrow-Hoff learning algorithm, is based on an approximate steepest descent procedure. As in [4]: "The Widrow-Hoff rule can only train single-layer linear networks. This is not much of a disadvantage, however, as single-layer linear networks are just as capable as multi-layer linear networks. For every multi-layer linear network, there is an equivalent single-layer linear network". The mean square error is calculated as follows:

$$mse = \frac{1}{K}\sum_{k=1}^{K}(e(k))^2 = \frac{1}{K}\sum_{k=1}^{K}(t(k)-y(k))^2$$

Here, *e(k)* is the error in *k*-th iteration, while *t(k)* and *y(k)* are desired and actual output, respectively. The new values for *IW* and *b* are calculated:

$$IW_{new}^{1,1} = IW_{old}^{1,1} + 2\alpha e p^T \tag{4}$$

$$b_{new}^{1} = b_{old}^{1} + 2\alpha e \tag{5}$$

The error *e* and the bias *b* are vectors, while α is so called learning rate. If α is large, learning occurs quickly, but if it is too large it may lead to instability and errors may increase. To ensure stable learning, α must be less than the reciprocal of the largest eigenvector of the correlation matrix $p^T p$ of the input vectors.

III. Neural Network Interface

The software tool for teaching basic NN concepts, called Neural Network Interface was developed in Borland Delphi Architect. The interface enables:

- design of a single layer NN (the definition of the length *R* of the input vector *p*, the number of neurons *S* and the transfer function),
- definition of the learning rate *lr*.
- definition of maximal algorithm passes (*max passes*), if this number is reached then algorithm terminates,
- definition of input vector(s) as well as desired output,
- selection of the appropriate learning algorithm.

The Neural Network Interface is shown on Figure 3.

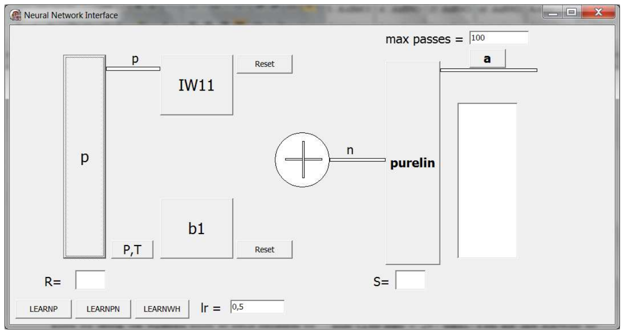

Figure 3. The Neural Network Interface

The software implements three learning algorithms: perceptron learning algorithm (LEARNP), normalized perceptron learning algorithm (LEARNPN) and Widrow-Hoff learning algorithm (LEARNWH). Available transfer functions are: hard limit (hardlim), linear (purelin), log–sigmoid (logsig) and tan–sigmoid (tansig).

In order to evaluate software tool, the following case studies have been conducted.

1. Create linear NN and train network to approximate function: f(X,Y)=2X+Y, if lr=0.05 and max passes=10000.

2. Create linear NN and train network to approximate functions: f(X,Y)=2X+Y and f(X,Y)=X+Y simultaneously, if lr=0.01 and max passes=300.

IV. Results

In order to approximate function f(X,Y)=2X+Y, linear NN has been created (purelin transfer function has been selected), see Figure 4.

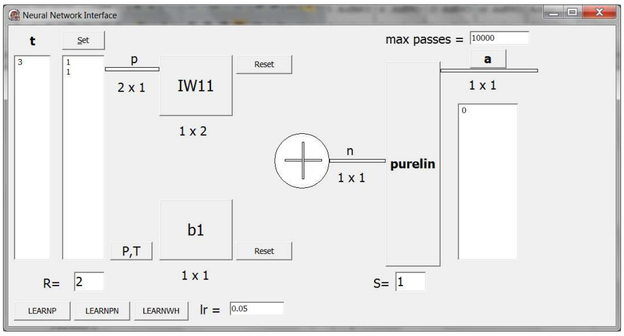

Figure 4. A single neuron linear network

As a training set (p_i,t_i), i=1, ..., 3 following inputs and desired outputs have been chosen: p_1=[1,1], t_1=[3]; p_2=[2,1], t_2=[5]; p_3=[2,2], t_3=[6].

The Widrow-Hoff learning algorithm is performed for (p_1,t_1), after that for input p_1 desired output t_1 is achieved. The network training is continued for (p_2,t_2) so that desired output t_2 is achieved for input p_2. But, for input p_1, network output is not equal to t_1 anymore (3.3 instead of 3). The network is trained again with (p_1,t_1). Continuing in the previously presented manner, network approximated function f(X,Y)=2X+Y after a few iterations.

In order to approximate function f(X,Y)=2X+Y and f(X,Y)=X+Y simultaneously, single layer linear NN with two neurons has been created (purelin transfer function has been selected), see Figure 5.

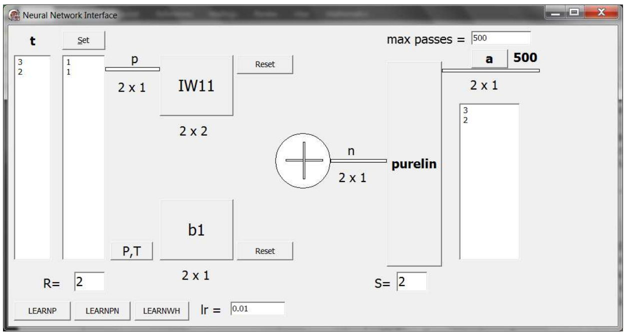

Figure 5. A single layer, two neurons linear network

In this case, as a training set (p_i,t_i), i=1, ..., 3 following inputs and desired outputs are chosen: p_1=[1,1], t_1=[3,2]; p_2=[2,1], t_2=[5,3]; p_3=[2,2], t_3=[6,4].

After two iterations single layer, two neurons linear network output is: y_1=[3,2]; y_2=[4.595,3]; y_3=[6,4]. It is obvious that desired output t_2 for input p_2 is not achieved. Only after a few tens of iterations, both functions are approximated. It is possible to change learning rate in order to accelerate learning process.

V. CONCLUSIONS

It is evident that artificial neural networks have many applications and are commonly used in various domains. It is important to understand the properties of NN as well as usefulness in numerous domains. There are various methods to learn and teach basic NN concepts. However, this paper deals with software tools, which were developed with the aim to demonstrate basic concept in the field of artificial neural networks. The software tool named: Neural Network Interface enables:

- design of single layer NN, (built in transfer functions are: hard limit, linear, log–sigmoid and tan–sigmoid),
- training of the NN by learning algorithm (perceptron learning algorithm, normalized perceptron learning algorithm or Widrow-Hoff learning algorithm),
- experiments by increasing or decreasing of the learning rate,
- visual representation of various single layer NNs,
- export of weight matrix and bias vector.

Previous properties of Neural Network Interface are important to understand the basic concepts in the domain of artificial neural networks.

Future work will include: new built-in transfer functions, new learning algorithms and more user friendly interface.

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APPLICATION OF WEB PORTAL IN CLASSROOM TEACHING

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Abstract – We are witnessing fundamental changes in society and education that are a consequence of the rapid development of information and communication technologies and their application in education. Creative use of IT in education at all levels is imperative in building a modern educational system. Information technologies enable learning through research, discovery, training, tutoring programs, problem solving and educational games, and influence the development of traits such as independence, creativity, accuracy, patience, which significantly affects the socialization of the child. In this perspective education, creating educational web portal would be a very significant improvement of education in general.

The aim is to contribute to raising awareness of the need to enhance the level of computer literacy, introduction of new methods of using information technology as well as to present the survey results.

I. INTRODUCTION

In almost all countries of the world to implement programs that significantly introduce new technology in schools. Namely, it is certain that the book or tutorial, lost primacy as a source of new knowledge. New technologies such as multimedia and the Internet, impose the use of new teaching materials and thus the methods in the teaching process.

The process of education in modern times would last through out life. It is necessary to time prepare young people for these changes, or the time to train them to use all the technological innovation and creative work in areas that decide.

In a world of accelerating change rapidly as the dominant form of learning imposed by learning with computers. Educational web portals that are "doors" that lead to many different facilities, which were organized for easy reference, with additional services, and services, enabling easy communication between teachers and students.

The traditional concept of training in the classroom gradually loses its dominant role it had. The new paradigm of learning is called distance learning, and is based on the mass dissemination of computer equipment, falling prices for equipment and Internet services as well as large time and financial savings and the possibility of almost immediate dissemination of new knowledge in faraway locations. [1]

II. EDUCATION TODAY

Application of Internet in education has taken the most seats at the university level, but more and more primary and secondary schools that implement it in the classroom. Students and teachers actively participate in projects of distance education. Two-way multimedia communications, which allows Internet significantly rationalize and enrich the learning process. With a rich communication that allows the Internet can significantly reduce the volume of the classical education of communication that is achieved with conventional communication media or direct contact with teachers and students.

Teaching and learning is no longer solely related to classroom and school day. New forms of communication offer an opportunity to successfully overcome short comings of traditional teaching methods, which are demonstrated many advantages of distance learning, and above all the versatility and flexibility when talking about where, when, and how to place the education process. [2]

The requirement for inclusion in distance education is satisfactory computer literacy and culture of dealing in a network environment.

III. DISTANCE LEARNING

Distance learning is defined by several criteria: the students are physically distant from the teachers, information and instructions transmitted through written and audio message or video and no interaction between lecturers and students. Receive the feedback at the same time or on time. [3]

Distance learning programs are tailored to the different characteristics of students, and they differ in the technology used, the structure of the program and the degree of supervision of students. In the learning program for students in lower grades, the higher the control than in the learning program for students in higher grades.

Thanks to the increasing popularity of the Internet, distance learning gets a new meaning. Internet services such as e-mail, news groups, bulletin boards, chat rooms, serve to improve communication between participants of distance learning. WWW provides clients with information in a different form, so that learning materials on the WWW contains different multimedia elements, such as text, graphics, sound, video, animation, and the like. In addition, the WWW is easy to come up with additional information about a specific topic. Teachers can quickly and easily set up learning resources on the WWW, so that they are available to all interested students. Students through the WWW and can communicate with each other using e-mail, whether to seek further explanations from the teacher, whether exchanging views on a topic that is being processed.

Distance learning technology provide the ability to track school students who, for whatever reason are unable to regularly attend classes. For example, some classes are picking up and make videos that are then distributed to interested students.

Technologies such as video conferencing, audio conferencing and the Internet provide opportunities for teachers to engage in teaching and teachers from geographically distant areas. Because of long distances, conditions of travel or personal commitments, many teachers it is easier, simpler and cheaper to establish a connection via the Internet and carry out consultations with interested students, but to travel for hours to school and back.

Distance learning can be successfully used for student collaboration on projects. [4] More and more projects in which students work together, which are spatially distant, and thus share their experience.

