ICT BASED INTERACTIVE AND SMART TECHNOLOGIES IN EDUCATION - TEACHING DIFFICULTIES

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Abstract - ICT tools are available in all fields of life, whether they are industrial or scientific. Development of technical tools are getting very fast nowadays, enabling several opportunities in educational technology too, and even the role of the educator is changing. But opposed to the opportunities provided by new technologies and tools, some educators still prefer conventional tools, and they are not open for the new technologies. The goal of the survey introduced in the study, was to reveal the important difficulties related to the use of ICT tools, which need to be fixed in the near future to make benefits provided by modern technologies available in as big extent as possible.

Keywords - ICT, education, smart education tools

I. INTRODUCTION

ICT tools are available in all fields of life, whether they are industrial or scientific [1]. Development of technical tools is getting very fast nowadays, so it would be a mistake not to use the opportunities provided by the tools also in the education [2, 3]. New tools appearing in the information society, such as different educational programs, content management systems and other (supporting education) ICT tools create a new requirement for people participating in education [4, 5]. However, it is not enough to involve IT tools into education. IT is only a tool to support students to learn new knowledges and skills, but does not guarantee its efficiency. Such an educational system is required, which is able to use benefits provided by informatics [6]. The experience, efficiency of learning may be enhanced, if students receive the information in auditory and visual ways, making the processing of new knowledges easier, because for instance during the introduction of an educational material supported by motion picture, it is virtually “played” in front of the students. [7, 8].

Thanks to changes experienced in recent decades, user-level computer knowledges have become the part of the basic education by now [9]. In modern information society, information management has got a highlighted role: production, store, transfer and reception of information have become an important factor. But it is not enough to know information technology, creation of IT aspect is a factor with at least the same importance. Due to continuous developments, management of different technical tools have been simplified, but learning the use of IT tools is not the same as the emergence of IT approach, because knowing how to operate a tool, does not also mean that we have learnt the capability of getting informed. For this problem, primary the educational system of nowadays information society should find a solution, and also individuals have to show inclination to lifelong learning and self-training. [10]. Spread of ICT tools set up demands against education. In modern information society, smart ICT learning is gradually builds into educational sphere [11]. In order to make digital renovation available, user-oriented appearance of modern tool system and applications of IT education is inevitable. For the modernization of education, ICT infrastructure of educational institutes, and digitization of educational contents need to be ensured, as well as design of different multimedia contents, not forgetting about the alignment of pedagogy programs and IT strategy of educational institutes with the goals of ICT based competence development [14], [15]. However, it looks like, introduction of ICT tools into educational practice is not so simple as we imagine. Integration into educational process may be slowed down by several factors, which deter many even from the idea of ICT. New expectations require learning new skills, which leads to the transformation of the educator’s role. In this field, according to our experiences, some of the educators still believe in traditional tools supporting education, which makes integration of ICT tools into educational process more difficult. In the article, we examine its reasons in order to use opportunities provided by smart tools of our modern age in education in a bigger extent, enhancing its efficiency [16].

II. SOME ASPECTS OF INTERACTIVE AND SMART EDUCATION

ICT tools may enhance efficiency of the lessons, because pre-designed explanation figures and tables are only needed to be projected, and no time is wasted for drawing or creation, it is much better to focus on teaching required knowledges and their as interactive method as possible. Learning supported by interactive ICT tools may arouse student’s interest in a bigger extent, support them in independent
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learning, which, during their later career, becomes inevitable in predominancy and adaption [11]. Learning supported by ICT tools may be made even more efficient by applying co-operative learning methods, whereas educator’s role changes from leader to supporter. [12]. ICT sets up new demands against education, and also the educator has to comply with these demands. This is not so easy for some, mostly elder educators, while they have not been socialized on the use of ICT tools. According to our opinion, this causes the biggest problem.

We can appreciate this, while compared to well-tried and applied methods, switching to ICT based education requiring different knowledge and role, is not seamless for everyone. The transfer is not easy indeed, particularly for those, who have been working in education for several years or even decades. However, benefits provided by new technologies may bring success to both educators and students. Skills regarding the use of information and communication technologies, in the most basic level, embrace the search, evaluation, store, creation, introduction and delivery of information based on multimedia technology, as well as internet communication and ability to participate in networks. [13]

III. ICT IN LEARNING

Problems may occur about the relationship of teachers and students with educational and learning methods supported by ICT, regarding their computer knowledge. When we are talking about computer knowledge, we can distinguish:

- “novice user”, looking at computers as a new display tool;
- “advanced user”, knowing and using opportunities of digital educational tools;
- “professional user”, being able to independently develop educational tools.

