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Information technologies in education

Technologie informatyczne w edukacji

Key words: education, information technologies, teacher, competence.

Słowa kluczowe: edukacja, technologie informacyjne, nauczyciel, kompetencje.

Streszczenie
Wraz z rozwojem społecznym wzrasta wartość informacji i systemów służących jej gromadzeniu, przetwarzaniu, przesyłaniu, a także prezentacji. Nowe możliwości w zakresie wymiany, przetwarzania i wykorzystania informacji zwiększają zapotrzebowanie gospodarki, administracji, nauki na dostęp do niej, stymulują procesy konwergencji i globalizacji, które zwrotnie powodują trwały wzrost zapotrzebowania na coraz to nowe i doskonalsze usługi informacyjne. Te wszystkie przesłanki przyczyniają się do ewolucji technologii komunikacyjno-informacyjnych. Postęp techniczny i rozwijające się wciąż nowoczesne metody dydaktyczne wymuszają coraz szersze zastosowanie nowatorskich narzędzi także w szkole. Nowoczesna szkoła powinna bowiem przygotować młodzież do życia w społeczeństwie informacyjnym, społeczeństwie kształcącym się przez całe życie.

Introduction

Together with the development of a society increases the importance of information and systems used to gather, process, transfer and present it. New possibilities in exchanging, processing and using information result in the increased need for getting access to information in economy, administration and education. Those possibilities also stimulate the processes of convergence and globalisation which, in turn, cause a constantly growing need for better information services. All of the above mentioned reasons contributed to the development of a new area of studies i.e. communication and information technology[1].

Information technology is the combination of computer science and other similar disciplines. IT includes such issues as: information, computers, computer science and communication. Recently, a new term 'telecomputer science' has also been introduced to describe the science and technology domain which is a blend of computer science and telecommunications. It is sometimes called telematics, which emphasises its telecommunications aspects. Information technology has emerged together with the development of computers, computer networks and software[2].

1. Information and communication technologies in an information society

The development of information and communication technologies depends on the access to technical and financial means. What increases the chances for success is an appropriate choice of

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[1] H. Noga, M. Vargová, *The role of school of work in technical education*, [w:] Annales Academiae Pedagogicae, Cracoviensis. Studia Technica II. Kraków 2008. s. 143–152.

[2] H. Noga J. Depešova, M. Vargova, *Opinie nauczycieli zawodu o powodzeniach i niepowodzeniach w pracy dydaktyczno-wychowawczej*, [w:] K.Jaracz (red.), Annales Universitatis Paedagogicae. Studia Technica III, Wydawnictwo Naukowe Uniwersytetu Pedagogicznego. Kraków 2010, s. 239–253.

needed technologies. To inform and communicate with its external and internal surroundings, an organisation may use two kinds of technical means:

- traditional technical means,
- computerised technical means.

Traditional technical means include telephones, telefax, telex.

To the group of computerised technical means belong:

- communication systems (Local Area Networks, the Internet, Intranet, extranet),
- telecommunications services (electronic mail, Electronic Data Interchange, information systems).
  Additionally, these means may also be divided into two categories:
- means of every day use for workers in their working environment (telephones, computers, peripheral equipment, software),
- means which improve the access to information and communication connections (video conferences, remote access servers, EDI, Integrated Services Digital Network, the Internet)[3].

The first group of means is an indisputable minimum to support the information exchange, whereas the second group provides the method for a more effective and accurate task completion by workers and helps to integrate all sections of an organisation.

The needs and requirements for some given devices are plausible if they are necessary for the workers to complete their tasks. Basic requirements, such as the need for a computer, telephone, some software packages or a modem can be seen as an indispensable part of the vast majority of communication solutions. Among the basic needs are the Internet access, video conferences, or some security elements, which are necessary for an organisation to function[4].

Participation in more and more modern, attractive and costly enterprises is connected with the data security. Technologies should thus be well verified to avoid problems with applying additional elements which are not indispensable for a given solution.

