METHODS AND FORMS OF TEACHING "INFORMATION SYSTEMS" AND "COMPUTER NETWORKS AND COMMUNICATIONS" WITH THE USE OF THE INTERNET

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ABSTRACT

This article intends to study the problem of educational content of the subjects "Information Systems" and "Computer Networks and Communications" and particularly the capabilities for efficient teaching of these subjects with the use of the Internet. The report draws the benefits and drawbacks of e-learning, and drafts the components used for organizing computer based systems, needed for modernizing the education of engineers at the University of Mining and Geology "St. Ivan Rilski". Starting from the experience of large companies as Cisco Systems and Microsoft, the changes that should take place in education of engineer specialists are drawn, with a view to the expedient accomplishment of the reform of higher education in the frameworks of the University of Mining and Geology "St. Ivan Rilski" and especially the matter of the mentioned earlier subjects. The contemporary complicated requirements to the people being educated are defined on the bases of a critical assessment of the dynamically changing technological data access and gathering by the means of the Internet infrastructure. Except that, the changed "working environment" of the educator is illustrated, which finally leads to a change in form and content of educational units and means of assessment of the future engineer's professional level.

During the last years information technologies and data stored in the Internet have significantly increased their influence. The need of information constantly grows with the development of data storage and data transmission devices. The Global Network revolutionized the world of computers and communications. The Internet became a mechanism not only for worldwide distribution of information, but a means of interaction between people and improvement of methods for distribution of knowledge and education.

E-Learning has a proven future, and will continue to develop and gain greater and greater significance in the field of higher education, and in particular for the methods of teaching in the University of Mining and Geology "St. Ivan Rilski". E-Learning is particularly adequate for instructing Geographic information systems and Systems for Computer aided design (CAD Systems). E-Learning turns to be a substantial appliance for mastering contemporary business knowledge, demanded by modern life - М.Маждраков и др. (1996).

A Cisco Systems (2001) statement says: "E-Learning provides faster learning at reduced costs, increased access to learning, and clear accountability for all participants in the learning process. In today's fast-paced culture, organizations that implement E-Learning provide their work force with the ability to turn change into an advantage."

E-Learning is utilizing the power of the Internet to enable learning at anytime, anywhere. Its main purpose is to considerably reduce the time people need to learn by providing specialized up to date information. This allows workers to stay competent in their jobs without the need to undertake time consuming and expensive courses. The E-Learning environment generally consists of the following components:

- o Virtual events taking place in virtual classrooms or lecture halls;
- o Self-paced education delivered over the Internet;
- o Collaboration in the form of learning groups, chat rooms, or discussion groups.
- o Competency road maps supplying a custom learning plan based on personal goals and profession of the student;
- o Assessments for primary placement.

E-Learning can take many shapes for example: newsgroups, conferences, usage of electronic books (E-Books) and other electronically based devices.

E-Learning Organization Systems

Recent technological improvements and their wide implementation have made e-Learning a distinct reality. Currently there are two main delivery technologies, which are used for E-Learning:

- o Scheduled delivery platforms;
- o On-demand delivery platforms.

Platforms with scheduled delivery are restricted by time requirements. This category includes appliances such as remote laboratories, videos broadcast over a network, and virtual classrooms. These electronic learning methods are based on the simulation approach. The classroom becomes a simulation of a real classroom on the Internet, with interaction between instructors and students. This makes the user feel part of a group, being an online user as opposed to a real life one. This is likely to raise the

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motivation of students for the course and proposes help when the student has difficulties.

On-Demand delivery systems enhance these characteristics by providing twenty-four hours educational material for the student, seven days a week, making this way of delivery more flexible than the former.

The following table compares the benefits of online learning and traditional classroom methods:

Table 1. Comparison of e-learning to traditional education

	Traditional education	E-Learning
Relative cost	*High*	*Low*
Access	*Limited*	*Continuous*
Quality	*Variable*	*Constant*
Result assessment	*Difficult*	*Automatic*
Retaining of information	*Variable*	*High*

The size of the market

It seems that leading experts are in disagreement on predicting how large the e-learning market will become. For example the International Data Corporation (IDC) predicts by the year 2003 corporate e-learning will reach a three-fold growth from 1999. A further leading expert Merrill Lynch (2001) predicts $4 billion in 1999, which will continue to increase at 40% annually – Sage Learning (2001). Data given by the expert Piper Jaffray (1999) claim $46 billion by 2005 with a 50% to 85% annual growth. Despite the tangible figures of these predictions what is ringing, is that e-learning will turn into the next main application for the Internet. Even with these predictions of rapid growth e-learning is still a new-appearing technology.

