USING MODERN INFORMATION AND COMMUNICATION TECHLOLOGIES IN EDUCATION PROCESS

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Abstract: *All the used means have their own specifics that predetermine their usage with respect to the abilities of the student. The suitability of these means must correspond with the level of education, state of mind and social conditions of the whole group. We can say that usage of different media in teaching process has been developing for decades. Proofs of that development are different multimedia applications, such as for example encyclopedias, atlases, games, etc. We must not concentrate only on specially created multimedia means, but using our own creativity we can suitably add new elements to the present teachings. It is possible to connect number of different devices to the main teaching resource – computer during the lessons of information and communication technologies. These devices will then fundamentally support the teaching process. Integral part of using any material aids is to consider them and to implement them into the overall context during the preparation phase of the teaching by the teacher. This article shows the extension of the problem of using modern information technologies in education process, which extends to many areas and does not have an easy solution.*

Key words: *Information and communication technology, learning, student*

1. INTRODUCTION

Changes that take place in teachings are in many ways influenced by using of information and communication technologies (ICT) in this process. The using of ICT in the educational process is caused by many reasons, one of which is the requirement of the companies for the competence of job applicants in area of ICT. We must add that these requirements are continuously increasing. That is why the Czech educational system (especially on secondary and university levels) faces the problem of how to offer their pupils, students better quality of education considering the great amounts of information, so that they will be later successful on dynamically changing and developing job market. If we want the future graduate to succeed in the information society, we must put emphasis on information literacy and associated information education. Information education can be characterized as complex, purposeful formative process of acquiring:

- Knowledge and skills in the disciplines concentrating on collecting, processing, storing, accessing and using different types of documents and professional information,

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- Skills and habits for the working with different types of documents and professional information and their sources.

Information education is purposeful, deliberate and systematic process of preparing human for creation, acquiring, processing and using the information in his personal and professional life. The implementation consists of information preparation in the given environment. Schools and educational institutions must always adapt to the reality of the new information age and start with application of modern ways of teaching with support of multimedia and network technologies. There are two ways of implementation of these two new technologies, as means of learning and as an object of knowledge. Both variants are more than desirable (Figure 1).

Fig. 1. Two ways of using information and communication means (Source: own)

Implementation of these technologies into teaching becomes more interesting for students, more vivid and we can say that even more motivating. Teachers can use these technologies to present and visualize the theoretical knowledge using practical examples. Education with interactive demonstrations often attracts students so much that they do not realize that they are at the same time learning.
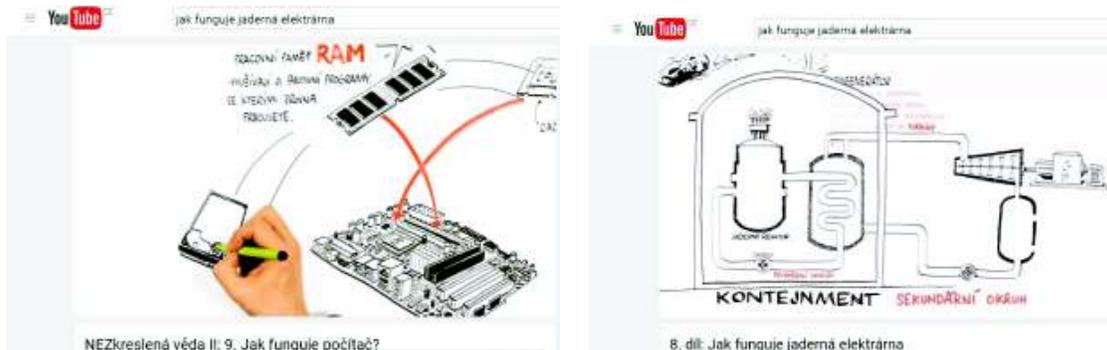

Fig. 2. Sample of suitable free educational multimedia shows in CR (Source: 1)

But it is necessary to emphasize, that only the suitable application of the information and communication technologies can provide the learning material to the students in more efficient and quality way. It is not possible to exclude the teacher from this process in any case. And that is why we do not think that the ideas of some colleagues, that teacher can be excluded from this process, are wrong.

