ICT-SUPPORTED INTERDISCIPLINARITY OF SUBJECTS

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Abstract

This paper deals with new access to manage of the teaching process not only in university, regarding dramatic development information and communication technologies, and last but not least with reference to possibilities of ICT in supporting interdisciplinarity of subjects. There are submitted essence of lecturer's and student's standpoints on chances of exercise of e-learning in state of affairs and view of future this method in education, and the necessity of new skills in information and communication technologies.
**Key words:** *education process, role of teacher, research, ICT, e-learning, collaborative learning, interdisciplinarity.*

Introduction

Modern information technologies are going to enhance development of new methods of searching, acquiring, organizing, processing, sharing and using of information from various sources and disseminate it to users, namely by using VLE and LMS. The applications enable automatic access to informations anytime and anywhere. By modern ICT it is able informations and knowledge share and effective use. In difference of past time, when informations were only transferred from teacher to students, now shifts demand on education to work in team (e.g . at projected teaching). ICT can create new, open learning environment and its instrumental role in shifting the emphasis from teacher-centred to learner-centred environment. Teacher move from being the key source of information and transmitter of knowledge to becoming a collaborator and co-learner and the role of students changes from passively receiving information to being actively involved in their own learning (Hopkins, D., & West, M., 1994).

Changes in education process

In past time all schools – not only university - especially created and disseminated knowledge, now shapes demand on university education to new wave in tutorial, to ability work in team (e.g . at projected teaching), cope with changes, be flexible and innovate. In addition it is necessary to concentrate on scientific work and on quality them providing information and knowledge, which will be measured so, what students know, and how they can use it practically. Nowadays increase requirements on universities on quality of education and research and on their proactive behavior.
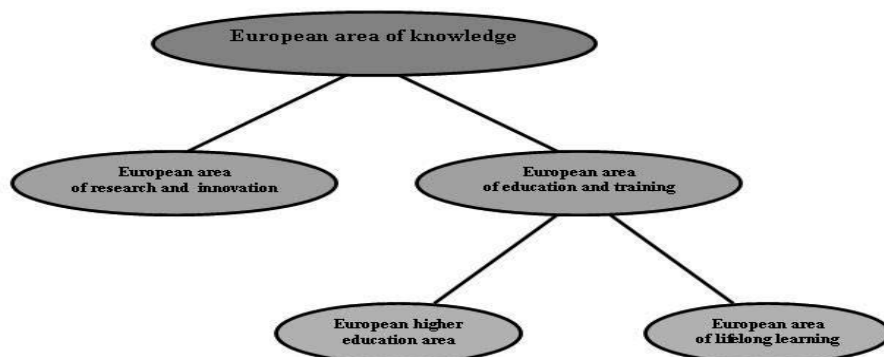
Figure 1.   European scope of education and research (by Ministry of Education CR).

Universities go to lifelong education, because in information society information processing and their sharing and presence takes part in everyday life. To prepare lectures now demands knowledges about different disciplines, combination with skills and practical know-how. Broad flexibility of knowledge, grant student, is often produced by new way of class organization and open using distance education. With using modern ICT the education process was modified, were created new relations and appear new possibilities for universities.

Some sample of research in our faculty

By our departement (Physics and informatics – Faculty of Education) was arranged a specific research in basic and middle schools, focused on maximising potential ICT efficiency gains. Through interdisciplinarity of subjects students can discover new possibilities to create new ideas and ICT can be used for improving the quality of teaching and learning, sharing knowledge and information and improving efficiency of education.

Goals of research

By reason that we are faculty which prepare future teachers, we wanted in this research to make analysis of computer and information litreracy of students and also teachers in basic and middle schools, their needs in informatics area and their possibilities to use modern computer equipment in education. The second objective of the research was to find possibilities of combine teaching traditions from different educational methods.

Results of research we want to use for improvement and increase education effectivity in our faculty and for future research.

Most important was to find usable spectrum of interdisciplinary relations among subjects, where is possible to use ICT support, adapt informatics education in our faculty from content and form aspect, and so prepare our students better for their future career.

Methodology of Research

Basic metodology of research was benchmarking – continually systematic process of monitoring and evaluation of teaching methods and outcomes, not only in informatics subjects. Benchmarking is process of identification some best practices and learning from others in different schools and various

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disciplines. It is effective tool for continually achievement of better outcomes. Part of benchmarking are comparative analyses. Yet in first phase were set key variables for research.

The research was focused on finding, how basic and middle schools, especially in our region, exploite potential of ICT in education. In pilot survey we used questionary method – first for learners and students, and in second stage for lecturers. They should fill answer on quite simillar questions. Our students, involved in research, visited some schools. In checklists we have given them such questions like „Do you have access to internet in school? How much lessons of informatics per week you have? Do you use interactive table in other subjects, than informatics?", and so on. All data was statistical processed.

Than we set hypothesis about influence of ICT on educational process - such hypothesis like „There is assumed, that with multimedia tools will lerners easier achieve better outcomes and will learn effectivelly.... There is assumed, that after school graduation they easier find good job in their specialization....", etc.

Used instruments for questionaire and for statistical data processing

Our students made own web program for questionaire, but we desided better to attend schools personally, because our experiences with feedback in questionary method through web or mail are not good.

For comparison level of exploitation ICT in education we suggested „ Factor of effectivity ICT in education", which take into account data from questionaire. Every criteria have weight, which projects to results coefficient.