Advantages and Disadvantages of e-Learning

The significant progress towards e-learning is undoubtedly motivated by the numerous benefits it offers. Nevertheless computers will never completely eliminate human educators or other forms of instruction. That is way it is important to understand exactly what are e-learning advantages.

Unique Features to e-Learning: Some of the unique features of e-learning are effective training of a globally distributed audience and reduced publishing and distribution expenses. Another benefits of e-learning are individualized instruction, which cannot be provided by print media, and courses led by teachers give up ungainly and at high cost. E-learning can answer to specific needs. In addition, synchronous e-learning is self-paced. Advanced students may speed up through or bypass the course material that is redundant while novices could slow their own headway until they fully comprehend the content, and then go on.

In this way, e-learning is suitable for a maximum number of students with a large span of learning styles and needs.

Advantages of e-Learning to the Educator and Organization: Some of the most considerable advantages to the educator and organization, applying e-learning, are:
- o Cut of overall cost is the most significant factor in adopting e-learning. The exclusion of costs associated with teachers' salaries, expenses for room rentals and students travel, accommodations, and dishes are directly appraisable. The decrease of time spent by employees

away from the work place might become the most valuable advantage.
- o Reduction of learning time with an average of 40 to 60 percent, as found by Brandon Hall (1997).
- o Self-paced e-learning provides consistent delivery of content.
- o Communication and capture of expert knowledge is possible with good e-learning and knowledge management systems.
- o Issue of completion proofs and certification are essential elements of educational initiatives. With the means e-learning they can be automated.

Advantages to the Student: Along with just mentioned advantages to students, certain benefits of e-learning include:
- o On-demand accessibility that enables learners to complete education process conveniently at off-hours or from their home.
- o Self-pacing of education practice for slow or quick learning students reduces stress and raise satisfaction.
- o Interactivity engages learners, pushing them with ease through training.

Disadvantages of e-Learning: E-Learning, however, does have drawbacks.
- o Due to development costs there is required a larger up-front investment. Budgets and cash flows will need to be negotiated.
- o Technology issues of considerable significance include whether the existing technology infrastructure can realize the training goals, whether additional technological expenditures can be justified, and if compatibility of all software and hardware can be attained.

Some cases, in which e-learning may not surpass over other training are:
- o Technology problems of the learners usually unavailability of required technologies and technophobia.
- o Lessened cultural and social interaction can be a drawback. The impersonality, suppression of association of communication mechanisms such as the inability to convey the body language and exclusion of peer-to-peer learning.

E-Learning under the conditions of world economics globalization

Modern trends of e-learning are connected with a higher and higher need for immediately applicable training in production under the terms of globalization of world economy.

There are three attractive tendencies happening in the United States of America related to education and the Internet:
- o "Anytime, Any Place" Education.
- o Competency-based Education.
- o Life Long Learning.

"Anytime, Any Place" Education: It aims the notion that, by using advanced mechanisms of distance learning, a student or an engineer anywhere and anytime could access learning courses. This would be most convenient in costumers' point of view. However, the complexity of higher education has altered this definition to offer courses in a more structured manner.

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The building strategy for "any time, anywhere" educational programs seems quite simple:

- o Create a high quality "any time, anywhere" educational program for teaching engineers and residential students of engineering.
- o Allow the students to be original in their programs of study to secure the educational freedom needed for job improvement yet keep the educational framework required for institutional reputation and accreditation.

Competency-based Education: In the United States of America CBE is an approach defined for the first time by industry. According to industrial principles if we can describe the process, then we should be able to predict the outcome if we are given the input. CBE has a similar philosophy. We must be capable of measuring the results and to do so we must put the frameworks of the learning process. However, the academic problem is a bit more complicated – because we have extremely variable input stream of new-coming students.

Structuring knowledge around major principles and concepts assists learning. A learner's preceding knowledge is the starting point for efficient learning. At the same time students self-monitoring of learning or so-called "meta-cognition" are important for gaining proficiency.

So learning is a fundamental concept. Certain industrial principles could be applied to the education process:

- o The system must be developed on the basis of product concept.
- o The "Voice of the Customer" must define the initial conditions.
- o The results desired by customers must be measurable.

Adopting these principles it becomes clear that one should apply a systems approach in the way education is conducted.

Life Long Learning: In order to create a job competency mechanism, one could try to develop a model structure applicable for any firm interested in the knowledge provision chain. This model may be used to help answer certain questions like the following:

- o How could a company lead training and education execution, both for the individual and the company? Can in be realized through classes and certificate programs?
- o What are the means for measuring the training and education process that lead to real results assessable by business needs?
- o Having limited set of knowledge workers, how should a firm model its multiple teams?