The basic issue is related to distance learning is related to the effectiveness of such teaching methods. Distance learning offers many advantages compared to traditional learning, such as convenience, flexibility and effectiveness. Distance learning enables continuous learning and professional development, students learn independently, at their own pace, place and the time to decide for themselves, available to them a large number of subjects offered by different institutions or teachers. The advantages of distance learning are reflected through: his own pace of learning, place and manner of learning is self-selection, it is possible to freely participate in quality programs.

IV. WEB PORTALS IN EDUCATION

The concept of web portal is linked to the concept of distance learning. Distance learning, actually represents a new approach to the distribution of educational materials to students who are spatially distant from the speakers.

The phenomenon of new educational technologies provides an opportunity to meet the ever-growing need for new knowledge, given the fact that every day multiply knowledge in all areas of human activity. It is safe to say that distance learning has become a need. Only this way can educate people in different places and at anytime. Also, it must be noted that distance learning causes major changes in the classical mode of creation and makes it much more interesting and accessible to end users.

Portal is a web site that serves as a starting point when searching for materials related to specific topics and areas of importance to the user. They allow users to find exact links to sites that deal with more specific topics and have information about them. Portal is a web site that has a folder of links around specific themes or areas of interest, which are divided into categories. In addition, the portal often includes a browser, chat, applications for news and other content.

Portals allow the width and content of a particular area check out the categories of different themes that make it up. For example, in science, in biology you can find flavors such as oceanography, and botany. Also the categories of art history is a broad field within the subject of history itself.

V. APPLICATION OF WEB PORTAL IN CLASSROOM TEACHING

Analysing the needs for modernization of classroom teaching, there is a possibility of application of educational web sites in teaching primary school students. Given the current practice, international experience and trends in the development of the education system, as well as the theoretical foundation of distance learning issues, we organized a study on possibilities of implementing educational web portal in teaching primary school students.

The aim of this research is the creation of teaching materials in digital form, and the introduction of modern web technology into the teaching process.

The experiment consisted of teaching the topic "Triangle" with teaching units: a triangle – site and the angles of a triangle, draw a triangle, the volume of a triangle, or 4 teaching hours by adding this class necessary for the initial test in mathematics. The final test of knowledge was done in the class schedule for a written exercise at the end of the theme "Triangle". Number of hours included in the experiment, at the same time held in the experimental and control groups.

Teamwork with the teacher information, prepared the conditions for third grade students stay in the cabinet for IT [5]. On each computer in the office of information technology, especially formulated with the desktop icon to connect to the site www.lugram.net/trougao_III.

Pedagogical documentation from the get data on the achieved success in mathematics of students in the first half. Before the study began that same day and at the same time held the initial examination in mathematics.

Working in pairs was used due to the fact that in a classroom with 12 computers for students. The good side of the pair's developing socialization among students and cooperative relations. Because the majority of students has a personal computer, there were no problems with adjusting student learning using computers.

Teachers of the department of experimental groups, before the experimental period, familiar with the manner of use of the website and for the appropriate software. Thus creating the conditions to realize the active role of teachers in implementing lessons in the experimental period. Teachers were given initial instructions to work, track work, and giving advice during the work and helped in mastering the art of using a computer program.

VI. ANALYSIS OF RESEARCH RESULTS

The study was organized in the third grade three primary schools in municipality Kula. In each of the schools participating in the study was taken by one experimental and one control unit. The research followed the plan and program designed process flow of unit "Triangle" and took place in parallel and all three schools. Held after hours and improved the final test data are organized and processed by Microsoft Excel 2007. [6]

Table 1. The structure of the sample of students towards success in mathematics at the end of the semester grade III

Success	„Isa Bajić“ Kula		„Petefi brigada“ Kula		„20. oktobar“ Sivac	
	EG	CG	EG	CG	EG	CG
Excellent	19	14	16	18	17	19
Very good	4	8	3	2	5	3
Good	2	1	2	2	1	1
Sufficient	0	1	0	0	0	0
Insufficient	0	0	0	0	0	0

When you make with educators and teachers on the organization of research in the process of unification, were selected classes with approximately equal numbers of students and achieved success.

Table 2 – Student success at the initial test in mathematics from the field geometry

Success	„Isa Bajić“ Kula		„Petefi brigada“ Kula		„20. oktobar“ Sivac	
	EG	CG	EG	CG	EG	CG
Excellent	16	14	13	13	16	17
Very good	7	5	7	7	5	5
Good	2	5	1	2	2	1
Sufficient	0	0	0	0	0	0
Insufficient	0	0	0	0	0	0

Table 3 – t – test: success in mathematics at the end of the first semester of third grade in the experimental and control groups

	Experimental group			Control group			Degree of freedom	Value t-test
	Number of students	Variance	Standard deviation	Number of students	Variance	Standard deviation		
MAT	69	0.362	0.602	69	0,430	0,656	136	0,789

There was no significant difference between experimental and control groups in the success of the mathematics score expressed in the first half of third grade of elementary school ($t_{136} < t_{136,\alpha} = 1,960$, $\alpha = 0,05$).

Table 4 – t – test: success in mathematics at the initial test in the experimental and control groups

	Experimental group			Control group			Degree of freedom	Value t-test
	Number of students	Variance	Standard deviation	Number of students	Variance	Standard deviation		
MAT	69	0,389	0,623	69	0,481	0,694	136	0,609

There was no significant difference between experimental and control groups in the success of the mathematics score expressed in the first half of third grade of elementary school ($t_{136}<t_{136}$, α =1.960, α = 0.05)

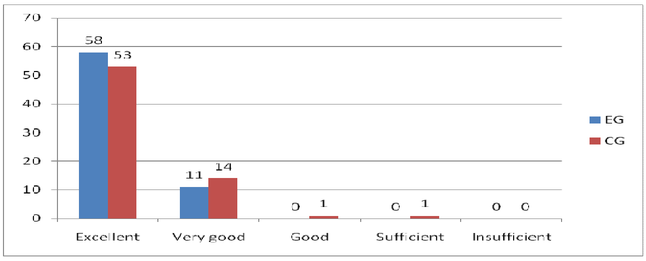

Chart 1. Results of initial tests in mathematics (geometry) of students in the experimental and control groups, objective type

Tabular and graphical presentation are the results of initial testing of knowledge in the experimental and control groups. The results were compared on the basis of the success that has marked grade. Chart 1 shows that here are no marked differences in scores on the initial test in the experimental and control groups.

Table 5 – t – test: the level of mathematics knowledge in experimental and control group on the final test of objective type

	Experimental group			Control group			Degree of freedom	Value t-test
	Number of students	Variance	Standard deviation	Number of students	Variance	Standard deviation		
MAT	69	0,055	0,234	69	0,314	0,560	136	5.569

Table 5 shows a statistically significant difference between experimental and control groups in their performance, which is expressed at the final examination marks of students' knowledge in mathematics.

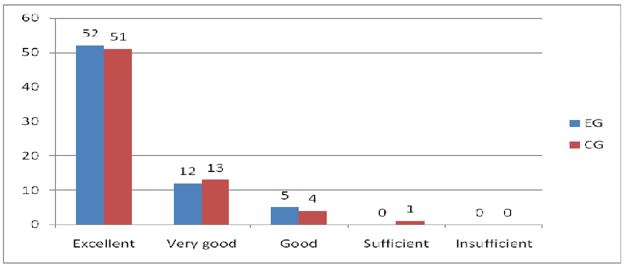

Chart 2. The results of the final examination in mathematics (geometry) of students in the experimental and control groups, objective type

Table 5 and chart 2 presents the results of the final examination in mathematics after the experimental period. Analysis of the results of final tests in mathematics after treatment of the theme Triangle for third grade of primary school progress can be seen clearly the difference in favor of the experimental group compared to the control at the final examination.

Increase in the success of the experimental group can be attributed to experimental factors. The experimental program had a positive impact on the achievement of the experimental group in solving the tasks of the final test of knowledge.

VII. CONCLUSION

Today, education is becoming an on going process throughout one's life. Knowing the fact that human knowledge is rapidly multiplying, experts of all profiles, in addition to his regular duties at work, have to resort to new forms of learning, and that their knowledge updated and refreshed with new knowledge. Computer literacy which includes not only knowledge and skills of handling and use of information technology, but the basic tool of our time, simplifies the job.

We live in an age that promises even deeper penetration of technology in human life and education. Specifically, the area of multimedia, development of a global network of Internet and the fact that computer equipment is becoming cheaper, more accessible and better, it improves the quality of education and make it interesting and understandable.[7]

Sophisticated organization of class teaching involves the use of various forms of work. In practice, different and most often used front, group and individual work and work in pairs. Computer-aided learning in itself brings practical work and exercises, sets tasks that are a problem to solve. The future of education systems based on the ability for self-study and distance learning that has a big role.

In one of the documents of the European Council says that the Internet distance education is not a parallel process but that is part of the effective integration of info-communication technologies in education and training. [8]

The key fact is that new technologies are not seen in isolation from the education system. These skills relate to the whole system of education at all levels, with expertise in which the particular deals.

Distribution and dissemination of knowledge is important, complex and more aspect, which requires the creation of web portals that have a dynamic character.

Bearing in mind the above, feel free to the conclusion that distance learning and retains the efficiency of learning in the classroom, but also offers the ability to communicate with other students or teachers, and to give complete comfort in the form of a possibility to choose time and place for learning. Internet and other web solutions will become essential to achieving the goals of education. As a substitute and complement to traditional education, distance learning has evolved into an alternative for many people who need education.

In our opinion, should begin to adopt new processes of education. Well prepared educational materials, set them on the web portals and in accordance with the needs and capabilities of schools and students, used in class. The application of web portals to improve the overall impact on the quality of teaching, without neglecting the traditional personal contacts, student-teacher and mentor approach to teaching..

It is estimated that in the future educational portals even more focus on your content to the specified groups of users with information or to exact a certain segment of knowledge.

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THE IMPACT OF INFORMATION ON INFORMATION SYSTEMS

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Abstract - Organizational systems are tremendously complex systems which enclose within themselves a large amount of administrative data. As a result of this complexity the organization of the work process and data gathering could be a tedious long-lasting job. But the use of modern information technology has had a major influence by speeding up the work process in any organization. Therefore the aim of this paper is to highlight the importance of information analysis with regard to the follows work process and the application of contemporary information technology in the business world. This paper emphasizes the role of information in information systems and its importance as diffused throughout work processes within the organization. It considers basic reengineering principles as a method of system remodeling. In the light of this, information has been viewed from different perspective – from the significance of information itself to its role in the work process.

