TYPICAL ASPECTS OF INFORMATION TECHNOLOGIES TRAINING IN UNIVERSITIES

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A lot of people, including specialists in the field of informatics use the term "information technologies" only as a synonym of technologies, based on the use of computers. Although this is not wrong, one should not forget that the activities associated with the selection, collection and evaluation of information, its efficient processing, storage and dissemination have been performed long before the advent of computers, especially personal ones.

At the current stage of its development, information technologies constitute a sound basis for participatory motivation: on the one hand - of the social aspect of the processes for managing the access to information, and on the other – of the commercial, market development of electronics and the supporting industries related to it.

And yet what is information technology?

Definition: The term information technologies stands for integrated sets of scientific, technological and engineering activities, specialized equipment and specific management techniques that are used in the creation, processing, storage, dissemination and consumption of information.

Generally speaking, information technologies incorporate two main aspects: social and technical.

From a social standpoint, information and communication technologies have made and promise to make it even greater the qualitative change in the mass communication systems. The change in public communications provides a direct impact on the quantitative and qualitative part of the employment of the workforce. This, in turn, has a substantial effect on all socio-economic processes.

From a technical standpoint, information and communication technologies lead mainly to relevant, qualitative change of means and methods for handling information. Here attention is

paid to the widespread computerization and the creation of conditions for conducting a maximum communicability in all spheres of socio-economic life.

Considered in both aspects, the purpose of the current development of information technologies should be such that they can be of benefit to every individual and for society as a whole.

Information technologies have two main lines of development:

1. Creation and development of products (devices, systems) and concepts (ideas, procedures, etc.), and
2. Applications.

At this stage of development of socio-economic relations, information technologies (where the computer is a main component) are widely used in all fields of human activity.

The issue of implementing information techniques and technologies in education has several relatively independent aspects; among them special place is rendered to exploring the options for using information techniques and technologies as a training tool and for increasing the effectiveness of the teaching process and their inclusion in it, as well as studying them as a component of general and special training.

Naturally, the problems of computerized education, as a reflection of the Scientific and Technical Revolution (STR) in education, found impact in almost all parts of our planet. These problems and the resulting tasks attracted the attention of the relevant international and national, governmental and non-governmental organizations. Firstly, we should note IFIP – the International Federation for Information Processing.

Immediately after its establishment, IFIP set up the so called Technical Committee on Education N3. The goals that this committee had to achieve were the following:

- to analyze contemporary technological and social trends and identify the new needs and areas for teaching activity in the sphere of information processing;
- to draw up recommendations for elaborating syllabi in informatics, etc.

Technical Committee N3 of IFIP has already successfully held several international conferences on information technology issues and on worldwide computer training in particular.

Secondly, we will point out the International Commission on Mathematical Instruction ICMI. This commission was created as part of the International Mathematical Union. During the fifth international congress on mathematical education ICMI 5, one of the main topics was the issue of computer in education and more particularly "Mathematics and the computer". ICMI has published a special document entitled "The impact of computers and informatics on mathematics and its teaching". This document has been circulated for discussion and it sets many issues of concern to present day teachers in primary, secondary and higher educational institutions about the connection that has to be made between computerization and training, particularly training in mathematics and informatics.

Active work on the issues of computer training is carried out by UNESCO as well, by means of a special programme in informatics.

Training in information technologies is one of the main fields in the work of ACM (Association for Computing Machinery). For more than 40 years this international association develops and offers comprehensive, practically tested programs for teaching at different levels of educational structures (mainly bachelor and master programs).

After summarizing the recommendations of all organizations that deal with the problems of training in information technologies, it can be concluded that their proposals are reduced to developing specific curricula in the following areas:

1. Computer Science;
2. Computer Engineering;
3. Information Systems;
4. Software Engineering;
5. Human – Computer Interaction;
6. Associate Degree Programs;
7. Software Ergonomics;
8. Informing Science.

Global experience in the field of application of informatics /and computers in particular/ in training can be differentiated into three distinct phases, the so-called entering waves. During the first wave the computer makes its way into the school as a teaching aid, like the projector, the

tape recorder, etc. As a technical tool the computer is particularly useful: it gives an opportunity to illustrate many things, lectures become more interesting and exciting.

During the second wave the impact of the computer is mainly on the content of the training, while in the first wave, the impact is mainly on the method and system of teaching. Typical for this second wave is the system reassessment of the objectives and content of individual school subjects in the presence of powerful information transformers.

The third wave is represented by massive Web-based distance learning.

Systematic research on the possibilities of the use of ICT in school practice began in the mid 70's. The most extensive studies were conducted in Great Britain, the Netherlands, the USA, France, Japan, Germany and the former Soviet Union. Historically computer-based training has developed as follows:

1. At the end of the 60's and the beginning of the 70's USA, Canada and the former USSR began research and related practical work for the deployment of large computer complexes (one or a few large ECMs, equipped with telecommunication facilities) in the educational system. These studies are mainly oriented to the needs of the universities.
2. In 1966 in Palo Alto /Stanford University/, California – USA computers started to be used for the needs of primary schools. It was there that for the first time a classroom was equipped with terminals and experimental lessons teaching grammar and maths games were conducted.
3. In 1974 in England, by decision of the Government, a national program for developing computer /based on micro computers/ training /NDPCAL/ was introduced. In the framework of this program a lot of special projects are funded.
4. The creation of specialized software systems and technical support for the education of children by using computers was launched. In his book "Mindstorms - children, computers and powerful ideas", The Harvester Press Ltd. (1980), S. Papert discusses for the first time the issues concerning the use of children-oriented programming language LOGO.
5. After 1980 in almost all regions of the world work began concentrated on the problems of education in information technologies (with an emphasis on the higher education sphere). And just like in the beginning, highly developed industrial countries set the pace.