Given the limitations of scarce knowledge workers available, dynamic team demands based on dynamically changing product and process timing, and available resources at any company, one could propose to create a competency-based education system. The purpose of such education system is to ensure application of the right training methods of the personnel.

Integrating the Three Approaches into One Model: It is clear that the three notions of education must be bound into a homogeneous training and education strategy. Such system will evolve as companies show more confidence in the academic institutions and when the letter learn how to "listen" better.

The reading of subjects that include content based on "Information Systems" and "Computer Networks and Communications", occupies larger space in educational programs on "Informatics" of different subjects in the University of Mining and Geology. The need for this matter considerably grows with the introduction of Master of Science degree. Estimating the world experience in this field and the presence of resources for using the Internet and multimedia instruments, it is natural to make attempts to realize educational appliances, created with modern technologies and oriented to the usage of the instruments of the modern information technologies. Using a suitable "search engine" the interested user may come across numerous instruction courses on a certain subject. This applies to the topics of "Information Systems" and "Computer Networks and Communications" as well. Similar courses are uncomfortable with the fact that they are composed on a foreign language bases and with a specific base idea, put in educational plan. Despite these disadvantages similar courses are useful examples, containing a great number of instructive techniques in respect of methods and forms of education. The major thing that all of them "carry" is the capability for individualized education on a material created by the principle of the hyper - text structures.

The experience of giant companies in the area of computer networks and e-learning is extremely valuable. The analysis of methods for instruction in "Computer Networks" created by "Cisco Networking Academy" appears to be beneficial. The program for network education of Cisco (Cisco Networking Academy Program - CNAP) modifies the way the people are accustomed to learn. The Cisco Networking Academy Program is a thorough program for electronic education, which delivers skills in working with the Internet that are important in the conditions of global economy. The networking academy program provides web-based materials, online-testing, close look to the process of education of students, laboratory practice, exercise with an instructor and a preparation for certification with respect to the industrial standards. Cisco business partners, governments, and public organizations form an ecosystem, which delivers a number of services and a necessary support in order to develop the working force of tomorrow.

On the other hand the specialization and application of e-learning methods in the filed of information systems and the conditions of UMG "St. Ivan Rilski" are concentrated around the Geographical Information Systems. The methodology for development of educational appliances and programs on the subject "Information Systems" should be oriented to the field of Geographic Information Systems as a modern, topical and more and more establishing sphere of application of information Systems - М.Маждраков и др. (1996)

Gathering and managing of spatial information is with no doubt a hard task. It has been carried out for hundreds of years, but without the help of computers and information systems. It was only+ during the last two or three decades the computerized systems have made these tasks easier to fulfill.

It can be said that the first geographic map, drawn on the walls of Egyptian pharaohs' tombs, in fact is the first geographic system. The modern term for a geographic information system (GIS) represents a computerized system with geographic or spatial nature. Administration needs spatial information for taking multitude of decisions for its routine activities. Scientists, geographers, archeologists etc., collect and analyze spatial data.

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In that manner all traditional goals, which grounded the development of geographical information systems, may become bases for understanding the term GIS.

Wireless Learning - Mobile Learning - M-Learning: Nowadays the term m-learning acquired serious currency in describing wireless-based learning strategies.

Mobile hardware turns to be the defining unit of mobile learning, as it is the point where mobile e-learning and computing interact to create an anytime, anywhere learning experience. The advance in handheld technology has enhanced m-learning devices just on time to meet the necessity for more fund-effective training options.

Modern hardware includes a keyboard, comparatively large screen, digital camera, and MP3 player and all in one device with the size of the man palm. M-Learning software enables the conversion of a PocketPC into a flexible presentation tool. Content for m-learning is most applicable to specific content areas like language skills. The WAP technology is best suited to discrete elements of e-learning such as tips, feedback, reference, browsing course material, reminders, links to WAP sites, and course registration.

Third generation cellular networks (3G) come to be a suitable technology for many m-learning goals. WCDMA (Wideband Code Division Multiple Access) is the radio access technology selected by ETSI (European Telecommunications Standard Institute) in January 1998 for wide-band radio access that supports third-generation multimedia services.

Optimized to give top-speed multimedia services such as voice, access to the Internet and video conferencing, the technology provides access speeds up to 2 Mbits/s in local area, i.e., in hot spots, and 384 Kbits/s in the wide area access guaranteeing full mobility. UMTS (Universal Mobile Telecommunication System) is the standard for supplying 3G services being created under the auspices of ETSI. There are of course still open questions concerning 3G. The limited frequencies set for UMTS may not be enough to hold the large bandwidth demanded by multimedia. Fortunately, there are other technologies such as Bluetooth with equal abilities that can cover a number of wideband multimedia services.

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