The organisations cannot also afford to buy the unnecessary equipment or to implement the solutions requiring vast conservation costs. The implementation of communication means must be clear, transparent and adjusted to the solutions which are best for the given tasks.

Technology should also be friendly for every user, who should be able to deal with any technological tools without major additional help.

- **Information society in Poland**

In the humankind development one can distinguish the period of the global society based on agriculture and the industrial society based on industry.

Global information society is characterised by the fact that the highest income is generated by computer science industries, and the computers are basic working tools. In such a society it is easy for people to communicate, cooperate and create bonds with one another.

It is difficult to find a commonly accepted definition of an information society. What seems to be most appropriate so far is the assumption that the information society is a social system developing in the technologically advanced countries, where the management of information, its quality and the speed of its transfer, are the most important factors of competitiveness both in industry and in services. The degree of its development requires the application of new techniques of collecting, processing, sharing and using information.

Poland can be said to have entered the way of modern computer science development only in the early 80s.

The beginnings of the global network creation lie in the introduction of the EARN web and electronic mail to the academic sector in the early 90s. The scientists soon got the access to the global Internet network thanks to the actions of the State Committee for Scientific Research which sponsored the NASK network (Scientific and Academic Computer Network.) NASK started building modern broadband connections.

In Poland the issues of the information society were long neglected. It was only the State Committee for Scientific Research that, within its little financial means, sponsored NASK which

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[3] A. Piecuch, *Edukacja informatyczna na początku trzeciego tysiąclecia*, Rzeszów 2008, s. 94–98.
[4] Hudy W.: *Cyberuzależnienia a zdrowie. Cyberuzależnieni@. Przeciwdziałanie uzależnieniom od komputera i Internetu*, Kraków 2007, s. 167–173.

provided universities with the access to the Internet. The area of communication and information was long monopolised by TP S.A. (Polish Telecommunications Ltd.). That is why the costs of using the Internet were colossal for individual users[5].

After the first Polish Computer Science Congress in 1993 a period of a deep silence about the information society started. At the beginning of 1998 the State Committee for Scientific Research proposed the strategy to be introduced by the Polish government.

The same year brought about the realisation of the biggest project in the educational sector. After many struggles of the few people from the Department of Computer Studies at the Ministry of National Education and school superintendents' offices, thanks to the fast reactions of the parliamentary Committee of Education, Science and Youth (Komisji Edukacji, Nauki i Młodzieży), 95 million zlotys out of the state reserve budget were devoted to realise the project called "A computer laboratory in every commune." It was especially important for the village communes which for sure would not be able to raise the funds for such equipment if it was not for the project. In every school which participated in it, the teachers were educated as well, which can partially guarantee that the computer laboratories will fulfil their planned roles at least to some extent[6].

During the second Polish Computer Science Congress it was suggested to create the Polish Forum of the Information Society. The European Union invited Poland to take part in the works of European IS-Forum, at the same time suggesting that, as it is in other countries belonging to the EU, we should take care of creating a similar national advisory organisation.

In 1999 in Tarnów a conference "Cities in the Internet" was held. It addressed the issues of building the information society in Poland. The discussions clearly demonstrated that the representatives of local government perceived the Internet as a powerful tool of social communication. They understood the information society as the commune information infrastructure which ensures the communication between a citizen and an office, but also as an area for the economical actions of local entrepreneurs, a possibility to introduce new educational methods, to raise the level of medical care and for many other initiatives. On 14 July 2000 the Council of Ministers of the Polish government adopted a position on building the modern society.