I. INTRODUCTION

The world wide popularization of different approaches to work process remodeling, with the intention to build new high efficiency organizational structures has arisen as a result of different ideas about data collection and manipulation. The significance of information in the business world derives from the rapid development of technology. As a matter of fact, the latest generation of computers commonly used in the business world in addition to the phenomenon of the Internet and Intranet has changed the long-standing path of its development. The effect of this development has been to create a completely new environment with a high degree of uncertainty and full of unpredictable events. [4]

But the gist of the change lies in the way intellectual assets are used in companies. The first time people became conscious of the vital role of information was in the mid eighties. Global connection through up-to-date high technology has enabled businesses to have instant access to information. The development of this technology was the prerequisite to change throughout the whole business world giving a glimpse of globalization at the same time. The barrier which had lasted so long crashed under the old way of organizing work processes. The business world had to make an effort to alter their attitude toward information. This change has given information a completely new role in business management. The change was inevitable in all areas. The shift has been made towards intellectual assets, laying down the structural foundation for e-commerce. [2, 4]

The historical facts regarding the development of information systems show that the beginning of the change came out of information handling itself. The problems which have accompanied information system creation and implementation in work process organization confirm that. Earlier attempts at information system building had been confined to automating the existing work process.

However, problems that occurred in information system implementation led to new approaches. Therefore it is interesting to give some explanation about the role of information in information system planning from the perspective of information science. In terms of this there a brief overview of business process reengineering is given from the perspective of information itself, since it represents the frame-work of workflow change along with the planning process and its tools.

II. REENGINEERING AND INFORMATION

Business process reengineering as one of the most up-to-date methods of organization, restructuring has a different relationship to information and work processes. Although this approach to information system structuring includes several fields of business reorganization, from human resource restructuring to information system architecture, it will only be discussed with regard to information flows.

Business process reengineering is a revolutionary method of planning information systems which has overturned all conventional existing ways of doing business. The pioneers of this method were James Champy and Michael Hammer. Although reengineering gurus had realized in the first place that something had to be done differently regarding information systems, they only focused on work processes. Their main idea lay in the statement «don't automate, obliterate« i.e. to start from the very beginning creating a completely new information structure as if the organization has never existed at all. But they first recognized the possibilities that work processes could be joined together to make one work flow in a fixed time frame. This approach caused misunderstandings in the business world. Because of the incorrect interpretation of their standpoint it was equated to some degree with downsizing. Still the creators of reengineering had opened a new door to the implementation of information system. Because of this newly established approach horizons widened, increasing the possibilities within the domain of the intellectual organization of work processes. [1, 3]

In addition, a further step in information system planning was made by Thomas Davenport. He is also an advocate of business process reengineering but from a completely different angle. The basis of his approach is knowledge management which is based to some extent on information itself. He became aware of the importance of information and its role in the work process. From the knowledge management standpoint work processes should be considered as a synergy of data combinations and information capacity. He argued that concentrating on information rather than on streamlining the work process could give a completely new perspective on information system planning. [1, 3]

It simply means that information and its flow through business systems should occupy a central position during information system planning. Thereupon the work process has been conceptualized on the basis of the information required in certain business fields.

In some ways business process reengineering could be described as a reverse approach when compared to the classical planning method previously used. By this reverse method of planning a new, flexible approach of information system structuring has been generated. It is clear that information has a major role in the computerized work process since it can be treated in a much simpler manner than it had been in the classic planning approach.

III. THE SIGNIFICANCE OF INFORMATION

As far as the successful transformation of the work-flow process is concerned, the importance of information and its use in this process along side the consolidation of the business workflow should be emphasized.

The definition of information will be given before any other explanation. The word «information« derives from the Latin informare which means «giving a form«. Information according to some definitions could be described as a set of data in the shape of facts, knowledge or cognitive processes learned via communication, in certain situations or events. Therefore we collect and memorize a huge set of data which makes cognitive sense – information- every day throughout our lives. But in the framework of information science information is a set of cognitive data which can be processed, memorized and transmitted electronically for different purposes. [7, 12]

In the business process the use of data collection extends from the production line or service delivery, the legal and financial domain through to statistical presentation. According to its uses data can be collected from the various areas and from completely different business fields producing a mixture of instructions. On the other hand, the collected data itself represent a mass of facts without meaning. To shape instructions deriving from knowledge data must have cognitive meaning. It has to form knowledge for business use about events occurring in the environment, selecting specific and suitable data from the available data set. At the same time through the formation of these processes the foundations for the decision making process has been set. Therefore the predefined workflow processes formed by a collected set of information are geared towards certain criteria. Naturally these criteria should be set down in legislation concerning the law and compulsory rules regarding companies.[5, 6]

But from the information science point of view data analysis in the information gathering process is much more interesting. It offers challenging opportunities to discover which information affects certain work process and which does not have so much influence on decision making processes.

The diagram below (Figure 1.) vividly describes information gathering in the work process. This process combines data in the cognitive flow which means that the information about specific events or objects consists of different mixtures of data. This gives certain facts while an on-going flow of information is taking place. As is shown in the diagram one work process consists of a large number of collected information flows.

In everyday life we are constantly surrounded with such kinds of data collecting processes. We do it mostly unconsciously and automatically discarding the unnecessary data in our mind concentrating only

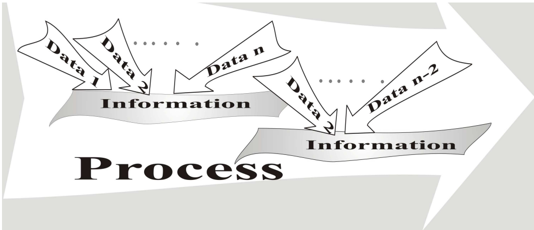

Figure 1. Graphic representation of information in the work process

on those which provide valid knowledge about previously defined issues. [6]

Compared to this data collecting and information creation for business processes is not so easy, especially if computers are involved. But aggregating information for computerized use could be structured in a similar way. Data could be grouped in aggregated form shaping the basis for further transmission of information. Assembling information flows in a certain group under previously defined rules should define the work process which means that information flows have been assigned to each work process.

This process of data selection and grouping hinges upon careful planning and acquiring business knowledge in specific fields together with established standards, company rules and legislation.

IV. THE ROLE OF INFORMATION IN WORK PROCESSES

When developing programs for business requirements every programmer in information system planning has run into a problem at least once trying to define the business process whose aim is to fulfill a certain business demand. In many cases the planning processes are followed by some problems with regard to the identification of the information necessary to be used in the computerized process. Disagreements mainly arise from the question of how should the manually gathered data be entered into a work-flow form adjusted for the computer. This problem arises from the electronic format of information. [8]

Observation shows that the main characteristic of manual work is to multiply a large amount of data through one process. Repeating over and over again the identifying data on different kinds of paper forms is unavoidable since it supplies the evidential connection among documents within a single process. Showing the relations between the paper forms, documents can be stored in files, archived and found very quickly. Therefore the process of thorough identification of the necessary data has to be the most important part of information system planning. Yet the main goal of computerizing the workflow process into a streamlined one is to mirror the efficiency and simplicity of data handling thus the following should be considered:

- Gathering and identifying data in a real business environment;
- Getting to know each detail concerning the manual flow across the entire organization;
- Analyzing all the follow-up legislation which concerns business processes;
- Identifying work processes duplicated in manual work;
- Assimilating data into one information flow eliminating duplication. This also includes the elimination of duplicated work processes;
- Creating cross-functional business processes.

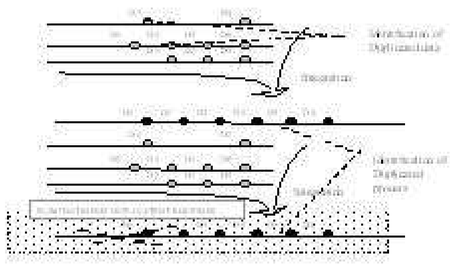

Figure 2. Process to create required information

Figure 2 shows an identification procedure for data from the given data set (D1, D2, ..D6) during the recognition procedure for the information. The first step of this procedure is the integration of this data in a single information flow. By this means we could reduce the registration of unnecessary data. But for the simplification of the whole process this is not enough. For that it is very important to analyze the newly formed information flow. Sometimes a completely identical superfluous information flow has been created and this places an unnecessary strain on the whole system.[8]

If the data identification steps mentioned in the analyzing process are considered then the development of the system has to include all the previously explained steps. First of all the information which is distributed throughout the business system has to be assembled and processed with regard to their future use. This means that planners should evaluate one single information flow from different points of view which include the following:

- Legislation analysis;
- Data analysis regarding several aspects:
  - work measurement
  - statistical analysis
  - administrative analysis
  - finance and accounting
- Examination of data flows in the process;

- Business activity analysis;
- Establishing and defining the identification code policy;
- Business process standardization.

It is obvious that identifying data represents the basis of the information gathering process. It should be the backbone of the entire system. However data collecting processes in the business stream are extremely complicated where myriad interconnecting work processes follow all business functions.

This data is stored in the database and can be retrieved for daily use. On a higher level, the same collected data could be valuable for work evaluation and comprehensive business analysis. Data can be retrieved not only for business evaluation but also for financial analysis. In short it serves the management process. Naturally it has to comply with all external and internal legislation and regulations. At the same time it has to meet the needs of statistical analysis of data with regard to business

V. PROBLEMS WITH WORK PROCESS REMODELING

Work process remodeling requires several traits in developers like flexibility, mental agility, communication skills, perception and knowledge of new trends. Otherwise it could create a negative picture causing confusion in the information system structuring combined with oppressive management of work processes. In conjunction with duplicated data and unnecessary information flows it will lead to an inert information system and even at some point paralyze the whole system.

Through the course of remodeling, members of the information system planning team are confronted with various problems. But from the standpoint of this paper interesting problems which arise from work process modeling are:

- Omitting the central position of information in the work flow planning process;
- Poor knowledge of methods used for analysis of work process flows;
- Misunderstanding the need for remodeling the business process;
- Resistance towards new and unknown events.

This means that information system developers have to focus on information flows as well as on information itself.

VI. TOOLS FOR PLANNING

Data flow analysis is a complex process which covers different aspects of quality process creation therefore all the listed problems have an equal effect on the planning process. From this complexity of procedure certain conventions have appeared concerning analysis procedures. Many software solutions and automated methods have been developed which are used to save time and simplify business process and information system planning. The software solutions could be categorized in four groups:[13, 14]

A. Work-flow analysis

Software created for workflow analysis are tools used in contemporary business process development. Therefore the use of these programs helps to automate a wide range of business tasks. Their aim is to help carry out everyday operational activities which follow the modeling process. This kind of software allows us to define data flows necessary to create connections between individuals and between departments in the planning processes. The basic role of software is reflected in the monitoring possibilities. That refers to the way the document should be formatted, reviewed and delivered. [8, 13]

The groups of software described previously give support to the business analysis combining statements with processes followed by transitions. Each process consists of a variety of statements and their combinations. Consequently, there is a need to address problems from time to time which might occur.

