Distance Education in Computer Science

Ásrún Matthíasdóttir and Kári Harðarson

Abstract: This article describes the authors experience in teaching computer science in distance education program and students' attitudes to distance learning at Reykjavík University. Both teachers and students in distance education need good support. It is not only support with the technology; they must have support with the whole process of teaching and learning. Communication is important for the students and the teachers must be active and follow up the student's questions and remarks. Teachers are concerned about the effect the mixture of school students and distance students are having on organization and teaching.

Key words: Computer Science, Distance education, e-learning, Student attitudes, Teachers attitudes, Technology in education.

INTRODUCTION

An education, where students and teachers rarely meet face-to-face and where technology is used for the distribution of material and communication, is the simplest way to describe distance education. The main goal of distance education has been to give students the opportunity to study anywhere and anytime within the school's timeframe. Over the years different technology and media have been used for distance education, e.g. radio, audio tapes, TV, video, satellite, multimedia on DVD. Some of this technology has been used with good results, but some has not gained wide use due to a variety of reasons like cost, access and effectiveness. It was not until access to powerful computer technology became common, e.g. PC and the Internet, that distance education flourished with online Web-Based programs. Now students attend distance education for a variety of reasons, not only because they live in a rural area but also because they do not want to change their lives completely by moving and quitting jobs. Their family duties and duties at work prevent them to attend school based classes although they live near the school or the university [2, 4].

Electronic and digital communication can offer new possibilities in how information is obtained and disseminated, how we can work on this information and how teachers teach and students learn. With the use of technology in education, researchers have tried to find out if there is a difference in traditional school based education and technologically enhanced education. In the book "*The no significant difference phenomenon*" McDonald [9] looks at about 355 research papers and comes to the conclusion that there is no profound difference between these two kinds of education. Twigg [14] wants to look at the situation from a different viewpoint, he wants us to think how we can use technology to gain better results in education and stop spending time on comparing different forms of education. Recent development has introduced technology both in on-campus and off-campus education, with different kinds of implementation regarding different organization and different goals and today the phrase "blended learning" is frequently used for a mixture of distance learning and school based learning.

Distance students need good technical skills, they must be independent and be able to organise their study as this form of education demands students being more autonomous. It is clear that distance education is not suitable for all students and they need to be prepared for a different educational environment, but with good support most students who are motivated to learn can make use of distance education.

Research has shown that four main barriers may prevent students from attending distance education; situational, institutional, dispositional and epistemological barriers [6,

7, 8, 10, 15, 16]. Peslak [11] gives a good overview of research into students' success in distance education. He mentions Eastmond [5] who emphasizes three factors for success in distance education; course design, support, and proficiency and Roblyer and Marshall [12], who in their research with the *Educational Success Prediction Instrument* found eight factors that enhance the success rate of students. These factors are: High self esteem, a belief in oneself, an understanding of personal responsibility of learning, willingness to take risk and make decisions, technological skills, excellent time management, good organizing skills and self-discipline. Other researchers have found similar factors and put new factors in focus, e.g. Alley and Jansak [1] with ten keys factors, Soong, Chan, Chua, and Loh [13] with five factors.

The teachers also need to be prepared for a different environment and as Berner [3] suggests, "Not just any instructor should be asked to design and teach an online course". Distance teachers need preparation, guidance and support as well as distance students. In a report from 2004, about research into the development of ICT in three universities in Iceland, the teachers reported the importance of meeting distance students, the need of quick online responses to students' questions, that communication with distance students is more time-consuming than with campus based students and that preparation for distance teaching also takes more time [2].

THE ICELANDIC CONTEXT
Distance education has been offered in the School of Computer Science at Reykjavik University (RU) in Iceland since it was founded in 1998. Until now the University has offered a diploma in Applied Computing (60 credits = 120 ECTS) in distance education, but from the next autumn, 30 more credits (60 ECTS) will be offered so the students can finish a BS degree in Computer Science in distance learning. Normally, school based students take four courses each semester over a twelve-week period followed by an exam time and then they attend a three-week course that can be by either a practical project work course or a specialized course. Two project work courses are obligatory in the first year. The distance education is part-time as the distance students take two courses each term in stead of four. All students have to take two project work courses but these two courses are not offered in a distance education form so the students have to come to the University for three weeks to work on a project in small groups.

