ICT EDUCATION FOR HIGHER COMPETITIVENESS OF THE UNIVERSITY STUDENTS

Ladislav Burita[1,2] and Pavel Rosman[1]
[1]*Department of Industrial Engineering and Information Systems, Tomas Bata University, Mostni 5139, Zlin, Czech Republic*
[2]*Communication and Information Systems Department, University of Defence, Kounicova 65, Brno, Czech Republic*

Keywords: Computer Science, Education, Evaluation, Experience, Knowledge Management System, Research.

Abstract: The paper summarizes the experience of teaching Computer Science at the Faculty of Management and Economics at Tomas Bata University in Zlín. Furthermore, the implementation of a knowledge management system in education at the Faculty of Military Technology at the University of Defence in Brno is mentioned. The methodology, an overview of subject areas, application of information and communication technologies (ICT) in instruction and its organization are also presented herein. The results of some research activities in the field of Informatics instruction are introduced; and options for future development of the courses are proposed. The introduction of new approaches and methods into teaching with the use of ICT is offered.

1 INTRODUCTION

In this paper authors raise a question whether students and teachers in education are adequately prepared to use all the opportunities and approaches leading to effective teaching, particularly in the field of learning supported by modern ICT, which offer new possibilities and how to prepare students in ICT areas to gain more competitiveness. The potential of the knowledge management system in education is described.

Authors mentioned two different courses: one course is Computer Science to prospective economists and managers at the Faculty of Management and Economics (FaME), Tomas Bata University (TBU) in Zlín (http://www.utb.cz), and the second course is Project of ICT at the Faculty of Military Technology (FMT), University of Defence (UoD) in Brno (http://www.unob.cz), Czech Republic.

The course of FaME is more elaborated (see chapter 2-3) in the paper and the results are included of research in teaching. It is mentioned elaborate only on one of the research goal: to what extent the course meets the expectations of prospective economists and managers for the use in practice (competitiveness). The analysis of the research results makes it possible to suggest options for further development of the course. The structure of the course is in the table 1. There is difference of teaching the course to full-time and part-time students. The part-time students have only consultations (lectures and discussion) and the full-time students have in addition practice.

The Computer Science for Economists (CSE) course might serve as an example when a whole range of literature is available on the market as well as plenty of interactive courses on the Internet. The development of the Internet has brought about new alternatives to traditional forms of study – and ICT play a key role in them. The content of computer science instruction has been a long-term discussion (Rosman and Burita, 2011).

One of the outcomes of these debates is the understanding of the importance of professional working with the Office Automation (OA), which is also reflected in the recognition of the qualification level achieved by gaining the European Computer Driving License (ECDL).

The course at FMT includes three main parts: project, information, and knowledge management. Only the third part is mentioned in the paper (see chapter 4) to illustrate the quick transfer of knowledge from research to education and to shows the possibilities of knowledge system as an education theme.

Burita L. and Rosman P..
ICT EDUCATION FOR HIGHER COMPETITIVENESS OF THE UNIVERSITY STUDENTS.
DOI: 10.5220/0003904302830286
In *Proceedings of the 4th International Conference on Computer Supported Education* (CSEDU-2012), pages 283-286
ISBN: 978-989-8565-07-5

2 EVOLUTION OF COMPUTER SCIENCE EDUCATION

The main objective of the course still lies in providing an overview of modern ICT, with regard to all the necessary components of information systems and applications, particularly OA including their essential characteristics and reciprocal links. Furthermore, we were interested in the student attitude to this type of education, including the willingness to invest money in it. General views on the acquisition and development of computer and information literacy have been changing in the course of history and still differ.

As a unifying requirement for achieving a measurable level of knowledge and practical skills might serve, for example, the requirements specified for earning the ECDL. This fact is reflected in our methodology: the students who present a valid ECDL certificate have fulfilled the requirements and are not obliged to enrol in the course. The objectives and description of the course are stated on the university portal (http://portal.utb.cz) in the course syllabus.

At the beginning of the semester, the students use the university information system (IS) to enrol in courses and chose particular seminars and practical exercises in laboratories. Thus they optimize their own study schedule. Communication between teachers and students of both study forms is performed through the CSE portal (http://ipe.fame.utb.cz/). Students access their study materials in the distance learning courses in the Moodle Learning Management System at portal Vyuka (http://vyuka.fame.utb.cz/), including course books and guidelines for exercises in laboratories. Furthermore, students have at disposal a large number of sample documents created in OA, and thus they can compare their products to the standards.