According to experiences, the most common computer use is the “educational machine” and the displayer, where introduction of images and parts of audio-visual material are available. The most useful method to merge traditional education with computer-supported education and learning, is complementing student’s book with a software. Here, the digital excipient processes such parts, which can be presented in the book less efficiently, or not at all. Educational materials with integrative aspect appear in vain, because their application are limited to only one subject. The most common is the frontal job: the teacher dictates the steps of using the program, he/she gives all home works. However, practicing is performed individually, and practically we can see the advantage of computer-supported education: everybody work, and most students prefer practicing in front of the display to paperwork.

For teachers already having some routine in ICT-supported education, creative use of purchased educational software is specific. They complement, modify the educational material, expand the interactive lesson bank, edit own multimedia presentations. For them, software is equivalent to student’s book. Learning the benefits of multimedia, as publication genre, teachers likely refer to intersubject relations. Instead of regulating every steps of learning the software, they watch and support independent learning from the background. There is a group of teachers, which, following gaining some practice in the use of new educational materials, make experiments with custom software and related methods. Obviously they do not solve serious programming tasks, they just create short applications required for the educational material. Students often act as colleagues in development. For the success of computer-supported education and learning, even more is required: design of new educational environment, where opportunities of ICT were taken into consideration already at the design of the educational material. Conditions of training: aligned school “machine park”; use of internal and external networks in education.

In these pedagogy-purposed software, introduction, processing and evaluation are both “mechanized”. Complex subjects are educated by a group of teachers, the computer partially replaces student’s books and booklets, while they are used by many students also at home. During learning, ICT and Smart education may have two basic roles. The first, when students are watching, what is going on the computer (display or projector), so they are passive participants; and the second, when they operate the tool by their own. Obviously, the second, active participation is much more efficient, because students learn the best by becoming active members. During the practice, they learn the necessary knowledges easier, because they see the educational material in front of them, and become an active participant during its processing. Some problems occurring in the use of computer may be approached from technical side, whereas primary the following aspects may appear:

- lack of required technical knowledges (how to use them);
- problems arising regarding the tools (internet connection, programs, etc.);
- other, general problems beside the two groups above (appropriate infrastructure, enough computers, etc.).

Factors described above may all affect the design of educational environment. We can say, they may be applied as aspects to design optimal learning environment, because all factors need to be taken into consideration at the performance. Analysis being
introduced below examines specific factors regarding the use of ICT tools.

**IV. SURVEY ON THE USE OF ICT BASED INTERACTIVE AND SMART EDUCATION**

The goal of the experiment to be introduced, is to survey, what kind of difficulties may occur in the field of the application of information and communication technology tools. The survey was performed by involving educators of University of Dunaújváros, using questionnaire survey. The survey also covers the evaluation of the usefulness of different ICT tools, therefore we can learn, which tools of the available ICT tool system are supposed to be efficient by the educators, and which are said to be less efficient during educational process. The final goal is of course finding a solution on relevant problems, therefore a solution recommendation is also the part of the research, where questioned educators can also describe their ideas regarding the specific topic. The research was performed by applying questionnaires. The fill was performed in a fully anonymous way, and lasted for about 10 minutes. The questionnaire primary focused on the educator’s research field, computer usage competences and habits of using ICT tools in education.

**A. Test subjects**
The gender distribution of questioned educators: 73% men and 27% women. The majority of participants (55%) belong to the generation between 31 and 40, 24% are between 41 and 50, 9% between 25 and 30, 6% between 51 and 60, and 6% belong to the elder generation. The results clearly show, that most of them are in their thirties or forties, which refers to a relatively young population. Regarding this fact, it is worth to observe the results of the questionnaire, because according to general presumptions, most of the younger educators can adapt to new technologies and methods easier.