B. Flowcharts analysis

Flowchart analysis meant for business process flow manipulation. In the first place, these programs require the definition of the process which should undergo transformation. The procedure itself requires gradually drawing diagrams, step by step and labeling the branching in the decision-making process. Besides that, these programs include time planning as well, since the execution of the processes requires a certain predefined period of time. Making a time schedule for processes every significant moment and the facts which have an impact on the execution of business tasks must be critically analyzed. Flowchart analyses often includes a process review for each relevant aspect which tackles the work flow solutions displaying it in the electronic format (brainstorming solution). Besides that, all possible actions are defined concerning questionable fields without any evaluations. [8, 11]

C. Gantt charts

Gantt charts, where the interrelation of activities is represented by a horizontal graph divided into definite intervals of time has been developed as a production control tool. The purpose of these charts is to help in business process management and the decision making process. Gantt charts are graphic representations of work flows or they could be time-tables of production activity/operation order from the beginning to the end. Although it could be manually set out on paper specially developed software provides a faster much more convenient automated version. [10]

D. Computer simulations of work processes

Computer simulations fall into the last group of business process planning solutions. Their aim is to simplify the procedure for structuring work process modeling by imitating processes. They are analytical tools focusing on the time frame of the execution of business processes. At the same time due to high flexibility they enable fast implementation of changes to the identification process of the newly structured business processes. In this way any necessary changes could be made before the implementation of the process in real surroundings and any problems tracked down. [13]

All the above mentioned tools and approaches have one trait in common– data analysis procedure simplification, analysis of information flows in processes and time management required for their execution. However the most important thing is a detailed knowledge of the business area where the change will take place.

VII. CONCLUSION

In striving to achieve higher efficiency in the business world through work process modification information handling as the main source of change has been put into the spotlight by Information science, System theory and Management. Since information management itself receives special attention all over the world new, advanced approaches and methods of business process restructuring have been developed.

These tendencies lead to a diversified range of software solutions for process identification and definition, work process and activity planning even simulating the structure of the work process before its implementation. All these tools are created to help in the planning phase of information system structuring. But to lay solid foundations for the successful implementation of information systems it takes knowledge of which information is required to follow business activities and work processes.

Therefore the main goal of this paper is to shed some light on the process to identify redundant data which could produce duplicated information flows. But the significant issue concerns problems connected to the data analyzing process. In terms of this the importance of information has been specially emphasized.

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ACCESSIBILITY AND POSSIBILITY OF INDIVIDUALIZATION AS A BASE FOR QUALITY EDUCATIONAL SOFTWARE

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Abstract - In this paper there will be presented a model of interaction between a man and a computer. The model has an option of individualization in order with user's needs. The fundamental assignment is that teaching is a constant search for models and methods in order to motivate listeners in their desire for knowledge. Information technology presents a powerful tool which can affect motivation through achieving positive emotional experience in the process of acquiring knowledge. One of the methods by which this experience can be achieved is also the positive interaction between users and computers. It is expected from the software to have a "user frendly" characteristics and to be directed towards a users. What we have placed in the foreground is the possibility of settings in order with user's desires and adjustment towards user's characteristic, so that possibility of choosing users can be achieved.

I. INTRODUCTION

The use of information technology has imposed itself as necessity in the proces of modern teaching. Information technology has assumed a dual role in educational area. This role has been reflected through developing of computer literacy and using information technology, but also through using its own possibilites. Being of on the powerful obvious teaching aids it offers an interaction between pupils and knowledge, as its greatest advantage.

The information technology offers us the possibilities and choices that enable us achieving a totality of studing process "through perception, memory, learning, cognition, imagination, reasoning, thinking and research" [3] and towards this the modern education is aspiring to.

II. THE ADVANTAGES OF USING COMPUTERS IN THE PROCESS TEACHING

One question imposes itself in the process of acquiring knowledge, motivation, as one the most fundamental preconditions of success. Exploiting of advantages which information tehnology offers us in the teaching process presents essentially searching for possibilities of increasing pupils' motivation as one of the preconditions of successful learning. The precondition is acquired here, that the process should be aimed an active participant instead of passive on. Through the process the student is directed towards his own research. It is insisted on the principle of activism.

According to [3] motivation manifests itself as "intrinsic (interest, attraction tovards understanding its own enviroment) and extrinsic (shoving knowledge and desire for proving something)". The software which we discussed about, has to fulfil the conditions that are reflected through the influence towards increasing interest and its attractiveness. This is the precondition of understanding the environment and providing possibilites so that a student trough self-evaluation can get some information about his level of knowledge. Besides knowledge, the student also has to feel pleasure trough understanding that he is in possibility that he, with his acquired knowledge, can understand elements and occurences in his close, everyday enviroment.

In order to maintain pupil's required level of motivation and interest, it is necessary to achieve a positive emotional experience. From this experience it deponds how the pupils'will behave towards the teaching process, whether the teaching process will be appealing or repelling to them, whether the work will be interesting or boring.

III. DEFINING THE ASSIGMENT AND CONTENTS BY WHICH THE EDUCATIONAL SOFTWARE IS ENGAGED IN

Defining the assignments and contents of software whitch is dealing with hydroelectric, became out of an idea that for a subject should be absorbed on area which is connected with everyday enviroment in wich there are the software users. The will be enable to understand fundamental legalitiers and elements by understanding the enviroment, that is universal for the whole area of hydroelectricity and energy in general. Besides this the software also had to satisfy conditions that referred to accessibility and possibilities of individualization in order with users'desires as a precondition for increasing motivation in aquiring knowledge. The special emphasis in its developing was given to indipendent research by using the Internet. By this, it is coming to accomplishing of an indirect goal which is reflected in training and perfecting the users in using the possibilities that are offered by its use.

IV. THE PROCESS OF ANALYSING THE METHODS OF SOLVING THE APPOINTED GOALS

On the ground of defined goals and defined assigments which software had to achieve it came to positioning basic demands which have to be accomlished during the process of making the software. As one of the basic demands, it was the accomplishing as much levers as possinile of interactive software, "because it is impossible to imagine the educational software without interactivity." [2]. There fore, the software had to possess the high level of interaction between pupils and the software itself, and above all to accomplish possibilities by which the pupil himself can choose his process of acquiring knowledge; on the other hand it also enables an individualization, in other words, ad adjusting the software to user's personal demands.

Accessibility is defined as an elementary individual's right. Using the elements which enable individualization and respecting recommendations which refer to use and combination of colours and page layouts during the process of designing it is achieved qualitative increasing of level of content's accessibility by wide range of users individualization is not just treated as a posibility of seetting the features (colors, font size, etc.), but also as a possibility of adjusting a content in order with the age and ethnic-cultural components of users, which are ignored very often. These components can make access a bit harder, and often they can ever present a classical information barrier.

TABLICA I. OPTIONS IN THE SOFTWARE

Num.	Adjustment	Features and elements that are changing
1.	Customizing the look	Font size, background color, objects and elements, color composition
2.	Customizing content	Changing the content accessed in accordance with the age's
3.	Ethnic and cultural requirements	Presentation of content in two scripts based on user choice

In developing the software, the certain action is directed to some elements wwich refer to users with special needs. Elements and the content are composed such way so that a clear colour contrast of text and background can be seen. This is achieved trough clear marking of available links towards additional multimedia contents and also by making a choice of multimedial contents followed by speech.

A. *A selection of content*

Starting from the idea that a software should provide an overview of successful approaches of aquiring knowledge from certain area, where the starting points take the initial subject-appearances from everyday life of student-user's enviroment, as the thome it is selected the field of hydro energetics.

Picture 1 Avalable video of mini power station in Radalj,located in the software, as one of the options

This field was suitable for processing at the local level due to the existence of objects that are know and relatively familiar to all students, and that will be a good way of introduction the theme.

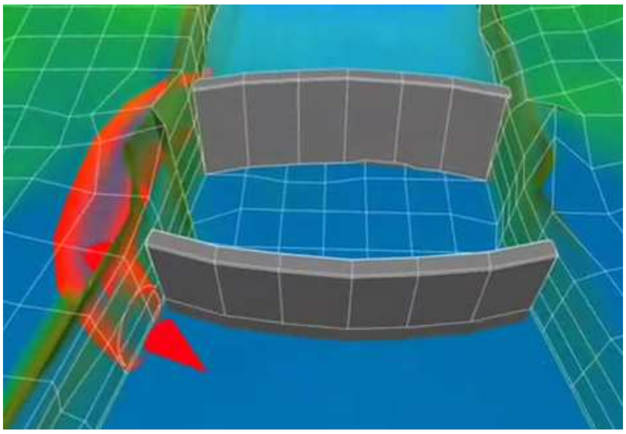
For the above mentioned reason, as a base of modul content presentation, there have been chosen facilities of hydro power plants in Zvornik and Radalj. Trough analyzing the function and elements of these two facilities, the users will be acquainted with knowledge universal for all energy facilities. In this way, we have been directly achieved one of the principles directed from the known towards the unknown, and also the principle that the user will come to fundamental knowledge by analysing familiar topics, and which is also a precondition of aiming to the highest level of knowledge such as synthesis and evaluation.

Besides selection of introductory themes that are locally familiar to students, it was necessariy that by directing users towards researching, it enables the access to thematically related contents, where the student will be able to comprehend and undestand these contents, with aquired knowledge from the presentation part. This way the principle of acquiring new wisdom has been introduced, relying on comprehension of similar terms.

B. *Presentation of content*

In time of designing the software, ie, defining the visual identity, the selection of elements, organization, and connecting contents and means of its presentation to the user, it was striven to obey two basic principles of design. These two basic principles are "widening horizons for learning and increasing an interaction" [2].

The idea of widening horizons in studing is realized trough use of "concentric circles" where at each repetition of the notion, it was expected from the student to expand and acquire the higher level of knowledge about the notion trough acquaintance with the facts. On the other hand, there are some notions in software that are related to the field of energy but not directly connected with hydropower. Such notions are most commonly related through links with the Internet content by wich pupils' orientation towards individual research is acomplished. Therefore, in this way, the students have been directed to acquire and expand their knowledge about areas that are not in direct connection with the area of energetics. By acqiring this knowledge it is being led to increasing the total level of knowledge and especially increasing the comprehension about the teme that presents the software's content. By this the request for diversity and widening knowledge in the process of studing are fulfilled. Also, the intention to stimulate students themselves to connect acquired fundamental knowledge and to make their own decisions about terms which they face for the first time is fulfilled.