2. APPLICATION OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN EDUCATION

Network technologies using Internet applications, multimedia technologies, hypertext, simulations and experiments in the virtual laboratories are ICT that enable us to present the professional issues within the school environment (but also outside this environment), issues

that could be hardly presented without ICT. It is also clear that these technologies develop not only creativity of the students, but also creativity of their teachers. Creative students will contribute by new ideas, original solutions and unusual creations. The task of the teacher is to "create favourable environment for all the students, to provide variety of different suggestions and opportunities for different talents and continuously seek optimal methods of educational work" (Maňák, J. 2001, p. 10). ICT creates conditions for more attractive, more interesting education process and through an appropriate implementation into teaching it can also become one of the criteria for the future decision making process of the students for their future studies and thus competitive advantage for the given school. Implementation of ICT into teaching can also face some limitations (see Fig. 3).
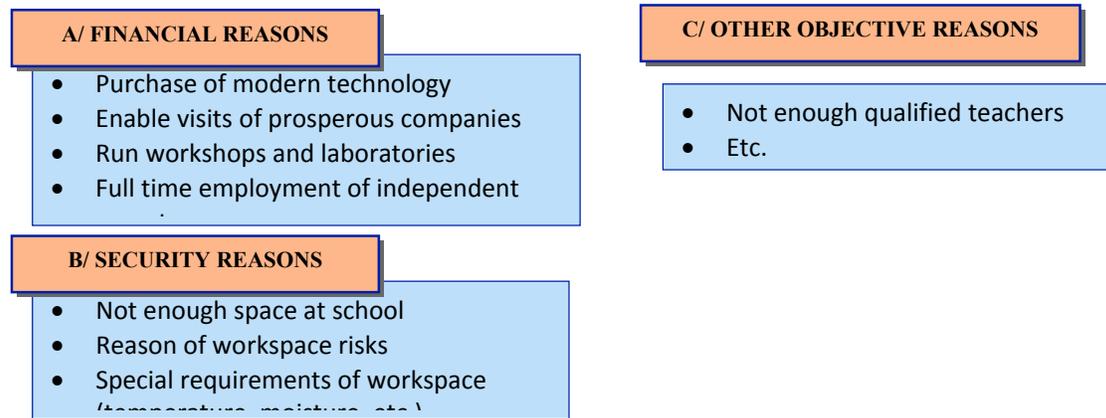
A/ FINANCIAL REASONS

- Purchase of modern technology
- Enable visits of prosperous companies
- Run workshops and laboratories
- Full time employment of independent

C/ OTHER OBJECTIVE REASONS

- Not enough qualified teachers
- Etc.

B/ SECURITY REASONS

- Not enough space at school
- Reason of workspace risks
- Special requirements of workspace

Fig. 3. Limitations in implementation of ICT into teaching (Source: own)

3. EDUCATION USING ICT IN THE CONTEXT OF CHANGES IN TECHNICAL EDUCATION

Implementation of modern information and communication technologies is related to many factors that influence the educational process, influencing it in positive and also negative way. Implementation of modern ICT reflects in the higher professionalism of the independent work of the teacher, it also greatly influences the management of educational process. Here comes the situation where present school stops to be the primary source of information, especially the most recent information. Teacher thus is not the only source of provided information (see Fig.4).

TEACHER as **the only one**

STUDENT

source of latest information

TEACHER as **one of**
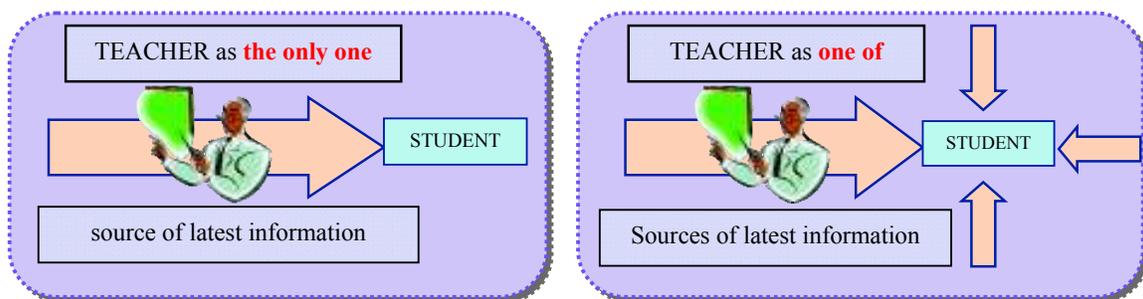
STUDENT

Sources of latest information

Fig. 4. Role of the teacher as the only one and one of the sources of latest information (Source: own)