For evaluation hypothesis we used single-selection t-test (confidence limit was 95 %).

$$t = \frac{\overline{X_{D\cdot}}}{s_D}\sqrt{N}$$

Test statistics is

In last part of project we compared both statistical samples (opinions of students and opinions of lecturers) by Spearman test of serial correlation.

All samples and results will be exposed on web pages of our departement http://pdf.uhk.cz/kfyi.

Results of Research

 In our samples the result was not statistic divergent opinion between teachers and students opinions.

There were confirmed hypothesis e.g.

> H1: With multimedia tools learners will able to learn more active, they will creative think and solv problems and achieve long-term knowledge

> H2: With ICT supported learning (in non ICT subjects) improve students stand to learning

> H3: Through interdisciplinarity of subjects will students have more chances to find job

> But we find other problem – some schools have quite wide ICT equipment, but they doesn't exploite that ICT potential. Also mostly is problem with team working of teachers in schools. It results also not effective use interdisciplinarity among subjects.

We would like to use results from this research for enhancing quality of preparing future teachers in our faculty and prepare students for the real world, which is inherently inconsistent and unpredictable. Last but not least, specific research is one of posibilities to involve students of faculty in research activities.

Common conclusions

Information and communication technologies must be harnessed to support goals of new knowledge society. They have great potential for knowledge dissemination, effective learning and

the development of more efficient education services. This potential will not be realized unless these technologies serve rather than drive the implementation of education strategies. To be effective, ICT should be combined with more traditional technologies such as books, radios, CD's etc., and be more extensively applied to the training of teachers.

Most important activities for effective learning in knowledge society are following:

- development of education and learning in accordance to knowledge economy needs
- continually measure quality of education
- exploitate possibilities of learning management systems
- create methodology of implementation of e-learning to the education processes with meaningfull proportion of face-to-face and on-line learning
- creation of alliances for educational activities in higher education institutions and collaboration with companies

Changed role of teacher

Changes are needed also in role of teachers. Contemporary teachers do not have to pretend that they know everything in order to formulate problems and ways to solve them. At the same time, teachers are taking on the increasingly important roles of advisor and learning facilitator. The new focus is on the process of learning and providing environments and tools that encourage everyone to become successful and responsible learners.

Using brainstorming in lessons

Brainstorming is a group technique for generating new, useful ideas and promoting creative thinking. It can be used to help define what project or problem to work on, to diagnose problems, remediate a project by coming up with possible solutions and to identify possible resistance to proposed solutions. In this method it is high supported interdisciplinarity of subjects by ICT, becouse new questions implicate next new questions, and students try to answer – and mostly they are seeking it on internet and find informations from different disciplines.

Collaborative and active learning

Collaborative learning is based on the teachers help students respond to literature by taking a more active role in their own learning. The cooperative learning tradition tends to use quantitative methods which look at achievement, i.e., the product of learning. The collaborative tradition takes a more qualitative approach, analyzing student talk in response to a piece of literature or a primary source in history. Cooperative learning is defined by a set of processes which help people interact together in order to accomplish a specific goal or develop an end product which is usually content specific. It is more directive than a collaborative system of governance and closely controlled by the teacher. While there are many mechanisms for group analysis and introspection the fundamental approach is teacher centered whereas collaborative learning is more student centered.

Active learning is classroom instruction that involves students in activities other than watching and listening to a lecturer. Working individually or in groups, the students may be called upon to answer questions, solve problems, discuss, debate, reflect, brainstorm, or formulate questions. Cooperative learning is instruction that involves students in team projects under conditions that meet several criteria, including positive interdependence (the team members must rely on one another to carry out their responsibilities) and individual accountability for every part of the project.

Possibilities of learning management systems (LMS, VLE)

In our university we are embarked in high-powered work on preparations choice subjects for combination forms studies in virtual educational environment WebCT, and for full-time forms of studies like supported materials. We also make up videoconference, but in my opinion not very suitable for education.

In e-learning tutorials are a way, where teachers supplement on-line learning with a face-to-face component. Typically, a teacher will organise a time where students can come and see him or her, or arrange for students to work in learning centre with assistance from tutor (Anderson, & Garrison, 1998).

Idea for our university and for Faculty of Education

By ICT-supported interdisciplinarity of subjects in school will be students much more prepared for real life and will have more chances for their career. Through application of innovation in educational process can improve behaviour of universities like social-economic systems towards increased quality, and they can become a learning organisations (Sutherland, 2004).
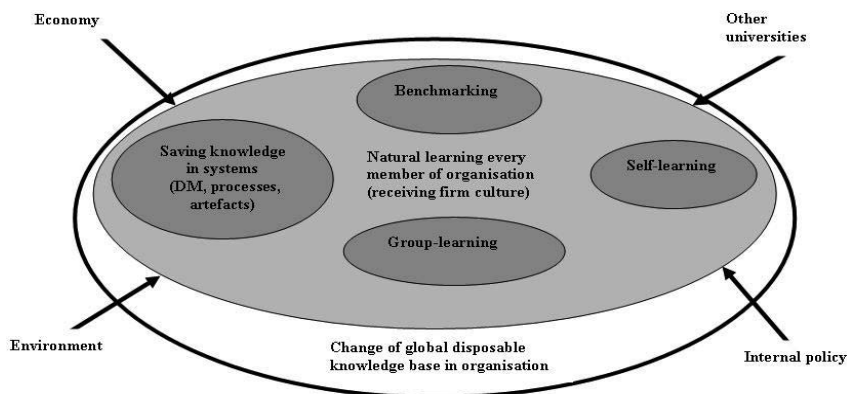
Figure 2.   University like learning organisation.

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