The assumptions of the plan for information society building:

- suitable informing and preparing the Polish society for the fast technological, social and economical changes which aim at creating the information society,
- changing and adjusting the law to the information society era,
- taking care of preparing the Polish society to the challenges of new labour markets and methods,
- establishing transparent and society friendly structures of public administration in such a way as to make it possible for them to start functioning in the new era using the computer studies tools,
- implementing new technologies for the stable and balanced regional development,
- supporting the electronic economy with the scientific background in order to better use the chances offered by the model of information society,
- modernising the economy in order to improve its competitiveness,
- wide promotion of the Polish culture.[7]

The above mentioned aims should be realised through:

- new law regulations and their fast implementation,
- full control and coordination of the actions taken by all levels' subjects in the public sector,
- help and constant activation of the private sector and non-governmental organisations in compliance with the rule of subsidiarity,
- establishing the indicators which will measure the realisation of the undertaken actions and initiating the actions which would require the usage of public means[8].

- **Teachers and the computer civilisation**

Contemporary teachers, who not only want to be active members of the information society, but also masters, should be able to effectively collect information and to communicate with the help of modern tools. They should be aware of the need for constant learning and getting to know the

[5] A. Piecuch, *Edukacja informatyczna na początku trzeciego tysiąclecia*, Rzeszów 2008, s. 59.

[6] Tamże.

[7] A. Piecuch, *Edukacja informatyczna na początku trzeciego tysiąclecia*, Rzeszów 2008, s. 94–98.

[8] Tamże, s. 238.

dynamically changing world. The students must also learn that throughout their whole school lives. Even though teachers' competences in the area of efficient use of the information techniques are of primary importance, it must be realised that using those techniques in the processes of learning and teaching cannot diminish the role of the teachers and the interaction between them and students. Information technologies might help a good teacher to make lessons more attractive or to increase his work effectiveness, but they will not substitute the lack of competences and pedagogical engagement. What is more, they are not any guarantee of his pedagogical successes[9].

Still, the teachers show the effective uses of the omnipresent, various information sources and their rational implementing into one's own knowledge system. In this respect it would be hard to overestimate the role of primary, junior high and secondary schools in preparing the young people for a clever and effective use of information and communication tools in their everyday practice. Schools will be able to conduct this task responsibly only when the teachers will be well prepared. And the teachers will be well prepared if in teaching their subjects, using their pedagogical skills, among others they can:

- show the students the role of information in building their knowledge,
- teach how to wisely select the omnipresent information,
- show how to, with the help of computer tools, find, process and effectively use the unlimited information existing in the "cyberspace",
- make the young people aware of the threats connected with the thoughtless and inappropriate use of the Internet sources, showing them the ways of avoiding such threats,
- persuade the students to constantly learn and get to know the surrounding world and the tools which make those learning processes easier,
- teach the young people how to function in the dynamically changing reality of tomorrow[10].

One of the aims of education is teaching the basic rules of using the computers and information technology. The core curriculum outlines as the most important purpose preparing students for the above mentioned tasks plus drawing their attention to educational threats connected with the improper use of computers and software. Analysing the core curriculum one may easily notice the schools' and teachers' tasks for the students as far as popularising information technology is concerned. They go far beyond the school subject "computer science."

Using new teaching technologies requires changes in the organisation of schools' activities and conducting the lessons, especially in the areas other than computer studies. In this light it seems especially important to well prepare the teachers in the respect of communication and information technologies so that, preserving the teachers' individual approach and schools' independence, they could adjust the teaching process to the needs and challenges of the global society of knowledge.

The computer supported didactics requires from the teachers wide, cross-curricular, constantly updated knowledge and looking for new methodological solutions. Hence preparing the teachers for using information technology in their work is an important and urgent task for all the centres dealing with teachers' education[11].

Computers' vast possibilities mean for the teachers the need for constant self education, searching for and getting to know interesting software, looking for and verifying the Internet addresses etc. Moreover, the teachers overwhelmed with the number of new situations, must learn how to react properly to them. For good, conscientious teachers, introducing computers to their teaching process would mean a much bigger input of both conceptual and practical work. It very often happens that teachers have to go through various difficulties connected with the access to the equipment and its installation. In computer supported education the teacher's role changes significantly, but does not lose its authoritative meaning. Acquiring new teaching competences becomes indispensable. Teachers, who have long lost their monopoly for passing knowledge, provide inspiration and supervision for students. They act as guides who lead students through more and more complex information structures. Through the physical closeness and emotional bonds the teacher makes the previously anonymous Internet resources credible and positively motivates students to look for important information.