Present generation of students is growing up in the environment influenced by smartphones, tablets and other specially developed Internet applications for information and communication services. Especially mobility, speed, reliability, capacity of memory and other advantages of these devices make them serious competitors to the present education at schools. It is very important for the teacher to be able to use these advantages for his own and for student's benefits. It is important not only visualize the study materials, but also to describe their connection to the reality and practice. It is not enough just to give students modern digital technology as a teaching aid, but much more important is that every important interactive element contains also specific example of using in practice. (see Fig. 5). Lessons are provided with computer equipped with complicated interactive programs that were subtly designed by multidisciplinary teams. Computer can manage and provide educational activities. It can also simulate interactions and debate with the student. It can also manage the files of the used didactic media and to provide information in numeric or analogue ways, as required. Computer can control video, CD player, digital processing of pictures and sounds or other programs, all interactive. This tendency is called hypermedia tendency and it characterizes the direction of the educational theory concentrating on interactive use of such computer controlled technological complexes, according to Y.Bertrand [1998, page 99].
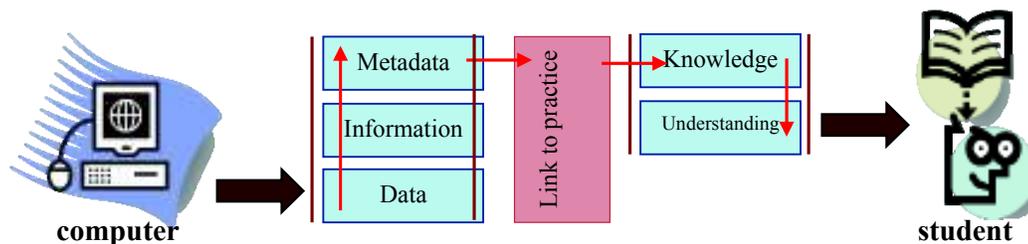

Fig. 5. Computer as means to acquire new information (Source: own)

Other possibilities, offered by the multimedia with the help of ICT, are:

- Interactive multimedia elements representing interactive user interface, using which it the cooperation of human with multimedia system can be influenced. This system is influenced by changing the variables of the running event and monitoring the change of the given output parameters.

- Distant computer games that can be modified by their content to interactively mediate the information and approaches. Students by "playing" such game subconsciously acquire and adopt the principles of control.

- Educational media and educational servers are structured as specialized computer systems or computer sets with high network throughput, high transfer rate and memory capacity. Web services provided by these servers include multimedia materials available for students, teachers and other subjects with the purpose of online learning. Majority of these multimedia materials is available only for the students of the given school, which is protecting their "know-how".

- Student Internet televisions are becoming very popular tool of presenting the information concentrated on the current events, especially at universities. Authors and people who participate in these Internet televisions are usually students themselves. The quality and content of these programs are usually very serious. Parts of the program are live broadcasting as well as archival broadcast.

- Virtual laboratories and distance experiments are multimedia software technologies that enable us to simulate laboratory experiments. Accuracy of the simulations depends on the quality of the multimedia objects processing. Students can input entry data and then monitor the progress of the processes, including the output characteristics of the phenomenon.

Fig. 6. Sample of the measured elements in distance laboratories on European
Polytechnic Institute, Ltd. In Kunovice (Source: own)

- Simulation and simulators are specialized software, or specialized equipment or workplace, that are faithful copy of one machine up to the whole complex of machines. These are technically most complicated, but also the most recent area of multimedia application. To achieve higher level of reality, existing controls are often used for these devices.

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4. USING CREATIVITY IN ICT IMPLEMENTATION INTO LEARNING PROCESS

If we assume that every man is creative, we must also accept the possibility that this creativity can be successfully used in teaching, even in teaching supported by multimedia elements. Unfortunately it is often necessary to be very brave and be aware of the possibilities how to

suitably use this creativity in the teaching process, whether it is creativity of student or teacher. We generally build upon the human need of activity, knowledge, recognition and also need for self-actualization. Creative individuals develop science, technology and solve problems. Creative individuals are often active, susceptible, they have elastic and original thinking. Original ideas are then by their bearers connected with the desire to implement them into practice. When considering the usage of creativity during implementation of ICT into teaching, it is necessary to consider the barriers that can in some way influence the developing of the creativity of students (see Fig.7).

BARRIERS IN DEVELOPING CREATIVITY OF STUDENTS

BARIERS OF PERCEPTION – inability to see the problem

BARRIERS OF CULTURE AND ENVIRONMENT – position created by prejudices. It is expressed at school as strong barrier represented by petrified regulations that survived and which cripples personal development.