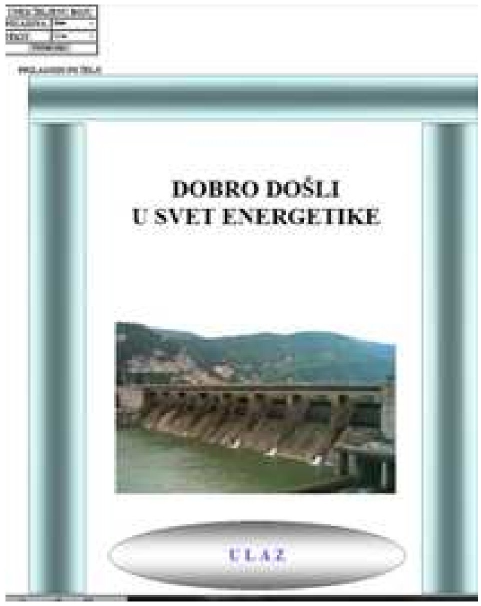
Picture 2 Frame from the video material available in the software

During the software development, the special attention was directed towards fulfilling the most possible interactivity and to maximum increasing of usage of multimedial content and above all of this, to video materials that are selected in order with above mentioned instruction.

Video material is processed in terms to achieve the the minimum requirements towards different hardware platforms.

V. DESIGN AND STRUCTURE OF EDUCATIONAL SOFTWARE

The certain restrictions have imposed themselves according to the absorbed request to enable the high level of accessibility to the content for several age groups, as well as some legalities which have to be obeyed during designing and structuring of content.



Picture 3 Front page

At the very beginning of the designing, there has been absorbed an attitude that the whole software preserves consistency-constancy in using navigation objects and elements and menues as a precondition for successful motion of all users trough the content. Also, the used elements have such a visual companent to possess a level of associativity towards the users. The used elements are such to associate the users vividly with actions which follows after certain activity (going to the next page, back to the page, etc.) All the elements of navigation, in the whole software, keep the same position and shape, and thus they affect on intensifying of feelings of security during its usage.

Although this is word about quite simple structure and organization of software, at the very first page it has been given the option to the user to enter the help module. In this part, besides help which is offered to the users, there have been placed some explanations, which role is to provide the user with an option to consider all features of software, trough accoplishing certain preconditions (for exsample the internet connection).

In the very content of software there is a great number of multimedia elements, usually in the form of video material. The idea for increasing usage of video material comes from maximal respect of transparency principles and content visualisation principles, by which the higer level and quality of acquiring knowledge is gotten. The chosen multimedia contents are such that the content itself is presented, in most cases, by work simulations, which by their simplificity allows easier mastering and understanding, which are again universal for the whole area that is word about.

In the previous part, it has been emphasized that the setting and adjustments are one of the ground ideas for increasing the quality of educational software.

The mentioned idea has imposed a certain structure of the software. After the initial screen that contains the visuas identity settings (text color, background and font size), there are pages which enable the user, ie, adjusting the content in order with user's needs and characterictics, considering user's age as well as his ethno-cultural characteristics and needs (using the sripts). After finishing the adjustment and selection, the user can enter the content. The content is presented in a such way that user can meet with the elements of power plant using lots of links wich can lead him to the certain contents with similar theme or the base supplement themes. The materials available through links are an integral part of a software or they can be available through their addresses at the Internet. In the final part of the software, ie, at the end of presentation's chosen part, there is part intended for testing knowledge, in order with user's demands. This part is supposed to be a possibility by which users can check his own level of acquired knowledge and notions, and not to be a possibility for grading or quantifying any achieved results. For the above mentioned reason, this part does not have an element which register a mark number of points,score, or something. The software is intended for as much users as possible, so its checking parts is realized on simplifying option of how to give answers (by mouse "click" on a given answer or the part a photo). Immediately after giving answer, the user gets information about the performed action, that is, about it the given answers is true or not. If a user gives the incorrect answer, it will suggested that he should re-study the certain part of the content.

A. The elements of the content

The attitude, referring to enable the usage of the software by great number of users and on different platforms (followed by requests for high accessibility), is being conditioned that in the conent should be chosen such elements that can enable functioning in a great number of software and hardware platforms. Because of the above mentioned reasons, it has been decided that software should be in a shape of Microsoft Office Publisher 2003, where as the visual components were selected the photos and video materials of lower resolution, an in purpose function on platforms of lower characteristics. For the page format, it has been chosen, for this purpose quite unusual, A4 format.

Picture 3 The appearance of a page from the topic

The section above is made based on reasons of how to make things easier to users, so that they can move trough the software, because there is no need for scrolling the page, which is one of the ways to overlook the content being offered.

During the software testing, it has been concluded that it functions at the most commonly used HTML (Explorer, Mozilla and Opera). This facts provides us making our own judgement about accessebility to the software that is close enough, even from this aspect.

B. Modularity

Following the initial idea that the contents from the power industry area should be presented to the students trough studying about familiar facts and widening acquired knowledge trough familiar term analysis, the question imposed itself about possibility of universal usage of such conceived approach. Universality should be reflected trough the usage in other areas, where the narrow focus could be avoid. This narrow focus at one area is solved by introduction of an idea about design modularity. Bu all of this, it is implying on very fast content changing, because all content are presented as specific, indipendent elements, and by changing content the basic programme structure is not being violated, which is related to options and adjustments offered to the users.

VI. CONCLUSION

Aspiration towards individualisation of studying refers precisely to the option of student's choice to choose himself fis own way of acquiring knowledge about some occuerence, notion or a content. The presented software show the basic options by which the students, in a relativilyconvenient way, acquaint and master knowledge, which relates to a wery tehnically demanding and complex area. Besides mastering itself and acquiring knowledge from this area, the students are directed towards individual research and expanding their knowledge using the Internet and information tehnologies, by wich multidisciplinary principles and principle of knowledege corellation from various areas are met. Here is one content which is from technology area enriched with contents and fundamental knowledge from other areas (geology, architecture, physics) that affect the total quality and one's breadth of knowledge. It is required from the users to connect and analyze knowledge from one area with knowledge from other areas, and as the higest level of knowledge it is required from the users to make their own conclusion about new occurrences which they are being acquainted with.

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ADVANCED WEB TECHNOLOGIES FOR ONLINE LEARNING

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Abstract - Basic tools and technologies used on the occasion of creating material for online learning are presented in this paper. The presentation of the tools is defined from the view point of the latest program technologies used in the procedure of making online materials. In the paper is carried out also an analysis, as an indicator which programming technology is most represented in the existing authorial tools.

I. INTRODUCTION

Formerly, not so long ago, the material for online learning could create persons with little basic knowledge of HTML language, enough to write a few Web pages, with knowledge enough to insert illustrations into existing simple pages from the present clip-art libraries. These persons were called Web masters, but meanwhile, the situation nowadays is more complicated and complex. Today we need much more knowledge for online material creating and expertness of much more various programmers` technologies. Nowadays are usually used combined technologies in the process of online material make, while for creating online material for learning no long is enough individual, but in its creating take part whole teams of experts and various specialists, who equally deal not only with the problems of online material development, but also with the material of installing material onto Web sites.

In this paper are presented some of basic tools and technologies for manufacture online materials for learning. When we create online material for learning, we mostly start from the supposition which authorial tool to be used or bought to create such material. However, such a supposition is very wrong, and it often leads to bad results. Correct supposition would be: What kind of online material we are creating, and depending on received results we select appropriate authorial tool which helps us to realize our aim. Out of all this we can draw the next conclusion: there is no universal and ideal tool, but that online material for learning is created using combination of various tools and technologies. In the following presentation, are given some of basic and most often used tools and technologies for creating online material for learning.

II. BASIC SET TOOLS FOR CREATING ONLINE MATERIALS

2.1 Power Point tool

The tool used for check-up and presenting presentations. Instructor or lecturer organizes his/her material in form of lessons which are presented in form of electronic slides, which are later put on Web. User, through Web, such organized material can take and later watch.

The example of such a tool in Windows environment is Microsoft Power Point tool.

Good characteristics of these tools are:

- Each electronic slide of the presentation can be followed by corresponding audio-record that follows presentation flow (narration).
- After electronic presentation show, each slide of the presentation can be watched again, unrestricted times.

Bad characteristics of these tools are:

- Less appropriate for materials creating for total online learning.

2.2 PDF and HTLM tools (textual tools)

PDF tool is programmer's product of Adobe company, in format of electronic text and book. The tool that is approachable through nearly all leading operative systems in the form of Acrobar Reader adds-in (plug-in). This tool unites all textual and leading graphic formats in one electronic format, with the title (Portable Document File).

HTML (Hyper Text Markup Language) is a programmer's language and format that is used for Web pages creating.

The examples of such tools are: Microsoft Front Page, Dream Weaver (HTML) and Adobe Acrobat Reader (PDF)

The advantages of these tools are:

- HTML is suitable for creating for instructors` sites and sites for online learning,

- Easy learning and using of the mentioned tools for creating online materials for learning;
- PDF provides unlimited number of copies for online materials for learning.

Disadvantages of these tools are:

- These tools are used independently, i.e. for their use we need to have pre installed programs and adequate adds in,
- HTML language is often used in cooperation with some other tools, as JavaScript and Flash tools,
- They are more difficult for learning and use with making online materials that contain tables

and forms.

2.3 The tools for asynchronous discussions

These tools comprise instructor, pupils and other participants in discussion, according to the principle of information exchange and posing questions (usually in shape of textual form), at different places and times.

Examples of such tools are: e-mail (electronic mail), IRC (Internet Relay Chat) services and conference programs.

Advantages of these tools are: The communication among lecturers, pupils and instructors of online learning can be organized on the basis of real-time discussion, when it needs, i.e. when pupil (user) needs very fast answer on posed question.

Disadvantages of these tools are: Communication in Real-time time, The need for additional programs (sometimes as well the need for servers) for discussion in real time

2.4 Script tools

They are program languages that are read and executed by Web browsers or servers in order to adding in to the functionality of Web page. This sort of tools is often used for adding in or interactivity broadening of Web sites or pages and for forming pages with the elements of feedback information.

The examples of such tools are: GGI programming, recently JavaScript or VBScript (Visual Basic), Dream Weaver.

Advantages of these tools are:

- Possibility for pages forming with quiz questions with feed-back information,
- Pop-up windows with additional information,
- Additional interactive elements of Web pages that use Script tools,
- There are script tools that automatically generate script code (as for example: Dream Weaver), so that one does not need knowledge to create code.

Disadvantages of these tools are:

- If in Web browser is switched off the support for Script tools or Web browser does not have the support for scripts, Web page (online material) will not be legible for pupil.
- Learning script language is not simple function and requires previous knowledge of HTML language.

2.5 The tools for animations and simulations

Animation and simulation is the tool suitable for graphic presentation of processes or simulations, that in coordination with user interactively checks the process of animation (simulation).

The tools nowadays more often used are: Flash, 3D Studio Max, Maya.

Advantages of these tools are:

- The presentation of the animated structure and sequences of a process,
- The concept of these tools is demonstrative,
- The tool allows interactive participation on the side of user in animation or simulation process.