3 RESEARCH ON THE INNOVATION OF APPROACHES TO TEACHING

In the 2010/2011 academic year, over 550 students (355 full-time, 196 part-time and 14 life-long learning) were admitted to the FaME/TBU in Zlín. To obtain adequate feedback of the quality education, an extensive research was carried out at the end of the semester in the academic year 2010/2011. It confirmed the correct aiming of the course, but also identified possible areas of improvement.

To obtain the results, two target groups of students who have successfully completed study requirements were addressed. After finishing the course, the part-time students (KIPE) were asked to fill in a paper questionnaire. The full-time students (PIPE) were asked to fill in an online questionnaire. The intention was not only to gain the views of students, including the assessment, but also to compare the two approaches in research and teaching the subject. Almost 70% of questionnaires were completed and submitted, which borders on a successful research (in theory 75% questionnaires should be submitted).

Two examples of the evaluation process continue. The first example analyses the students' response of the item: "Benefits of lectures to students and the difficulty of the course." In both tests, the benefit of the CSE (IPE) course subject areas was examined in detail. Individual subject areas were marked; the average mark in test 1 is 1.89 (1.68 is the best and 2.14 the worst one); the average mark in test 2 is 2.27 (1.80 is the best and 2.76 the worst one), see Table 1. The scale is 1 to 5; 1 is the best.

Table 1: Importance of the CSE (IPE) subject areas for students [Source: authors].

	IPE subject area	KIPE	PIPE
1	Introduction, IPE placement	1,68	2,16
2	Computer science - concepts	1,92	2,41
3	Inform. and Knowl. Society	2,14	2,76
4	Data, information, codes,	1,83	2,24
5	Software	1,80	2,27
6	Data processing and HW	1,98	2,49
7	Computer components	2,13	2,46
8	IS, enterprise applications	1,97	2,50
9	Computer networks, Internet	1,68	2,00
10	Computer infiltration	1,77	1,80
11	Computer security	1,93	2,08
	Average	**1,89**	**2,27**

The least beneficial subject areas marked by the students were areas 3 and 7; the full-time students identified areas 3, 6, 7 and 8. The subject area which also includes the issues of enterprise computer science earned the average mark of 1.97 by the part-time students and 2.50 by the full-time students.

Regarding the fact that lectures at the FaME/TBU are not mandatory, students' attendance was decreasing steadily from almost 100% at the beginning of the course to less than a half. The full-time students lacked motivation to participate in

lectures, and therefore they challenged the benefits and importance of the lectures. They expressed more criticism; however, it is vital to state here that they have less or no practical experience in the use of ICT in practice. They have not been able to assess the importance of the course in view of the future needs so far, and thus their marks were lower than the marks suggested by the part-time students.

The question of the appropriateness of the choice of subject areas presented in lectures was assigned to the PIPE students only. The teaching should reflect the requirement for getting the ICT skills of students from various schools on the same level, preparing them for work with ICT at the FaME, and enhancing the professionalism of work with ICT for enterprise computer science. Table 2 shows the result of the responses. The vast majority of students consider the subject's areas are beneficial for them.

Table 2: Importance of the CSE (IPE) subject areas for students [Source: authors].

Evaluation	Count
1= very good	20
2= appropriate	58
3= I do not know	9
4= less appropriate	2
5= irrelevant	0
no response	20
Total	109
Average	1,57

4 KNOWLEDGE MANAGEMENT SYSTEM FOR EDUCATION

The information and knowledge society needs well trained professionals who will be able to work with knowledge in enterprises, government and public organizations, and will be able to innovate processes. Meeting such demands is not an easy task. Therefore, besides an increase in the potential of knowledge, the students should develop creative skills and personality traits that would lead them to the enhancement of their problem solving skills.

The procedure and method of teaching the knowledge approaches at the University of Defence (UoD) in Brno, Faculty of Military Technology (FMT) and creation of knowledge-based systems to students model the methodology used in the research project MENTAL, Knowledge Management of the Network Enabled Capability of the Army of the Czech Republic (ACR) in 2008-2011.

The research defence project MENTAL was oriented at the research of the knowledge and KMS development for the NEC administration in the ACR. NEC concept includes all ideas and measures about warfare in the information age.

The following example of individual student's work was taken from the „conferences" domain. At first, the basic concepts and work with information sources are introduced to students, and simultaneously, the TOVEK SW modules are described and used (www.tovek.cz). Consequently, the students are introduced to knowledge approaches, creating ontology in the AToM2 SW environment (www.aion.cz).