**B. Qualification and experience of test subjects**
42% of the respondents have been the member of the educator’s population for more than 10 years, while 21% have been educating in the institute for 6-10, 24% for 3-5 and 12% for 1-2 years. 42% have got university degree, 18% college degree, 39% have got doctorate. Percentage distribution of scientific fields among responders: 12% faculty of arts, 48% IT, 18% engineer, 9% social sciences, 12% natural history. Almost the half of the responders have got some kind of informatics degree. 13% among them have already gained Phd degree, while the ratio between university and college degrees is 56% : 31%. 82% of responders have got some kind of informatics pre-qualification, which can be divided into two main groups. Among subjects with college/university degree, 38% have got CISCO or ECDL certificate. Among people without college/university degree, this number is much lower, 15% have got some kind of computer user certificate.

All of the responders are active Internet users, most of them use it to visit news portals and to manage their daily issues (such as bank transfers, job-related issues, electronic mailing), but there are also some, who surf the web only for information collection and search purposes. 73% of the responders manage technical interventions by their own, while 27% ask for the help of professional, competent person. The percentage distribution of the question’s outcome is in close connection with informatics pre-carrier for sure, while the majority of responders (48%) have got IT qualification, and the number of those, who have computer related qualification, is also high (82%). The software knowledge question aimed to figure out, if there is such kind of computer program, in whose handling the educator is well-experienced. Only 12% gave negative response, which means, that 88% of them know or use well some kind of software(s).

Among the responders, scientific software used in education, such as MATLAB, SPSS or the SAP, as well as software suitable for application development (e.g. Visual Studio, PellesC) were well-represented. Almost everybody designated Microsoft Office program group, probably because for creating electronic documents, this program is used by most people.

**C. Survey results**
The survey showed, that 93% of educators are satisfied with the IT tool system available in the institute, all educators have got computers for office work, and 39% of them also received notebooks for home use.

<table>
<thead>
<tr>
<th><strong>Course name</strong></th>
<th><strong>%</strong></th>
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<tbody>
<tr>
<td>course related to professional fields</td>
<td>18%</td>
</tr>
<tr>
<td>professional basics</td>
<td>9%</td>
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<tr>
<td>professional basics, related to professional field</td>
<td>9%</td>
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<tr>
<td>professional basics, professional body</td>
<td>12%</td>
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<tr>
<td>professional basics, professional body, related to professional field</td>
<td>15%</td>
</tr>
<tr>
<td>professional body, related to professional field</td>
<td>12%</td>
</tr>
<tr>
<td>social sciences basics, related to professional field</td>
<td>3%</td>
</tr>
</tbody>
</table>
Course name | Distribution
---|---
social sciences basics, professional basics, related to professional field | 6 %
social sciences basics, professional basics, professional body, related to professional field | 3 %
natural sciences basics | 6 %
natural sciences basics, professional basics, professional body | 3 %
natural sciences basics, professional basics, professional body, related to professional field | 3 %

Table 1: Courses

Regarding educated subjects, distribution is quite significant, because an educator mainly educates only one subject group. Table 1 shows percentage distribution of educated subjects. Survey of educated subjects was necessary, because subjects belonging to each subject groups, due to their nature, require different tool usage. For example, while for educating a theoretical professional body, using computer as a presentation tool is sufficient, on a practical lesson, due to tasks and different calculations, better visibility is important, so other tools (such as interactive tables) are worth to involve into the educational process.

The majority of educators, 91% use Internet access on the lessons. The proportion obviously show some difference. Most of them (55%) avail opportunities provided by the Internet only in one quarter or the half of the lessons (18%). The number of those, who use them during the whole lesson (6%), or more than half of the lessons (12%) are marginal.

In our institute, every educators use the Moodle educational framework. Taking this into consideration, it is worth to deal with that question too, who can use opportunities provided by Moodle. The most used feature by the colleagues is educational material upload (97%), but the system is also used for proposing lessons and homeworks (27%), creation of tests (27%), and logging of activities/presence is also getting experienced by more and more. In addition, 12% think so, that community builder services of Moodle, such as chat and forum, are also worth to use.

Educators also had to evaluate usefulness of ICT tools, examining that from educational process aspect. To use Internet and Moodle, a computer is essential, which is equipped with properly configured network access. Everybody use computers, so the result might be not surprising: the tool got five marks in the 85% of the cases, which proves, that it plays a major role in the forming modern pedagogy methods. The figure below represents the usefulness value of the computer according to educator’s opinion.

