Present and future trends of ICT in Education

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Abstract

Firstly, nowadays usage of computers in education is introduced on the basis of an overview and survey of the researches presented on the recent conference Computers in Education organized by the Asia-Pacific Society for Computers in Education. Last research in the following areas is discussed here: computer-supported personalized and collaborative learning, seamless learning, level of attention and learning efficiency, learning analytics, application of innovative educational technologies in STEM education, and online game-based learning in school education. Despite the geographical orientation many issues may be inspirational for scholars from western countries.

Introduction

The Department of Informatics of the Faculty of Science at the University of Hradec Kralove (UHK) provides doctoral study program of ICT in Education (guaranteed by the first author of the paper) in cooperation with the Faculty of Education at the UHK and others three Czech Faculties of Education. This unique study program, recognized as the only one in the Czech Republic, is focused on preparation of experts in the major of information and communication technologies in education. Furthermore, it is also concentrated on their independent creative work in the field of science, research and their good prerequisite for further development of the area of information and communication technology (ICT) in Education.

1.Current Tends within ICT in Education
1.1 Computer-supported personalized and collaborative learning

The importance of computer-supported personalized and collaborative learning was a highly discussed topic. Regarding this field some rese4arch papers were based on identifying the effects and impacts of flipped classrooms on pupils and student's achievements in different areas. Flipped classroom is described as an innovative and effective approach which engages students in a lesson and learning process actively and also changes the role of teacher. A teacher is considered to be more a guide or couch than that the one who is providing all-knowing to students and they only passively listen to.

Teachers often create videos and use websites, tutorials and new technologies to enhance problem-solving ability, discussion, cooperation and interaction among students. Students watch the video before the class and use the class time to solve complex concepts, answer question and students are encouraged to learn actively [1].

Using this new approach for teaching means that a teacher should handle new challenges of this creative and interactive way of education. Some research raised a question whether these methods is equally efficient for students of different ages (younger people, middle are people and old age people). The results showed that the effectiveness of the method was influenced by will and personal preferences of participants. Nevertheless, all groups reached better results in learning.

1.2 Seamless learning

Many researches were driven with the idea to uncover opportunities of support of seamless learning. This is an approach in which learners can create relationships between their formal and informal learning. To support seamless learning, some seamless learning systems have been proposed, as for example aforementioned method flipped classrooms which tries also to incorporate and use this principle. Some researchers describe seamless learning system as a system based on the learner's textbooks (teaching materials) which can be prepared as e-Book. Learners can record their learning in class and the system allows them to link up what they have learned in class and what they have experienced

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outside of the class by providing quizzes or book information. One of such works devoted to this topic was e-Book Based on Seamless Learning System. [4]

1.3 Level of attention and learning efficiency

Other groups of research works were based on exploring. These works often used the comparison between traditional and digital learning materials. One of the goals of these works was to understand how different types of teaching materials affect learners' attention and how particular materials can unfold their potentials faster than others. The preliminary experiment described in the paper A Study of Attention Difference between Traditional and Digital learning Materials Using Brainwave Measuring Devices, showed that the attention level was higher when studying digital materials compared to traditional printed materials. [5] Electroencephalography (EEG) was used for collecting data that were analyzed later and they showed significant differences in brainwaves while working with different types of materials.

Very similar results were shown in the other pilot experiment The Effect of a Mobile Mathematical Game on the Mathematic Learning of the Student with Intellectual Disability [6]. Intellectual deficit is often manifested by lowered ability of concentration, short-term memory and other cognitive skills. It means that many areas needed for efficient learning are impaired and acquiring of new information is very demanding for learning and also teaching. A digital game used as a tool for learning had positive impact on participant's learning gains, he was able not only to learn a new concept in mathematics but this fact positively influenced his self-esteem and confidence for next learning. To sum up, it may change the personal attitude of someone with disabilities towards education.