Disadvantages of these tools are:

- They require access with high passing power (bandwidth),
- Data files originated by use of these tools are of big dimensions,
- The programs for animations and simulations making are difficult for learning.

2.6 Data bases

They are very used tools if they are used within Web site. They allow (to) user that he himself defines (creates Web page content, depending on loaded information (they are usually questions over data base). In this procedure user defines requirement (question) over data base, defined question is passed to Web server, which executes that question over base and after that returns result of question executing in form of Web page.

The tools for work with data base are: PHP and ASP programming, while data bases under various platforms are: My SqL base, Oracle or Access.

Advantages of these tools are:

- The learning contents is formed depending on pupils` needs

Disadvantages of these tools are:

- Developing of the material for online learning demands defined level of knowledge for data bases controlling. Because of that the development of the material for online learning is left to more experienced users.

2.7 Streaming data

Streaming (Streaming media) data unite audio and video data that are delivered to final user very quickly, without need for great quantity of downloaded data by user onto her/his hard disk.

The examples of such tools are: Real Producer, quickTime, Microsoft Windows Media Player 9 and Windows Media Player 10.

Advantages of these tolls are:

- Presenting contents for learning in real action.

Disadvantages of these tools are.

- Unfeasibility of presenting learning contents on connections with little capacities (Low-bandwidth)
- Creating of streaming materials and data requests wide range of knowledge, as: production of streaming material and data, editing and development of material. Use and creating of material for learning is recommended to be executed by more experienced users.

III. TECHNOLOGY FOR ONLINE MATERIAL

If we have shown some of basic tools for creating material for online learning, the next step is defining of basic technologies for creating online material. Researching od these technologies leads us into contact with technologies that are wide-spread or they will be in some nearer future. Into these technologies are considered the next ones:

- XML technologies and
- PHP and MySqL technologies.

3.1. XML technologies

XML or extensible Markup Language is technology of newer generation, that enables easier transfer of one type of documents into another one. This technology has been developed by the consortium known as WWW consortium (World Wide Web Consortium - www.w3.org). XML is the technology which in its essence originates from HTML technologies and tools, so that it has some common characteristics, too. Both technologies use the notion of tags (◊) for data description.

The main difference between these two technologies is in essence that HMTL technology describes data appearance, while XML technology describes what datum presents. The advantage in relation to other technologies is that the technology itself provides creating of the contents for online learning, that will be possible to transfer on various computing platforms that execute it, without any intervention or with minium of intervention by the person that has created online material.

3.2. PHP and MySQL technologies

This technology is actually unity of the two technologies: PHP script language and MySQL data base. PHP is as a matter of fact script language, that enables to users writing web pages with dynamic contents. As well as previously mentioned technology, this one counts on the basic HTML technology. PHP is in its base program language with which one can easily and quickly create dynamic Web sites. Its great application in Web, it can thank to the fact that the code written in PHP language, easily and fast can be implemented on the same page composed with HTML contents. Because of that it has got the name embedded language.

It originated in 1994 as the independent project of Rasmus Lerdorf. The first version was used on his personal Web page for visits tracking. The first version accessible to others appeared in the spring of 1995. The essence of PHP was remodelled in the middle of 1995 when it was connected with several programs written by Rasmus for data manipulations loaded into forms, the support for data manipulations loaded into forms, the support MySQL was added and so was made PHP/FI (Personal Home Page/Form Interpreter).

In the middle of 1997, a group of people with Zeev Suraski and Andy Gutmans at the head ran total reengineering of the very heart of PHP and then originates PHP3. Thanking to its great popularity, the development has been continued so in May 2000 appeared for the time being current version - PHP4, based on Zend engine. It brings with itself improvement in performances PHP and presents the beginning of PHP expansion that lasts so far. Judging by Netcraft (www. netcraft.com/survey), PHP is at the moment presented on about 5 million domains, with monthly growth of about 15%, what makes PHP the fastest growing script technology on Internet.

The reasons are the next:

- Nowadays Web development trends request dynamics, interactivity with visitors, personalization, what PHP as well enables.
- It is not a standardized language and it makes easier its learning. In other words, it is not necessary to define the type of variable, PHP will convert it itself into necessary type, depending on the context of its use.
- Taking into consideration that PHP is a script language, it is not necessary to compile programming code, so the script results can be immediately seen in browser.
- In contrast to similar technologies, PHP much faster follows trend steps in Internet development
- The most of problems that PHP can solve are also solved with the help of other program languages, with difference that PHP is designed to work in Web context, so solution is achieved with only some of code lines.
- Free tool

Taking into consideration the above mentioned, the conclusion is clear: PHP is without equal when there are similar server script technologies. One of necessary tools is text editor. Programmer may use any editor including. Notepad, or simply ASCII editor, too.

Another indispensable tool is host (UNIX, Linux, Windows or Windows Server) computer that will enable scripts executing on real working conditions. As a host can serve a computer on Internet, a computer in local net or as in our case, the computer that is used for writing scripts. If as a host is used Internet computer, there is indispensable FTP client, too.

If we execute the analysis of the authors' tools necessary for creating and presenting on-line material for learning, from the stand point on which programming technology it is based, we come to the simple conclusion that PHP and My SqL technology (recognized in all 49 authorial tools) is the most represented technology what we can see from the next graph, too:

IV. CONCLUSION

When we perceive the tale from the previous text, it seems at the first glance that this is very complicated and complex field. Tools selection will be done according to the aim of online material for learning, but when it is necessary to do selection of corresponding technologies for online material creating, choice is left to user that does creating of online material (Fig.1). It is important to point that correct choice of combination of tools and technologies, very much improves quality of online learning material.

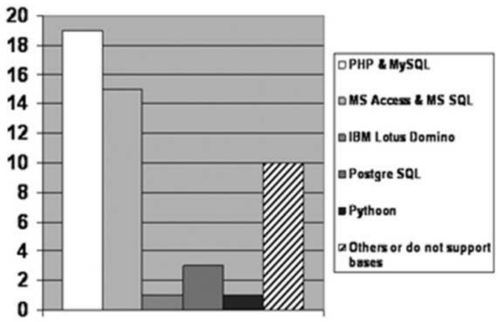

Fig. 1. Most used web technologies

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USE OF ICT (INFORMATION-COMMUNICATION TECHNOLOGIES) IN EDUCATION

Nataša Aleksić, dipl.ing
VISOKA TEHNIČKA ŠKOLA STRUKOVNIH STUDIJA KRAGUJEVAC

Abstract - This paper discusses and summarizes research results of pedagogy using information and Communication Technology (ICT) effectiveness, as well as the influence of initial education of teachers on various components of their training in the use of new technologies. The research is focused on the main stages of the research process and models of teaching and learning that support access to support and researching the development of teachers and provides illustrations of effective practice rich enough to encompass the complexity of choice. Teachers have to decide when, when not and how to use ICT to strengthen their teaching in the information domain. Included in the results of the investigation are a series of examples illustrating effective use of ICT by teachers.

I. INTRODUCTION

Global information society is developing at an incredible rate. Globally speaking, the main task of automation of information - communication technologies to improve conditions for gaining the knowledge of students and teachers to use computers.

Information and communication technologies have become an integral part of all aspects of life. In the last twenty years the use and application of ICT is fundamentally changed the practice and business in all areas of human activity. Within education, ICT began to have significance, but also the impact that still is not as strong and intense as in other areas. In a world that is so rapidly developing, the role of ICT in education is becoming increasingly important. Education is an activity that required a quality that is traditionally associated with quality teachers.

It should be noted that ICT can make teaching more efficient and richer only if applied correctly and balanced, accepts without reservation and non-selective, and any form of implementation in education is interpreted as a positive osavre-ently teaching practice. It follows that the primary task of developing the competence of teachers to use ICT to support teaching methods that support the overall development of students, activating them and provoke them with higher levels of thinking and learning, motivate them and encourage critical thinking and consider different options and styles of learning.

The aim of this study and implementation of information - communication technologies is not only to those applications in ICT matters, but also in teaching other subjects.

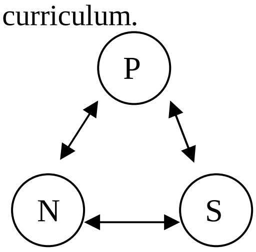
The problem is not in great anticipation of information technology in education, but lies in the fact that complete and excellent use of IT in organization of teaching requires fundamental changes, from the context in which instruction and learning of any predmeta.To can be achieved only if we reform the education system.

In the field of education system it is necessary to establish a part of basic education, which refers to the knowledge and skills of computer literacy and the use of ICT in teaching and learning. Future teachers would be able to:

1) for the implementation of educational projects in the areas of application in teaching and learning
2) for the diagnosis and evaluation of knowledge using ICT
3) for shaping the environment for learning appropriate developmental age of students (the competent use of ICT in education)
4) to encourage independent learning
5) for evaluating and selecting educational software for different areas of knowledge
6) to continue self-improvement times longer.

II. TEACHING AND LEARNING PROCESS, ICT

With the pedagogical and methodological aspects, in the center of learning and teaching the student. Figure 1 shows the didactic triangle, which clarifies the relationships of students, teachers and curriculum.



P - Pupil
N - Teacher
S – Course content

Figure 1. Didactic triangle: students, teachers, instructional content

How this approach viewed with a special view, where the means of teaching and learning among other things to take technology, get active didactic triangle (Figure 1). The concept of a student here, we can replace the notion of man, can educate people of different age limits, ICT are not limited to use only one generation, but also be usable by all people.

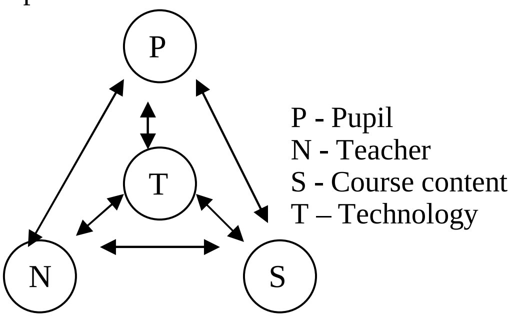


Figure 2. Active didactic triangle: the student, teacher, nastvani facilities and technology.

When the work of preparation for teaching and learning which will have an active role of modern technology, it is often forgotten or only partially meet the methodological and pedagogical side. People (teachers) who are planning the content and use of modern technology to implement them, often put in second place students in these facilities are intended.

Information and communication technology has become an integral part of education and to support teachers in the implementation of traditional instruction or as a substitute such teaching with one of the new methods and modes of teaching process and learning process.

The new educational paradigm is oriented towards students (engl. Learner-center paradigm). The student is placed in the center, while the environment for learning resources, both in terms of time and places and ways of learning (Figure 3). The student's all-oriented and included an expression of learning resources (people, knowledge, technology, media, organizations ...).

