E-LEARNING IN COMPUTER SCIENCE EDUCATION

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Abstract. The article describes the history and current state of computer science education in distance and e-learning forms on University of Ostrava. It presents the methods, forms and also content of these study programs. It shows different types of subjects taught from theoretical computer science to applied branches like programming or computer architecture. The most important issues of such kind of education are discussed and systemized.

Keywords. Applied computer science, e-learning, computer science education.

Introduction

In academic year 1998/99 Faculty of scince, University of Ostrava (Czech republic) has installed combined form of bachelor's degree study programme "Applied Computer Science". In the beginning the priority was focused to hearing defect handicapped students (10 students in 1998/99). Nevertheless these students generally had high level of failing to finish studies. Nowadays the study program has strong distance education features and it is still growing the usage of information and communication technologies. Thus interest in this course is still increasing and in the academic year 2004/05 about 80 of new students were enrolled (TELNAROVÁ, FOJTÍK, 2000). Distance education was designed as a parallel form to face-to-face study and its content is the same. Output requirements are also equal.

The curriculum of the programme includes courses from theoretical computer science (formal languages, logic etc.), applied computer science (computer architecture, programming etc.) and also mathematical basics. From the academic year 2003/2004 teaching lies on materials prepared according to distance education methodology (CANNING, 2002) and also partially on on-line courses prepared especially in Learning management systems (LMS) (mainly Lotus Learning Space 5). A research among students was performed on order to obtain systematic information about this form of computer science studies.

Research

The first stage of research was performed through a questionnaire among students after winter semester of academic year 2002/2003. Number of respondents was 68 from combined form of applied computer science (90% males, 10% females). Students evaluated issues related to courses – Computer architecture, Programming in C and Programming in C++. The average age of respondent was 26.

First part of the questionnaire consisted of personal questions and further it evaluated particular courses and modules. The last part analysed technical issues of distance studies. Questions were mainly evaluated by score 1 – 5 (1 - best, 5 - worst).

Best results in relation to parts of courses had input tests (1.43), repetitive tests (1.39) and summaries (1.41). Tests were automatically revised without tutor intervention. This issue was positively evaluated since tests partially substitute face-to-face contact with educator. It shows that solution of test like dynamic web pages improves quality of distance education. High rank had also graphical design of modules (1.37). On the other hand worse results had animations included in courses (2.22) and also solved examples (2.04) that should occur in greater amount.

On-line vs. off-line materials

Respondents had several problems using on-line materials (courses) (TURČÁNI, FOJTÍK, POLÁK, 2001). The main advantage of off-line materials lies in the possibility to posse physical (printed) version without the need to connect to the Internet. This connection brings some students technical and financial problems. Technical problems were mainly on the side of University since used LMS has been installed only on a little number of institutions in the Czech republic. It was observed that students have different approach to on-line courses. The most important reasons for low usage of on-line courses were:

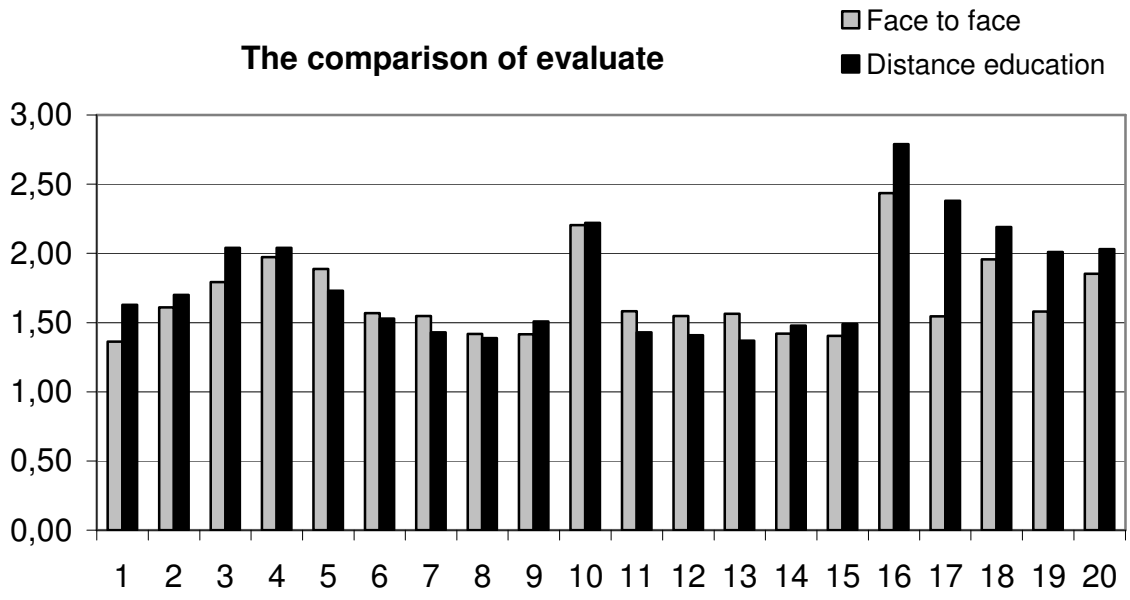
- Technical problems with connection (53%).
- Absence of Internet connection at home (13%).
- Preference to other teaching materials (33%).

A problem with Internet connection of students seems to be important issue. 64% of students have transmission speed of Internet connection limited to 64 kbps.

Important information may also be time spent on studies by students. 26% of students have reserved 2 days per week, 25% 3 days per week, 18% 4 days per week and only 4% are able to study only for one day per week. Since students of distance form are often employed so they time available for study is limited. They often focus their effort mainly to exam term when they take leave.

At the second stage of research respondents were chosen from students of full-time (face-to-face) form of study. Number of respondents was 77 (92% males, 8% females). Although students of full-time study have access to standard teaching materials, they use distance education materials even in greater amount than students of combined form. It could be partially explained by their possibility to use university network with high-speed connection to Intranet and Internet. We can observe difference in evaluation of selected questions by students of full-time (face-to-face) education and distance education.

Comparison of course evaluation by full-time and distance education students	Difference
1. Clarity of text	**-0,27**
2. Extent of text	**-0,09**
3. Solved examples	**-0,25**
4. Quantity of examples	**-0,07**
5. Intensity, adequacy and suitability of exercises	**+0,16**
6. Check questions and tasks	**+0,04**
7. Input test of lesson	**+0,12**
8. Repetitive test of lesson	**+0,03**
9. Clearness of figures and schemes	**-0,09**
10. Animations	**-0,02**
11.Summaries	**+0,15**
12. Keywords	**+0,14**
13. Design	**+0,20**
14. Pdf file for printing	**-0,06**
15. Total quality of course	**-0,08**
16. Frequency of usage of materials	**-0,36**
17. Working with LMS (Learning Space)	**-0,83**
18. Speed of data load	**-0,23**
19. Technical problems with LMS	**-0,43**
20. Problems with loading online modules	**-0,18**



The most important difference could be observed in working with LMS, where distance education students are significantly more negative than full-time students. It is logical consequence since full-time students are not completely dependent on online courses and could use other ways of learning. Distance education students had higher variance of their relation to online courses, which is based on the fact that their social origin is variable. This group is more heterogeneous than full-time students group.

From the research it follows that distance education students are more critical to quality of online courses since it is their exclusive way of instruction.

Conclusions

Distance education study program applied computer science has several problem issues in comparison to face-to-face education. It could be summarized as follows:

- There is an essential need to create quality materials (both static text and also online courses in LMS).
- Basic technical problem lies in high-speed connection to the Internet that is not available for majority of distance students in comparison to full-time students.
- Differences in content of courses brings a need to create original materials for teaching theoretical computer science disciplines like theory of formal languages and automata, logic etc.

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