EMOTIONAL BARRIERS – often very strong and not easy to overcome, teachers can have uneasy feeling, are afraid to take risks. Bad influence of indifference, disinterest in fate of students

INTELECTUAL AND EXPRESSION BARRIERS – these barriers are characterized by low ability to seek, proces and sort information
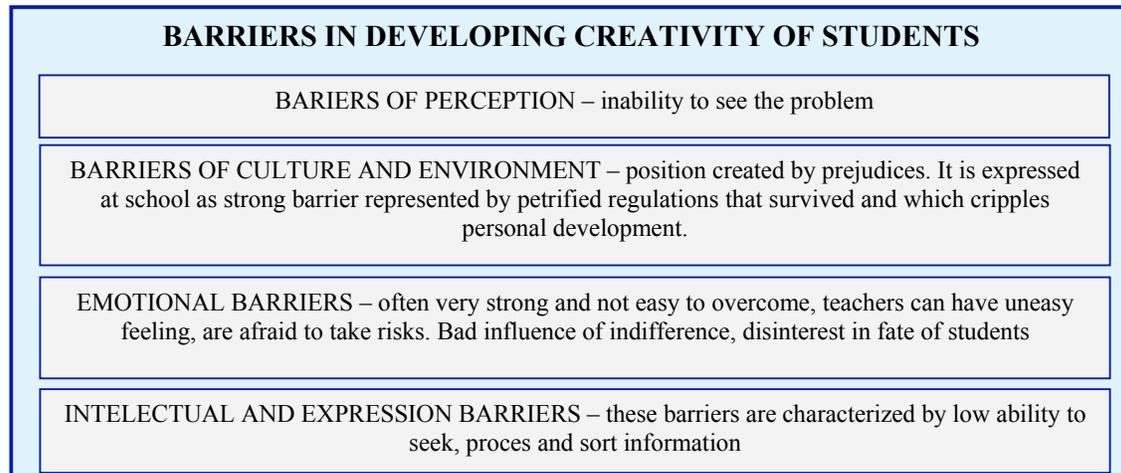
Fig. 7. Barriers in developing creativity of students (Source: Maňák, J. 2001, p.24 – own)

The first step of the right approach is to make the analysis of the objectives of the given subject, where future learning materials of the subject is divided into target, main and partial goals. This will also answer the main questions – why is this subject taught? We must also deal with the question who will take part in the learning process. We must consider psychological, biological characteristics of the students. This part deals with the pedagogical variable – psycho-structure. Even socio-cultural environment, i.e. environment that students come from, is participating in the education. This will answer the question – where are we teaching? We will use material didactic aids to reach the goals during the teaching process. This can be considered the multimedia equipment, as well as learning spaces, tools and aids. We answer the question – what do we use for teaching? The last fundamental question is how do we teach? By seeking the answer to this question we analyse method or algorithm. Even though the described variable is answered as last one, it is not one of the least important ones. As we wrote before, everything must be considered in context of the whole teaching unit. We can then say that teaching method enables us to reach, with taught curriculum, chosen tools, given participants and influence of the social-cultural environment, the defined goal of the teaching process. The above described approach requires us to be engaged in multimedia support of teaching from the viewpoints of technological equipment, didactics, psychology, social-cultural environment and the used teaching methods.

5. CONCLUSION

Multimedia technology is powerful tool that can help teacher to improve the quality of teaching. The final effect corresponds with the quality of the preparation for teaching by the teacher. If the preparation for the teaching is neglected, multimedia tools become just a storehouse of equipment and software that will be used just to replace writing on blackboard. But there can also be a situation when some hard-to-remove pedagogical mistake appears. Part of the usage of any multimedia tools must be their previous consideration and implementing them into the overall context during the analysis of teaching process, i.e. during preparation for teaching by the teacher. Quality preparation consists of the answers to the

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basic questions, and it is necessary to see the mutual respect between these questions. Doing some mistake during the analysis, even one, may cause decreased efficiency of the teaching, or even hard-to-remove mistakes in teaching. Seeking the interconnection of the information technologies with building and managing the own career of the students should be the main part of the education at schools, together with providing the basic information about information technologies. The main goal is to provide student with such knowledge and competences that will help him optimally use his personality and expert traits for successful applying at the labour market and for building and managing of his professional career. ICT accents too much the traditional approach to education, i.e. computer symbolizing mainly the information intermediary. Informatics as branch of science exists more than half of the century and the efforts to use ICT in education are as old. There is no reason to wait, further waiting will just increase the difference between using ICT in the life of young people and their use at schools.

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