[9] B. Siemienicki, *Multimedialne sieci informacyjne – obszary cywilizacyjnych zagrożeń i możliwości*, [w:] Cz. Daniłowicz (red.), *Multimedialne i sieciowe systemy informacyjne*, Wrocław 1998, s. 139–148.

[10] A. Piecuch, *Edukacja informatyczna na początku trzeciego tysiąclecia*, Rzeszów 2008, s. 238.

[11] W. Hudy, K. Jaracz, *Klocki LEGO jako układ mechatroniczny*, Annales Academiae Paedagogicae Cracoviensis, Studia Technica V, Wydawnictwo Naukowe UP, Kraków 2012, s. 66–71.

- **Students and the needs for creating information technology**

These days computers are indispensable working tools and elements of many activities. They are used in professional life, as an entertainment device and teaching aid, both at school and at home. This fact cannot be omitted in educating young generations. The skill of using computer based appliances strongly influences the future existence and proper functioning of a modern society. Computers appear in children's world since their earliest age. Children naturally make the first attempts to play with a computer first, and what follows is their quick acquisition of many computer skills, which can hardly be achieved so fast by older generations. This opens the way to the implementation of modern computer studies. They have become attractive for many people as a potential didactic tool thanks to the fast development of computer technology. Only appropriately prepared teachers can create multimedia presentations and educational programs which support the teaching of their subjects or the whole sets of subjects[12].

A rapidly increasing role of information and ICT technologies in every domain of life, including education, made the government of Poland prepare the strategy for the development of the information society in Poland until the year 2013. On the basis of such society's visions and missions and the demands for the above strategy realisation, three areas of Poland's development were established:

- men,
- economy,
- state.

In the MEN area, among others, there were the following aims set:

- raising the level of motivation, awareness, knowledge and skills as far as using information and communication technologies is concerned,
- raising the level and availability of education (from kindergartens to universities) and spreading the rules of life long learning by means of using information and communication technologies,
- adjusting the educational offer to the requirements of the labour market, whose vital part are information and communication technologies [50].

Within ITC MEN since 1998 some school computer equipment has been being bought from the financial means of the state budget. Moreover, some teacher trainings and postgraduate ICT studies have been organised. Additionally, projects co-financed by the EFS (European Social Fund) have been being introduced:

- computer laboratories for schools,
- the Internet centres of multimedia information in school and pedagogical libraries,
- computer equipment for vocational and continuing education centres[13].

In the „Direct strategy for the development of the computer studies in Poland until the year 2013 and the long-range prognosis for the information society transformation until the year 2020", in the "Priority for the development of the computer studies in Poland until the year 2013" the main assumptions of the above strategy are outlined. They include: training teachers in working with computers, using computer studies and the Internet in teaching, conducting information technology training programs in order to acquire by the working teachers preparation compatible with the strategy standards. To achieve that the Ministry of National Education organises for teachers numerous ITC courses and postgraduate ITC studies[14].

At present we witness and take part in creating a new category of society belonging to the interactive, computerised world and searching information. Such a society of the computer and computer networks era is called information society. Even though in the past a computer used in the teaching process was regarded as a didactic means, at present the term "computer" has to be expanded to include to the term "computer network."

The latter term introduced a range of new possibilities to the economic, scientific and educational life. They include: widely understood communication, distributed processing of hypermedia data, a

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[12] H. Bednarczyk, *Innowacyjne technologie – nowe kwalifikacje zawodowe przyszłości*, [w:] Edukacja Ustawiczna Dorosłych, 2010, nr 4, s. 97–106.

[13] H. Bednarczyk, *Praca i technologia – inspiracje rozwoju edukacji i technologii nauczania, uczenia się,* [w:] H. Bednarczyk, E. Sałata (red.) *Education and technology*, Radom 2010, s. 173–180.