1.4 Learning analytics

Digital data was an issue that has been discussed very often. On the one hand it is becoming very powerful and its good analyzing can bring new opportunities in education. However, on the other hand, we must be aware of its dark side. Not only researchers but also teachers at all level of schooling find the topic of learning analytics very important and potentially extremely beneficial for teachers and their students to unfold their potentials. Regarding to

this issue let us mention the research and project about lea's Box, A Competency-oriented Approach to Facilitate Learning Analytics in School Setting [8]. Lea's Box is a research and a development project funded by the European Commission. The project has focused on the fact that school-based teaching and learning the producing the digital data but tools for analytics of the data (which can lead to enhancing and individualizing of teaching process) are still missing. This new tool enables teachers not only to collect but also to analyze and visualize educational data of their pupils. Thanks using this technology, a teacher can tailor education for each student more specifically and make better and more suitable decisions about their pupils. The goal is to evaluate individual achievements and competencies and provide the learners with the best possible individual support and teaching. Besides the schools from Austria some schools from the Czech Republic and Turkey also participated in this project.

1.5 Application of innovative education technologies in STEM education

Next area which was filled with wide numbers of research was application of innovative education technologies in STEM (Science, Technology, Engineering, and Mathematics) education. STEM education is vital for nation's competitiveness in the global economy. Therefore, STEM has been recognized as a part of education which should be changed in order to become more effective.

Both of the following research stressed the need of increasing mathematical critical-thinking. Moreover, the authors of the first research consider mathematical thinking as a skill necessary for the 21st century skills.

The first research related to STEM, Non Numerical Aspects of School Mathematics [9], claims that shifting the focus from numeracy (acquiring of basic mathematical ability) to consideration of mathematics as much wider cognitive ability is necessary.

Focused on integrating ICT with reciprocal teaching. Reciprocal teaching use four strategies to increase and maintain good engagement of students in learning process-

These Three strategies are:

1. summarizing what they read and identifying the main idea,
2. inquiring in order to ensure they understand the material,
3. clarifying parts of the next that may be confusing.

2. Future trends of ICT in Education

What current trends in technology for education indicate about the future of educational technology. Highlights of the discussion included the following :

What Has Promise :

2.1 Mobile learning's movement has arrived :

Five years ago we were talking about SMS and very limited smart phone pilots. SMS limited as a learning device given its inherent constraints, but the explosion of smart phone ownership everywhere means that applications are now a legitimate tool for delivering educational content – and content that can be interactive and responsive. The path to scale now exists. People are already using smart phones to learn, even in ways they aren't aware – the development field's job now is to harness this tool for systematic educational initiatives.

2.2 Easy online environments provide new potential for communities of practice to gather and learn from each other

Educators and other educational professionals who may have been previously isolated from each other can now much more easily and conveniently connect and exchange knowledge. This facilitates the dissemination of new ideas and tightens professional networks, making them more useful and rewarding to participants.

2.3 "mini-MOOCs" are demonstrating the appetite and potential of new e-learning models

While MOOCs are in the very early stages of uptake and development in developing countries, "mini-MOOCs" – short courses, delivered to computers or mobile devices – can help users develop specific discrete skills to help them become more competitive for employment. Mini-MOOCs help people improve specific, discrete skills that make them more competitive. In 5 years, we won't

be using the term "MOOCs" we'll just be talking about different types of e-learning.

2.4 Blended learning is becoming a reality

The ability for instructors to usefully integrate technology tools into lessons shows us that there isn't really a choice to be made between good teachers and useful technology. Effective pedagogy makes use of both. One participant shared an example of how a trainer asked students to use their smart phones to fill out a short online poll, and then used the real-time results to direct class discussion.

2.5 Simulations

"The best way to learn is to actively solve problems." We heard about research and experimentation into digital simulations that allow medical students to practice surgery in a safe environment – especially practicing rare cases that they might not have the chance to encounter during schooling otherwise.

Conclusion :

The new technology using in teaching and learning process enhance the performance of students and interest also. It increase the collaboration among the students. Allow the Instant diagnostic information and student feedback enable the students to learn their own pace. The flexibility and accessibility of the method make it more Interesting and challenging. It provides the students autonomy and promote the student ownership self pacing for slow or quick learners, reduces stress, Increases satisfaction, reduced isolation its gives the better information and feedback on work. Current generation of the students are digital natives, they are using new web based technology. It is the high time for the using technology in the field of education.

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