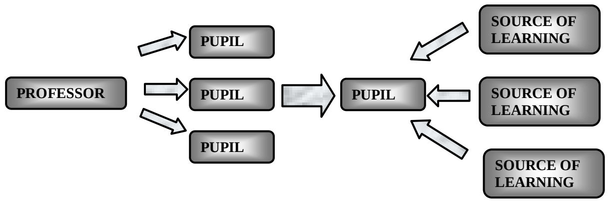


Figure 3. Crossing the traditional teaching paradigm to a new, advanced

Traditional education is based on the educational paradigm called model reproduction of knowledge. The purpose of this study was transferred from the static knowledge sources (teachers) to the student a passive recipient of such knowledge. Model reproduction of knowledge should be replaced with the construction of knowledge. This can be achieved only if teachers and students as partners in working together to build a knowledge base that should be adopted.

III. PROFESSIONAL DEVELOPMENT AND PROGRESSION OF REPLYING-TEACHER

The education system is under the influence of contemporary technology adapts to the demands of the information society. Schools are becoming more modern and attractive, and teachers continually develop professionally.

M. Vilotijević alleges that the school as a peaceful and relatively closed oasis of knowledge must become an open research station in which young people acquire and constantly updated knowledge. (Vilotijević, 2008:8). That students achieve better results, teachers are expected to continually revitalize the knowledge, skills and skills-.

The traditional approach in our country is still present, because the majority of teachers there is a fear of acceptance of innovations and feel safer and more readily by applying already proven methods, while for a number of teachers' innovations have established in practice. Most teachers have a moderate attitude towards innovation, tj.implementaciji modern information and communication technologies in teaching process. As reasons for the resistance of teachers to innovate changes occur profile, lack of newspapers, as well as obligations and responsibilities that are imposed by introducing changes.

Traditional approach is characterized by frontal ooblik work and usually a one-way communication between teachers and students. Students are not sufficiently activated in work and unable to progress individually in accordance with the knowledge and skills, which affects their motivation. The most common suggestions of teachers discussing the reform of education were the proposals for training in ICT in education and application in teaching (Smith - Cerovic, 2004), which indicates the divided views in relation to application of ICT. Drucker says that most teachers spend much hours trying to correct things that are best to learn and not to surrender, because the subjects best taught using computers and different programs (Djordjevic, 2001).

Therefore, it is necessary and a system of professional development for teachers, including: initial and in-pravništvo; service training, system monitoring and evaluation system of teachers and professional development of teachers. The aim of the professional development of teachers is constantly developing teachers' potential for high quality business and improving teaching. In order to develop teacher professional should consider all the aspects of their profession, during training, internships, and to continuously increase the awareness of the work (Bjekić, 2009). It is necessary to enable the teacher to apply the computer in teaching, to discover new possibilities for teaching and learning and to develop based on its own strategy in the classes. Professional Use of Computer Assisted Learning qualitatively improve the teaching process, and improper use can have negative effects.

Analysis of UNESCO indicates that there is not enough in teaching computer science and computer literacy. They believe that the use of computers can improve teaching, if applicable, at the right time, with adequate and acceptable content, and if it is designed to certain methodological techniques and procedures.

IV. State of ICT in schools in the municipality of Kragujevac

4.1 Case studies

The research was applied ICT among students and teachers, as well as the level of investment in the development of ICT in schools.

Timing of research:

• During the first half year 2010/11.

Defining the area of research:

• Primary schools in the municipality of Kragujevac

4.2 Objectives of research

The aim of the research is the idea in the way of research. If the goal is properly defined, recognizable and hypotheses to be verified.

The study aims to determine the level of the presence of ICT in education, the ratio of teachers to introduce ICT as well as an adequate level of material investment of school management.

4.3 Research Hypothesis

The hypothesis is scientific assumption that scientific research must confirm or nepotvrditi.

In this case set the basic hypothesis:

In primary schools, teaching computer science, but also in the teaching of other subjects, not done in enough application of scientific and technological development, tj.primena-wide information and communication technologies, as well as the specific social needs, so that teaching in primary schools there is no tendency to recently become more efficient and to monitor trends of scientific-technological revolution.

In the main and auxiliary hypotheses are the hypotheses;

1. The content of teaching in education is not sufficiently monitor the current techniques and technology

2. Classes are based on theoretical knowledge and less on practical knowledge

3. Most students have a weaker con-tact with the information and communication and the technology.

4.4 Research

Research interest is the municipality of Kragujevac. The study sample is representative and it was attended by students of 7th and 8th grade, management schools, and teachers / professors. In a sample survey of eight primary schools in the municipality of Kragujevac (Table 1).

	School City	**Place**	**Municipality**	**Area**
1	Đ.Jakšić	KG	Kragujevac	City
2	S.Marković.	KG	Kragujevac	City
3	M.Simović.	Dragobraća	Kragujevac	Rural
4	D.Obradović	Erdeč	Kragujevac	Rural
5	Prota Stevan Popović	Čumić	Kragujevac	Rural
6	R.Šubanić	Gruža	Kragujevac	Rural
7	N.Nane Nedeljković	Grošnica	Kragujevac	Rural
8	V.Karadžić	Knić	Kragujevac	Rural

On the chart 1 you can see the number of surveyed urban and rural schools.

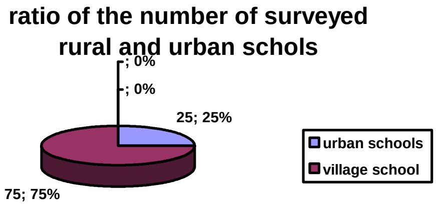


Chart 1.

4.4.1 Qualifications of teachers

One of the major carriers use information and communication technology in primary schools as teachers of information technology and engineering education. They are the ones who are expected to be the first holders of ICT activities. They are usually responsible for training other colleagues for the use of computers, and other technical devices. Of their expertise and enthusiasm depends greatly on the use and application of fast infrared technology.

Therefore, we consider (chart 2) the structure of teachers who teach computer science.

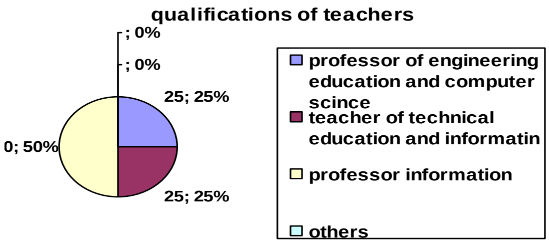


Chart 2

Teachers who were interviewed were the first teachers of technical education and computer science, but the doškolovavali the professor of computer science and professor of engineering education and computer science.

Teachers of technical education and computer science: 25% - higher level of education

Teachers of technical education and computer science: 25% - high school prevent ma-

Professors: 50% - university degree

The question of training. Professional development should be based on the needs and interests of teachers. It is important to motivate teachers to professional development, and the specificity of calls and dealt with in the field should be continuous and ongoing professional development. If the first IT teachers have ceased to be trained in simple terms"time to be pojelo"za short period. Technology development of new hardware and software are so far left that it is almost impossible to track. Interviewed teachers declared (Chart 3) to attend seminars, but when you declare the same, most of them make comments that do not follow the development of technology and the current situation in the country, especially in the world.

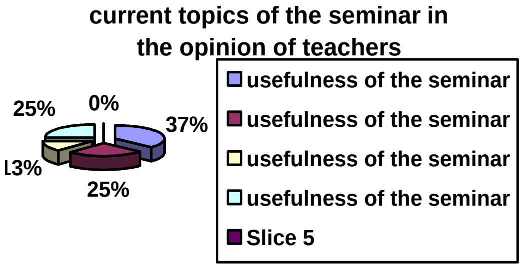


Chart 3

Usefulness of 50% - 3 teachers (37%)
Usefulness of 60% - 2 teachers (25%)
Usefulness of 70% - a teacher (13%)
Usefulness of 80% - 2 teachers (25%)

On the basis of the data, concluded that professional development programs enhance the existing knowledge, skills and abilities of teachers. Teachers are beginning to actively monitor the new educational technology and to apply them in their work, become better prepared and more competent for self-evaluation process and promoting the profession.

V. CONCLUSION

Information and communication techno-logy is nowadays often used to enable each student individually appropriate learning. The initiative comes limelight application of ICT for learning and for a comprehensive change teaching and learning. It is necessary to orient teachers to the need for inspiration and updated knowledge in certain areas. The recommendation is subject to different ways suitable for the exchange of knowledge in practice so that all pupils confidently and creatively use ICT to help develop the skills and knowledge potrebih to achieve goals.

Development of ICT has created the pre-change is considered to be the position of teachers and students. The teaching process has become unthinkable without a PC. Focus of the teacher moves from the realization of the preparation of teaching. Students become more active and independent in their work, and teachers as producers of knowledge, organize the work, motivate and encourage students. In schools all pupils are equal, but students' ability to teach, write, so the tasks are different. Schools should be given to changes in technology, society and culture, to be capable of daily change and adaptation.

The integration of ICT into the teaching process entails the issue of teacher competence. To train and improve vocational teachers and prepare them for lifelong learning (Life Long Learning), monitoring trends and frequent changes in information and communication techno-logy is an essential process that can not be avoided.

In primary schools, teaching computer science, but also in the teaching of other subjects, is not monitored sufficiently applying scientific and technological development, tj.primena rmaciono info-communication technologies, as well as the specific social needs, and teaching in primary schools there is no tendency in recent could become more efficient and more suitable to follow trends - Scientific and technological revolution.

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THE STRATEGY FOR IMPROVING CULTURAL VALUES OF THE YOUNG BY MEANS OF EDUCATIONAL SOFTWARE

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Abstract – This paper presents a modern approach to the strategy for improving cultural values of the young by means of educational software. The software which is the result of the analysis of National strategy for young people is described here. This software is designed by the students of Technical faculty »Mihajlo Pupin« in Zrenjanin, it is created for this type of work with young people and covers the field of gender equality.

I. INFORMATIZATION OF EDUCATION

Informatization of education is a term frequently used in pedagogy and it also represents the process which requests a synchronized institutional activity of all levels of management within educational system. Within National strategy for the young (we'll use Strategy in the text) in Republic of Serbia which was adopted by the Government in 2008 [1] young people were recognized as active participants of the society and their education was postulated as the state's priority. In the same document the stress was put on the necessity of developing mechanisms in the society for increasing the level of information literacy of the young. Information literacy assumes the basic knowledge in computer work and the ability for using aplications. The strategy's imperative represents the integration of Serbian educational system in European educational system.

In all countries, especially in developing countries, such as Serbia, the education and training of manpower is considered a cultural, social, economic and political development strategy. Economically, the education and training of manpower is considered a long - term strategy whose benefits have always been significant. Education plays several roles: first it prepares and trains skilled workers at all levels to manage capital, technology, services and administration in every sector of the economy. The education and training of manpower, on the one hand, is the most important means for development, on the other hand, it provides the substructure of all including development goals. Therefore, today, the role and importance of education of human resources is emphasized as a means to increase and hasten the speed of economic development.