[14] K. Wenta, *Samouctwo nauczycieli dla technologii informacyjnej*, w: J. Migdałek, M. Zając (red.), *Informatyczne przygotowanie nauczycieli*, Kraków 2006, s. 188–199.

fast exchange of scientific thoughts, a possibility of distant working, learning and publishing, using individual information servers, doing the shopping, etc. The main aim of the network building is to reach a better level of communication and cooperation with simultaneous limiting the costs of the equipment, software, etc. The networks make it possible to create and publish common resources. In the educational process computer networks play an especially important role and influence the growth of educational resources thanks to the possibility of easy collecting, finding or publishing materials. Special educational servers provide the latest scientific and didactic knowledge to the public use, which has considerably increased a direct flow of scientific knowledge to the area of education. Thus, the Internet has its impact on popularising knowledge as such. In order to achieve higher effectiveness in the process of teaching, computer networks intended for education have started to be built. This issue can be seen from many angles. Apart from the equipment, communication means and software, there are rich information and program resources. A crucial part in those networks' acting play people (teachers, students, the staff). Virtual schools are created there, distant teaching methods and technologies are developed. There also exist organisations and institutions which undertake various new initiatives in the area of open teaching. In many countries the educational domain has been considerably expanded and supported by industry, e.g. computer companies or TV and radio corporations. Outside school different organisational structures have been created, whose aims are organising and technologically supporting education.

Summary

Using new technologies, together with the knowledge of foreign languages, communication skills and team work, are among the core skills of a modern man. The lack of such skills means a bigger marginalisation of those who do not have an access to modern education. Teaching through the Internet (e-learning) is a constantly developing way of learning in the whole world. Also in Poland one can observe a growing interest in distant learning. There is no doubt that any form of teaching, including distant teaching, could be effective without teachers who are properly prepared in terms of the subject matter, methodology and teaching techniques. The need to prepare and persuade to virtual education first and foremost the teachers themselves, seems thus to be of primary importance. Teachers must precisely get to know the Internet in order to conduct students' e-education effectively. They must also learn how to obtain new information, didactic materials, lesson plans, etc. from the network. It requires from them an attitude which is creative and open to the Internet and new technologies (data bases, presentation programs, communication programs, programs used to create their own applications.) Teachers who start moderating classes in the network must base their work on the above programs. They should also be fully aware of the change in their work style and, what follows, of their role in education. This role changes from being a central agent of the teaching process into its consultant and animator.

Such a new personality of teachers consciously using the achievements of modern technology in the teaching process is forced by such activities as new methodological challenges, test preparation and checking, examining, preparing lesson plans or educational tasks. New media such as Internet forms of distant teaching introduced to organised teaching, force changes both in the teaching process itself, and in the teaching programs, tasks, means of work and present school standards. Whether they will be a help or an obstacle in teachers' work depends only on the teachers, their creativity and openness to the forthcoming changes. If the teachers want to fulfil their role effectively, they have to learn the possibilities of information technology and implement them into their work with students[15]. Among the presently suggested ideas for the use of e-learning tools in school education are: preparing and presenting teachers' documentation like electronic lessons registry, teaching programs, requirements' standards, programs of educational activities. It is possible to provide students and their parents with those documents on-line. E-learning platforms enable each student to get a separate account. In this way the exchange of information between schools and the students (and their parents) could be significantly improved. One of the elements of this system which would ensure interaction should be electronic mail and programs for instant communication.

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[15] E. Chmielecka, *Edukacja dla społeczeństwa mądrości*, M. Dąbrowski, M. Zając (red.), *E-edukacja dla społeczeństwa*, Warszawa 2008, s. 11–20.

Technical progress and constantly developing modern didactic methods force wider and wider use of such innovative forms and tools of teaching as e-learning. School of the future should be able to prepare students for living in an information, lifelong learning society.

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