As we have already learnt from a previous partial result, Internet is also very popular, not only regarding home use, but also regarding the use on courses. This is also confirmed by the result of recent answers: in total, 82% of responders have provided four or five marks (Figure 2).

Opinions regarding the Moodle educational framework is ambivalent, some educators do not use the opportunities provided by the framework (Figure 3).

Projector, regarding utility, is similar to computer: it received five marks in the 82% of all cases, 9% four, and 6% three marks.
The interactive table divides educators the most. According to evaluations, mixed opinion can be read. The majority (27%) rated the tool’s utility with three marks in educational process, which represents the neutral point of view about the interactive table. But there is a promising sign, that in total, 33% have given five and four marks (in 15-18% distribution), which means, that a part of the educators have become familiar with the tool, and implemented it into the lesson structure.

![Fig.4: Projector usage](image)

![Fig.5: Usage of interactive table](image)

D. Discussion
All of the educators filling the questionnaire use ICT tools in their courses, however, the usage method of these tools may differ. During the lessons, everybody avail the computer’s help, but primary only as a presentation tool. Colleagues utilized computers for individual jobs in the 70% of all cases, beside 67% of projector, and only 24% of interactive table. It can be observed, that while everybody use computers, the use of projector and interactive table are limited of course, here the tool usage may be largely affected by educational material related to educated material, and in which form is the material available for the educator. Although, from the results above it is mostly obvious, but I also consider important to survey, which ICT tool system is used by educators most often. All of them chose the application of the computer with projector, 15% do not ignore the use of interactive table either. Almost two-third of the educators, 58% think so, that interactive table is not considered efficient enough to modify their educational methods so far. In contrary, 39% experienced so, that using a tool is more complicated in practice, than traditional tools supporting education, therefore it is not so efficient. Only 3% think so, that they do not have enough knowledges to use the tools. According to the educators, beside the facts mentioned above, probably one of the biggest problems is the absence of educational materials designed for interactive table education. As long as there are no such digital materials, interactive table will not become a commonly used equipment when visiting different courses either. According to the educators, current materials should be transformed complying with the new methods, but this would be quite a time-consuming task, therefore the transformation process is slow: it can be achieved only periodically, incrementally. Transformation procedure becomes even more difficult due to the lack of time thanks to lesson overload, educators do not have enough free time to modernize educational materials.

According to the survey’s result, the following consequences can be concluded:

- Availability of ICT tools is not the same as their active usage, but only a part of the equipment is utilized during education.
- Mostly the interactive table divided the opinions of the colleagues, most of them could not take side neither pro, nor contra.
- During the use of ICT equipment (mostly from operational side), smaller-bigger difficulties occur, that somehow need to be handled by the educators.
- There is a demand for handling actual problems. Organization practical lessons or method presentations could be an efficient solution.

In total, 36% of the colleagues designated response opportunities aiming to the operation and use of the tool, which leads to the conclusion, that for more than one-third of the responders, the lacking knowledges required for the use of tool is the main problem.

V. SUMMARY
The goal of the survey introduced in the study, was to reveal difficulties regarding the use of ICT tools enabling interactive education. One reason of the difficulties can be approached from two sides: on the one hand, there is ‘fear’ from new things, so the majority of teachers are simply afraid of modernization and related difficulties. On the other hand, we can talk about some kind of ‘negligence’, so some educators do not spend enough time to learn new things, although they have got all possibilities to do so, and replacement of their deficiencies would be supported by the conditions too. In order to get rid of these problems, from educator’s side, it is absolutely necessary to learn these tools by spending more time and energy, and to realize, how could they utilize advantages provided by ICT tools in the educational process.
Working with ICT tools can be efficient only, if educators have got the required background knowledge. Development of educator’s ICT knowledge could be achieved by applying practical introduction lessons, or simplified user manuals. The simplified user manual would cover only the main parts, introduce such features, which could be used by the educators during their courses to make them more interactive, within a transparent, logically built-up edition. If knowledge required for the application of ICT tools have been learnt, then during the planning of new methods, these could be applied for the design of optimal educational environment, thus enhancing education’s level and efficiency.

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