International examinations [2] have shown insufficient quality of educational achievements of students in Republic of Serbia as well as their tendency to reproduction and not to research and problem solving. As a result, it is necessary to make formal changes in teaching programs and in methodic approach to teaching. Frontal work and traditional approach cannot respond to fast and multimedia requirements of students' perception in current social and civilization moment.

Introducing computers in teaching process can overcome these difficulties in communication and influence, in great deal, students' motivation and maintaining their attention. Combination of good and irreplaceable features of traditional teaching and modern methodic design of teaching activities (and free activities, too) represents a complex process which requires exceptionally great involvement of all management structures in educational process. Apart from its educational function school participates in upbringing of young people and modern social tendencies impose themes such as ecological consciousness, interculturalism, tolerance and sustainable development. Specific goals of the Strategy are: building the system of informing young people at all levels and in all fields, increasing the level of information literacy, making relevant information available, making and developing information programs for the young, reducing prejudice towards different social groups, systematic monitoring of problems, needs and attitudes of young people, increasing the number of young people who participate in different kinds of formal and informal education, improving living conditions and developing safety culture among young people.

II. ”COMPUTER CONSCIOUSNESS” OF YOUNG PEOPLE

The beginning of XXI century was certainly marked by exponential rise in computer using in all segments of computer action. Children, from their early age, are faced with digital devices and their upbringing goes along with them. Mobile phones, Internet communication, various types of electronic entertainment, availability of information are all parts of young people's lives. If the teaching process does not include these modern phenomena, it is strange and uninteresting to the young so it cannot give good effects. Consciousness shaping is directed towards multimedia perception, globalization and permanent search for the new. Schools still do not recognize these activities, they do not use valuable resources of Information technologies. Using computers in free time is completely without any control and it makes negative effects. Young people acquire new knowledge and experience mainly individually and diffusely. It is necessary to integrate all resources in educational system aiming at setting computers in the function of building a positive system of values among the young. Such integrated action should respond to real needs in the society: respect of human rights, interculturalism, equality, high level of health, ecological consciousness.

III. EDUCATIONAL COMPUTER SOFTWARE AS MEANS OF COMMUNICATION

It has been already proved that introducing computers in educational system has positive effects on children and that it increases the level of their motivation. However, the main requirement of educational technology is that computers are used properly, in other words, proper organization and methodology in relation to computer usage are necessary as well as appropriate didactic material (software). This software is called educational computer software.

Evidence whose validity has been proved by numerous scientific researches related to using computers in education show that a computer is the only means which can contribute to visualization and simulation of natural processes. Apart from technical possibilities, very strong evidence represents a high level of motivation which a computer itself achieves concerning young people. [3] When we say “computer” we think of educational software which is designed and licensed to be used in education. Criteria for designing educational software are nowadays defined differently in different countries and there are differences in methodology of their design. Evaluation aspects of software are also different, going from format, technical, educational and summarized. Each of them is equally important and it influences the final quality of software.

Teaching, as a form of human affair which deals with education and upbringing of young generations, is a complex communication process that influences directly the development of a society. The communication process in information includes teachers, students and contents which are being exchanged, as well as communication channels or media or even wider – educational technology. They are the elements of so far mentioned didactic square. Communication in education contains two crucial components: (1) information-knowledgeable component and (2) socially-emotional component. Students have certain information needs from both fields, they accept and interpret both information categories, react on them and forward these information.

Communication channels are similar to sensor acceptance of messages (visual, audio, tactile, etc.), types of messages (linguistic/verbal and non-verbal communication) and media for their transmission which may be natural (exs. voice, facial expression, etc.) and technical – in this concrete situation, computer one.

Computers are now only means capable to provide complexity of communication channels and to affect the formation of attitudes, belifs and models of behaviour.

Educational computer software combine verbal/notion and audio/visual information and in this way they enable:

- interactive learning, current correction of errors and determination of acquired knowledge and skills;
- help in creativity and development of other skills for problem solving such as determinatioin, persistence and step by step method;
- individualization and differentiation of work;
- emotional influence which directly affects the building of attitudes and consciousness formation.

Communication is performed by means of sending and receiving messages. A teacher sends information and receives them from students and a student/attendant is not only a receiver but he is a sender, too. Feedback information show how the sent information is accepted and interpreted by a receiver/student. Feedback information are very important because they enable control of the process of exchanging messages and the interaction among the students. The basic principle of communication in education is that a sender should adopt the message to a receiver. Processing of receiver's message can be the following:

- perceptive – makes conditional which information a student accepts by various sensor channels and the way he does it (attracting attention, aesthetics, contents reader-friendliness, etc.);
- cognitive – determines in what extent are presented information comprehensive to students;
- emotional – affects the student's emotions in relation to accepted information;
- associative – it is related to free associations that can appear in connection to certain information

In teaching communication the notions of authoritarian and democratic communication are very important as well as the notion of communication atmosphere/climate. **Authoritarian communication** is based on using superior position, power or influence of a teacher/instructor who decides what contents the students should learn and the method they should use. **Democratic communication** is characterized by respecting individuality, interests and independence of students, the possibility of mutual influence, adjustment of teachers/instructors to the needs and wishes of students, equality, development of democratic culture in mutual relations, encouraging students to express their opinions, suggestions as well as listening and respecting the others. **Communication climate** represents a general atmosphere in which communication is performed during educational process and it may vary on account of experience and the extent of freedom in relation to openness, sincerity and free expression of ideas, mutual relationship, the level of cooperation, accepting the others within a group, etc.

Starting from the very nature of the teaching process and the fact that one more crucial element is involved in didactic square – a computer, which is often classified in educational technology by many authors and sometimes identified with tutors or instructors, we are approaching a new didactic potential. Development of educational computer software points at the conclusion that maximum effects of applying computers are achieved in individual work. Therefore, development of educational computer software is mainly oriented towards individual interaction appropriate to knowledge, capabilities and tempo of individuals. For all these reasons different methodic solutions have been worked out which enable the use of program packages adjusted to personal features and wishes of students. These program packages provide students with a possibility to master educational content in their own tempo and with maximum effects.

Designing such software and respecting this methodic paradigm show that these program packages are efficient in the process of self-education.

These strategies have been made according to the world trends. Serious limitations in relation to limited time and financial means in schools as well as Informatics' struggle with other priorities have been considered. This model is for sure burdened with numerous problems because it is really reformistic in comparison to the previous models in all fields. It requires teacher training, innovations within curriculum, testing in classrooms, development of web site, making guide books and more challenges as well.

IV. The Example of Educational Software with Cultural Content: Equality of Gender

As an illustration of this theme the final-year-students from Technical faculty »Mihajlo Pupin« in Zrenjanin, Teacher of Informatics Department, designed educational software whose purpose was not strictly linked to teaching programs but it represents an additional educative means directed towards shaping positive social consciousness of the young in accordance to directions determined in the Strategy for the young. The selected theme is Equality of gender.

The concept Gender equality is one of necessary conditions for achieving a balanced participation of men and women in decision making processes which can lead towards positive results in the whole society. It is also one of the most efficient ways for making political strategies, decisions and solutions which will improve the life of all population within a country and permanently represented their interests and needs.[2]

Building correct attitude towards this issue begins in the early childhood, in the family. However, in school age children form a priority attitude related to this issue.

The proof for actuality of this theme is the project of Institution for Gender Equality which has made the project "Gender Equality" and incorporated it in school plans and programs aiming at studying the current plans and programs in order to determine the way men and women are presented in them. Another goal is to find out if there is any disparity between boys and girls concerning possibilities for education and the available options.[3]

The software is designed for primary school pupils from 5th to 8th form. It may be used as an additional means in the subject Civil Education. The content of the software "Gender Equality" was designed on the grounds of National Strategy for the young. The guidelines for theoretic part of the software were taken from National Office for Employment, Subotica.

Figure 1. Intro screen

The structure of the software was designed to cover the following fields: Gender equality, Stereotypes, Prejudices and Discrimination. The program Macromedia Director MX was chosen for designing the software. Within this software there is an exercise which pupils should do and discuss the conclusions. At the end, there is a test for checking the acquired knowledge. The test is based on the lessons from the software.

The software is easy to use, it is multimedia, intuitive, easily navigated by the menu which also serves as the front page. It is adopted to a user in technical sense, fulfills hardware and software requirements (resolution of 800x600 (24bit) is the only requirement) so it does not cause any problems concerning the program work.

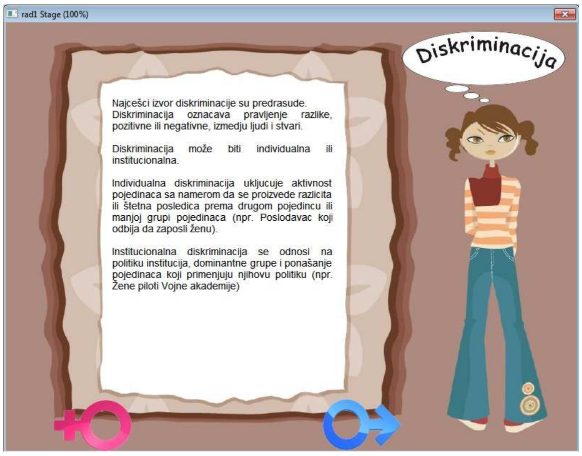

Figure 2.

The following steps are taken in order to make the work for the pupils from 5th to 8th form easier:

- The whole software is designed in order to motivate pupils –there are lots of pictures.

- Communication student-computer is performed through «mouse».

- Students can go back whenever they want to to repeat the lesson or they can go ahead to the next lesson.

By double click of the left button on the mouse the software is started and the introductory screen of «Gender equality» is opened.

Lesson selection is done by clicking the title.

After selecting the lesson the process of screen changing begins within the lesson and going to the next lesson is done by hand (by clicking buttons).

Moving backward –one or more steps - is enabled as well.

Last but not least, the role of a teacher is still irreplaceable as well as the work with didactic material.

Figure 3.

V. CONCLUSION

Communicating cultural values to young children is a part of every society. Educational software is one of way for young to learn about the cultural norms and values of a society.The new education age requires a modern approach to the strategy for improving cultural values of the young by means of educational software. This software which is described here is one of the the results of the analysis of National strategy for young people. The main problem here is extra time and management skills of teachers. The main goals of this works are:

- Be open to developing their knowledge and understanding of different cultural groups and of diversity within those cultural groups.

- Explore the impact of their own cultural background on the development of their values and beliefs.

- Reflect on how their own values impact on their approach to their work with families.

- Be aware of the limited value of stereotyping individuals from certain cultures or ethnicities.

The most important factor is to encourage young to interact with each other, and computer communication may be the best way to foster this interaction.

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AUTHOR INDEX

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