The curriculum is the same in distance education as in the school based study and since the usual form of instruction is lectures, all the lectures are recorded with the help of a program named Camtasia, and put on the school learning management system (LMS) called Myschool (see http://www.betrilausnir.is/). The students can download the recorded files and listen to the teachers lecturing, watching the PowerPoint Slides and see what the teachers write and draw on the white board (smart board).

The department also offers practical sessions for two weekends each term where the distance students can work under teachers' guidance and in collaboration with other students. Communication is via the Myschool system with the use of e-mail and a discussion board and teachers also offer an hour a week discussion either by phone or by online programs that are not part of Myschool, e.g. MSN or Skype. Support for the faculty and the students is provided by one of the authors (Matthíasdóttir) but technical expertise support comes from the RU technology department. The distance students in computer science are 12% of the student population or 41 students in the spring 2005.

For communication the LMC system is used with e-mail (Outlook), a discussion area, and in addition, teachers offer private sessions/interviews once a week. Some teachers

use programs like MSN or Skype for communication and of course old-fashioned phones are always classical for communication. The LMS system offers a variety of other possibilities for distribution of material, online questionnaires or exams and special facilities for administering and handing in projects and essays.

LESSONS LEARNED

If we look at where the distance students at Reykjavik University are situated, 63% live in Reykjavík and the nearby towns where the University is and if we add all the students that live less than one hour drive from the University the percentage is 75%. So it is clear that the majority of the students are not in distance education because they live in rural areas far from the University. At the end of March 2005, we sent 40 distance students an e-mail asking them about positive and negative aspects of being a distance learner. We received 12 answers and will discuss them here as well as our experience as distance teachers.

Students' attitudes and experiences

Overall, the students have positive attitudes towards the distance education program at the School of Computer Science at Reykjavik University. They like to have opportunity to study without having to make big changes in their life and they do not want to move or give up jobs. They want to study without it affecting their life or as one said:

The main advantage is of course to be able to work while studying. And you do not have to move your family.

The flexibility of distance learning is clearly important for the students, being able to take responsibility and organize the learning autonomously is appreciated by the distance students. They are not bound to the school's timetable; they can work according to their own timetable and can adjust their time to study, to work and family life, or as one of them said:

Another advantage is to have control over when you study but that can also be a disadvantage if you do not study at all. You can take care of the learning speed, how fast or slow you learn.

The recorded lectures are very popular among the students, they like to have control over their study and be able to listen to them when they want to, even in the car or when they are ironing at home. Communication with other students and teachers is important for them and they like to meet and work together as one said:

It was critical for me to communicate with other students, it was important to work with other students and learn from them. I would not have survived without them. To be able to come to the school and work with the teacher and fellow students is a great support.

The students feel the responsibility of a different learning form, they must be active and observe what is going on, they must check on the LMS what is new every day. They want to have good access to the teachers and most of the time the teachers seem to respond quickly to their questions and comments but distance students are very sensitive to any delay in response.

The main negative responses are concerning workload and teacher service. Distance learning is hard work as all learning can be and if students have obligations to family and job it might be difficult to find time to spend on learning. They do not like group work over the Internet, they want to work alone, or work in groups only when they meet other students at the University or as one said:

It is difficult to work over the Internet with people you have never seen and some of the projects are not suitable for this kind of communication.

As the distance learning program follows the on school courses, the distance students often worry about what is going on in the school hours. What is going on in the lectures and practical sessions? Do the teachers say something important that is not recorded? As some teachers use practical sessions for formal teaching they also record what goes on there but others use practical sessions for project work and discussions that are not suitable for recording. This makes the distance students insecure and they complain. The two weekend's practical sessions for the distance students are supposed to solve these problems but they are only useful if you can attend them and that can be a problem for students living abroad and bound to work at weekends. Here is one student's comment:

I often feel that the teachers forget us, we do not exist for them, they put on group work that we can not attend over the internet, they forget us when they are recording the lectures and start pointing without using the mouse, we can not see where they are pointing, and they give a hint for a project work in practical lessons without telling us.