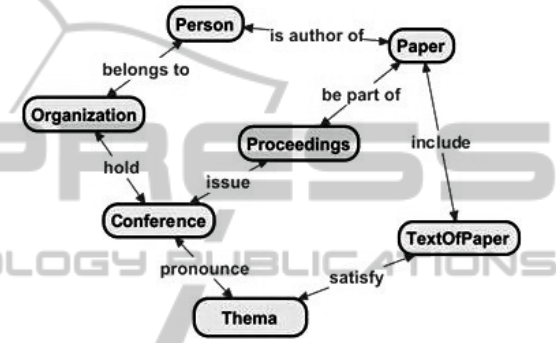

Figure 1: Ontology design [Source: authors].

The key problem of the knowledge management system (KMS) development is ontology preparation (model of the system). Classes and associations of the ontology see at Figure 1.

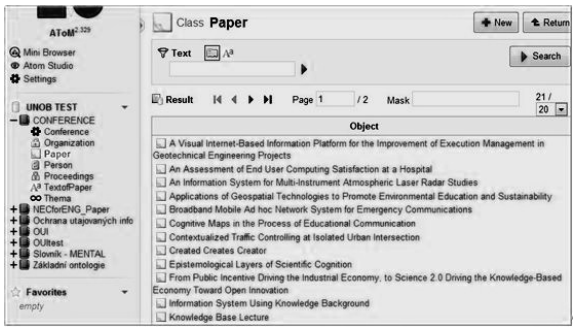

Figure 2: Example of knowledge base on conferences in the ATOM2 environment [Source: authors].

The procedure of the ontology elaboration consists of typical software engineering steps: analysis, design, implementation, testing, and production. The implementation environment is the ATOM2 SW, see Figure 2.

The opportunity of the KMS for the education is resulting from its characteristics. The embedded information and knowledge can be divided into small parts and connected into requirement nets.

Ontology driven KMS offers the chance to study various themes according ontology concepts (classes). Each occurrence of the class is a start point for the new study problem, see Figure 3. The next advantage is a complex environment where there is no problem to add or change new study material.

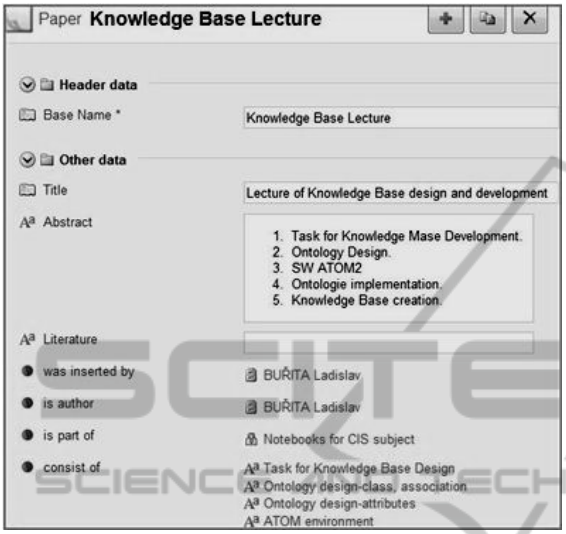

Figure 3: The various starting points for the study [Source: authors].

5 CONCLUSIONS

The first part of the paper analyses state of the university teaching and explains the ICT role in education process; it is followed by the description of the teaching of Computer Science at TBU/FaME in Zlín. The second part of the paper describes the procedure of teaching the knowledge approach at UoD/FMT in Brno and illustrates quick transfer knowledge from research to education.

It states the objective, overview of subject areas and methodology of teaching as well as the use of information and communication technologies. The second part contains some results of the research on the Computer Science for Economists course and its importance for students, focusing mostly on enterprise computer science. The analysis of the research results makes it possible to suggest options for further development of the course.

The evaluation by students of both forms of study (full-time and part-time) was positively influenced by a number of measures and operational changes leading to more effective communication towards students, including innovation of the SCE course content, which was introduced in the 2011/2012 academic year.

These include the implementation of the CSE course portal, new FTP server and a range of measures aimed at the improvement of the preparation, course content and conduction of the CSE course. They resulted from our research report, which intended to streamline the issue of university education, using ICT as a means for not only obtaining information, but especially for education and communication.

REFERENCES

Rosman, P., Burita, L., 2011. Experience of the Integration of ICT into University Education. In *Information and Communication Technology in Education ICTE´2011.* University of Ostrava Press.