From the analysis of the historical review the purpose and the resulting problems associated with the introduction of ICT in education are easy to define. It becomes evident that

the existing problems that arise and are solved when considering information technologies a means of training and an object of study, have mostly innovative nature.

Here are some examples of the national policy on the problems of computer training in several Western countries:

GREAT BRITAIN - in the historical review we have focused on the creation of the NDPCAL national program. Later on the other, more ambitious program of the English Government: Microelectronic Education Programme (MEP) also received funding. In the framework of this program, England, Wales and Northern Ireland are divided into 14 regions and there is a regional centre of computer training for all levels of education in each of these areas.

SCOTLAND - this country also has its own program for computer-based training / SMDP /. In many respects Scotland's programme for computer training duplicates those of the UK.

FRANCE – this is one of the countries where work on the problems of information technologies in universities is most intense at present. French schools use mainly French computers, such as Logabax and Micral.

GERMANY - three major programs for computer based training were funded. They are called "Datenverarbejtungs-programm der Bundesregierung 1, 2, 3". Greatest success in implementing these programs has been achieved in Bavaria. Last but not least, Germany pays special attention to the effective computer training for teachers. With regard to this, far back in 1986 the federal government adopted a special program whose aims were every school to train at least 3 /three/ teachers in basic computer education and all higher educational institutions to establish a Department of Informatics and/or Information Technologies.

DENMARK - in 1972 the so called Johnsen Committee, supported by the Danish Ministry of Development issued a report that recommended and provided guidelines for the application of computers in the teaching process. Practical work on the implementation of similar

projects started in 1975. At this stage 79% of the primary, 93% of the secondary and 100% of the universities in Denmark are equipped with computers.

USA - centralized researches on the introduction of computers in the academic activities are not carried out; instead hundreds of different projects in this area have been created and implemented. Actually, at this stage all university structures and almost all secondary schools are equipped with computers of the newest generation. Researches were conducted in the USA and they have made it possible to differentiate three main areas of deployment of advanced computer technology in the educational system of the country:

- studying informatics in all its aspects;
- using computers as an additional training aid;
- using computers as a means of programmed instruction, replacing the teacher.

Most often in American universities you can find computers such as APPLE /about 50% of all computers / PET and TRS. Recently (2005), IBM computers have started to invade American high schools. Their share is now about 50%, with a tendency to reach 75% by 2008.

Researches and developments in the area of implementation of information equipment and technologies in schools are conducted in Eastern Europe as well.

The educational reform in Russia is aimed at further improving the quality of training, at bringing it in line with the conditions and requirements of modern scientific and technical revolution (STR). At this stage the use of computers in Russian universities is definitely of more theoretical, research nature, while the massive invasion of this technique is still a question of the future. We should not forget the fact that the former USSR was one of the pioneers in the implementation of large and mini computing systems in higher education institutions.

Great success in information technologies training has been achieved in HUNGARY. Presently more than 15000 computers are installed in about 800 schools in the country and are actively used in the teaching process. All universities are 100% supplied with modern computer equipment and technology.

BULGARIA has some experience in solving the problems, especially in studying the basic, initial elements of programming and computing. About 68% of secondary schools and

27% of primary schools had equipped, so called computer classes. By 1995 most of the computers used in schools were made in Bulgaria: PRAVEC microcomputers. At present 87% of these computers are replaced with modern ones such as IBM. In the last 3-4 years, due to the affordability of acquiring modern mid-range computers for personal use, a 'transfer' of part of the computer training from educational structures to people's homes is observed.

After recording the huge slowdown in the deployment rate of modern information and communication equipment and technologies in the educational system of our country, urgent and emergency measures have been undertaken in last year to make up for the lost. By Decision of the Government the realization of a project, meeting the needs for modern computers and communication equipment and technologies was initiated at all levels of the Bulgarian educational system. The Bulgarian National Virtual University was launched and it develops successfully. Thus, Bulgaria is trying to become an integral part of the "E-EUROPE" project of the EU.

INFORMATION TECHNOLOGIES training in Bulgarian universities is differentiated mainly in two basic directions depending on the type of these institutions.

In engineering and technical universities priority is given to syllabi, grouped around the mathematical foundations of informatics, computer engineering and technologies, communication technologies, software engineering, software ergonomics and associated syllabi.

In humanities universities the focus is on advanced mathematical training, computer and information sciences, information systems, organization of the interaction and communication problems "human-computer", software engineering and information management.

Compulsory total credit hours in studied subjects during the four year training period necessary for obtaining Bachelor's degree is no less than 2800 hours and they are acquired accordingly:

a) compulsary subjects - 1700 hours including 150 hours of specializing practice;

b) optional subjects - 700 hours including 100 hours self-study;

c) facultative subjects - 420 hours.

Compulsory total credit hours in all subjects studied over the two / three / semester period of training for obtaining Master's degree is no less than 730 hours and they are acquired respectively:

a) compulsory subjects - 300 hours;

b) optional subjects - 180 hours;

c) facultative subjects - 60 hours;

d) individual work - 40 hours;

e) preparation and thesis defense - 150 hours.

Training in Bulgarian universities of information technologies in their different varieties and interpretations is performed on an average European level. It complies with the established basic concepts and the latest trends of development in science and technology. University teachers have the necessary scientific, professional and language skills. The quality of students is very good. Almost as a rule, when applying for a wide variety of university majors, student applicants in the information technologies field form the highest acceptance grades.

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