To record the lectures live can be a problem, the teacher must repeat any question from students sitting in the class; otherwise it is not recorded and they must remember to use the mouse or electronic white board for drawing and pointing.

One common complaint is that not all the teachers are equally active on the LMS or MSN. The teachers should offer one hour per course a week for a formal interview via phone or the Internet but some of them offer more service, they give the students their MSN or Skype name and answer whenever they are online, even in the evenings or at weekends. This of course invites the students to complain about teachers who do not give their MSN or Skype name and want students to use e-mail or LMS discussion board for communication and only attend to their messages in office hours.

Teachers' attitudes and experiences

New distance teachers are often insecure about how they should prepare projects so they are suitable for distance students and they complain about the extra workload that follows distance teaching and communication. Some are also unhappy to have to work twice at a weekend each term. Teachers that are used to this form of teaching and have prepared their course for the distance teaching are more concerned about the effect the mixture of school students and distance students are having on organization and teaching.

When Reykjavik University started to offer distance learning in computer science in 1998, the teachers recorded their lectures at their offices, they repeated the lectures with the PowerPoint shows without an audience. Both teachers and students were not happy about this; the teachers had to go through the lectures two times and thought the recorded lectures were lifeless without audience. The students were worried about missing out questions and discussions that happened in the lecture room with a real audience. So in 2000 we started to record live lectures but it is only what the teachers says and shows on the board that is recorded, students questions must be repeated and the teachers must use smart boards for drawing.

It is a common complaint from the teachers why they have to record the lectures. When they attend the classroom the technology is sometimes not ready, someone has unplugged the system, the sound may be missing and if they do not notice before they

start they have to repeat the lecture later in their office. They also feel that they either forget the distance students when discussion starts or it is affecting their teaching when they must all the time repeat questions and remember the distance students.

The sound quality of the lectures is very important. Some lecturers experimented with recording using Bluetooth headsets, but this was not popular among the students; telephone sound quality does not suffice. On the other hand, being able to see the lecturer is much less important. Today, we record the presentation screen only. This has the added advantage that the media files are much smaller than they would be if a video of the lecturer had to be included.

All students in the department have access to the lecture recordings; they are not only for distance students. This has resulted in a drop in attendance of lectures, which some lecturers consider a problem.

CONCLUSIONS AND FUTURE WORK

The main conclusion is that both teachers and students in distance education need good support. It is not only support with the technology; they must have support with the whole process of teaching and learning. It is very important that distance learning programs are well defined and organized with good support for the students. The teacher's role must be well defined and it must be clear to the teachers what is expected of them, they must be highly computer literate and familiar with the possibilities that the learning management systems (LMS) offer. The same applies to the students, they must be aware of the fact that they must be responsible of their learning and they must have time to study. As well as all other students they must be active on the LMS and take part in both synchronized and asynchronized discussion and hand in projects at the right time. If teachers are to prepare material they must be comfortable with the tool they use and they must get support when needed. Communication is important for the students and the teachers must be active and follow up the student's questions and remarks.

It can be difficult to respond to the teachers' and the students' negative comments. It is hard work to be a good teacher and a good student and it is also time consuming. The distance between teaches and students in distance education is difficult to bridge with technology, it is more convenient to ask the teacher for help when he is in the classroom rather than send him an e-mail that he may respond to the next day. Distance students are often working on their study in the evenings but the teachers are working during the day. It is important for administrators and developers of distance education to listen to teachers' and students' attitudes to be better prepared to promote the distance programs and aim at finding the right balance between support to students' and teachers' contribution.

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ABOUT THE AUTHORS

Ásrún Matthíasdóttir, Assistant Professor, Department of Computer Systems, Reykjavik University, Phone: +354 599 6200, E-mail: asrun@ru.is.

Kári Harðarson, Adjunct, Department of Computer Systems, Reykjavik University, Phone: +354 599 6200, E-mail karih@ru.is