Information and Communication Technologies as a University Subject

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Abstract. The aim of the paper is to focus on the role of information and communication technologies in education. It presents a university subject titled 'Information and Communication Technologies in Education' which was implemented within the study program 'Teaching Specific Engineering Subject'. It is a master program which is realised at the Institute of Engineering Pedagogy and Humanities, Faculty of Materials Science and Technology, Slovak University of Technology in Slovakia. The paper also presents the syllabus of the subject as well as the students' performance at the end of the course.

Keywords: information and communication technologies (ICT), engineering education

1. Introduction

Information and communication technologies (ICT) are methods, procedures and ways for collecting, saving, processing, evaluating, selecting and distributing information in a desired form and quality. They include information sources such as computers, the Internet, CD and DVD applications as well as different multimedia and hypermedia. Those technologies have become a part of our daily life. The development of ICT leads to its implementation also in educational processes. Nowadays, the implementation of ICT in education has become one of the primary targets in many countries in the world.

2. ICT in education

Modern technologies bring new possibilities of using information sources and implementing non-traditional methods within education. Teachers use the Internet to implement new ways of teaching and to gain the current scientific knowledge. It also allows a quick communication with other scientists as well as with students. As for students, it is an option how to search new information and how to learn in a different way. Using ICT allows students [1, 2]:

- to work with more complex information, i.e. with texts, pictures and sounds
- to improve their computer literacy
- to develop their skills and competencies, etc.

On the other hand, using ICT allows teachers [3, 4]:

- to find information quickly
- to provide different assignments for students, i.e. each student can get a different assignment
- to present the information
- to implement learning via solving problems and finding solutions
- to revise the information
- to provide a feedback
- to evaluate students' performance
- to make lessons more attractive, etc.

3. Aspects of ICT implementation

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Information and communication technologies allow implementing new ways of teaching as they stimulate students to solve different tasks. Students learn how to choose procedures which they like the most and allow knowledge to integrate. ICT and mainly the Internet support the development among different cultures. Students create their own web pages and they use electronic communication among universities.

When implementing ICT in education, it is necessary to consider the following aspects which play an important role within educational processes:

- pedagogical and psychological aspects (the influence of ICT in education, advantages and disadvantages of ICT implementation, involving ICT in specific subjects, etc.)
- school policy and education system (each country has its own education system which determines all school documents and thus the possibility of ICT implementation)
- social aspects (the influence of ICT on students, the relation among teacher-student-ICT, the relation among students in a class, etc.)
- health aspects (using appropriate tools, to assure that students will not spend too much time working with computers, etc.)
- technical aspects (technical demands on multimedia classrooms, technical equipment, using interactive boards, number of computers regarding the number of students in a class, etc.)

The main purpose of the implementation of ICT in education is to involve tools and equipment in teaching-learning process as a media and methodology. The general purpose is to familiarise students with the use of computers and related issues. The use of ICT has also enabled teaching as well as learning through multiple intelligences as those technologies have introduced learning through simulation games. That enables active learning via all senses.

The implementation of ICT allows students to be more involved in the tasks. However, the existence of ICT itself is not sufficient. It is necessary to use them when it is appropriate, e.g. for communicating or finding information. The educational processes are realised to transform the knowledge in the graduates' profile via teaching methods and didactic technique. Nowadays, the huge importance is highlighted to the implementation of ICT in the whole society. That is why the society needs students and graduates who are prepared to use them, to be able for further education and to cooperate in a team. It is also important to use new methods, ways and approaches as well as new teaching tools and equipment which allow receiving, processing, evaluating and providing a wide range of information. However, teaching students via ICT requires:

- to use all advantages of electronic communication
- to create a space for ICT implementation
- to develop ICT skills
- to assure a feedback on students' performance, etc.

4. ICT as a university subject

Institute of Engineering Pedagogy and Humanities (Slovakia) is an institute at Slovak University of Technology which provides studying engineering education in three degrees:

- Teaching Practical Subjects within Engineering Majors (bachelor degree)
- Teaching Specific Engineering Subjects (master degree)
- Didactics of Engineering Professional Subjects (doctoral degree)

The master degree was completely re-accredited in 2008. Thus, new subjects were created and 'ICT in Education' was one of them. The aim of the subject is to inform students about the possibilities of using didactic technique, teaching tools and information and communication technologies within teaching engineering subjects at secondary vocational schools. To be more specific, Table 1 illustrates the syllabus of the subject divided into 5 main topics.

Table 1: The syllabus

	Topic	Contents
1	Basic terms	basic terms in ICT, classification of ICT, teaching tools, technical equipment,

	in ICT	advantages and disadvantages of ICT, impact of ICT on students
2	Development of ICT	information society, information literacy, computer literacy, competencies, models of information and computer literacy
3	Communication Technologies	communication technologies, electronic communication, multimedia, specifications of communication technologies, e-learning
4	Implementing ICT in Education	the Internet, ways of teaching and learning, open learning, distance learning, interactive boards, virtual conferences, video conferences
5	Virtual Learning	electronic applications, creating online courses and online study materials, Moodle and other systems for virtual learning

After the implementation of the subject, we were interested in students' performance at the end of the semester. The subject ends with a written exam via a didactic test. During the summer term of the academic year 2010/2011 we evaluated 193 students' results. As Table 2 illustrates, the most positive fact is that all the students passed the exam and the results were better than we had expected.

Table 2: The students' results

Subject	Information and Communication Technologies in Education	
Academic Year	2010/2011	
Students	193	
A	146	75.65 %
B	34	17.12 %
C	10	5.67 %
D	2	1.04 %
E	1	0.52 %
FX	0	0 %
Total	193	100 %

After the course we asked students to evaluate the contents of the subject. 91.47 % of students were very satisfied with the subject and 7.29 % of them were satisfied with the subject. Only 1.24 % of respondents thought that studying the subject was a little bit difficult because of the wide range of information. However, there was nobody who would not be satisfied with the subject.

5. Conclusions

ICT has become a modern and useful teaching aid. Schools use mainly multimedia programmes and communication technologies and their application in the society will increase in the future. However, ICT is an important tool in education. Despite the fact that multimedia influences education positively, the role of a teacher still plays an important part within educational processes. Each teacher has to determine what he/she wants to use ICT for, what are his/her expectations and targets. It is important to implement ICT according to the students' age, previous experience as well as to accept students' literacy in the field of ICT. An inappropriate ICT implementation can lead to student disengagement, lower motivation and success. It is true that even the best information and communication technologies cannot replace a good teacher.

6. Acknowledgements

7. References

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