FROM DISTANCE EDUCATION TO ONLINE LEARNING: FORMATIVE ASSESSMENT IN HIGHER EDUCATION[1]

Bertil Roos, Umeå University

Introduction

Higher Education is changing. There are:

- changes in staff-student ratios
- decreasing student/teacher ratio
- changes in student profiles
- decreasing economic resources
- increasing demand
- political aspirations to increase participation
- changes in student roles (encouraging flexible learning)
- communication media to enable students to learn at a distance or asynchronously
- tools which can take over mechanical tasks and free up time for students to develop higher level skills
- changes from distance education to online learning
- debates about summative (high stakes) and formative (low stakes) assessment

In the 1930s and 1940s there were less than one percent of the Swedish population at universities and institutes of higher education. Directly after the Second World War there were about 14 000 students in the Swedish Universities. Subsequently, the universities in Sweden has been extended to give further possibilities for higher education. In the beginning of 1990s there were more than 200 000 students (Sörlin & Törnqvist, 2000). During the 1990s the number of students in higher education has increased by more than 50 percent. During the academic year 1998/99 there were more than 300 000 students (Högskoleverket, 1999), and 50 000 employees (SCB, 1999). In Swedish higher education instruction should build on a foundation of science and be conducted by teachers who hold a doctorate. The level of teaching that met this requirement during 1999 was 55 percent (Högskoleverket, 1999). During the period 1989/90 – 1997/98, however, universities student/teacher ratios increased from 10:1 to 15:1 (Westling m.fl. 1999). Whereas the number of students during the period increased by 86 percent, the number of teachers/researchers increased by only 17 percent (Riksdagens revisorer, 2000). The character of the universities has changed from elite to mass institution during the second half of the 1900s.

Consequences for teaching and learning

Such expansion has changed the working patterns in universities. Students are taught in lecture halls with up to 250 students in each group, such that the possibility to ask questions is limited (Brownson, 2000).

Research shows that all learning demand thinking and active construction and development of mental models.

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> *From today's cognitive perspective, meaningful learning is reflective, constructive, and self-regulated. People are seen not as mere recorders of factual information but as creators of their own unique knowledge structures* (Miller, 1999).

> *It is time to move the emphasis from teaching to learning* (Harvey, 1997).

How can resources be reallocated to allows for learning? Use of e-learning, for example, is one solution that is widely promoted. It is claimed to be 50 - 90 percent cheaper than using real-life teachers and holding formal classes (Svetcov, 2000). Maise (2000), however, suggests that the key to success is to find the right mix between online learning and classroom based instruction.

Research shows that there are now significant differences in the ability to learn with different technological tools. Carnevale (2001), however, claim that the media do not affect learning. The design of the instruction and partly what the students bring with to the instruction situation that affect learning. Online education does not differ significantly from traditional classroom-based education in respect of results and student satisfaction (Vachris, 1997) (Jones, 1997). Harvey (1997) claims that *the Web must be brought to life in an environment of cooperative learning.* In online courses students wish to have frequent feedback and interaction, particularly if they feel cut off from both teacher and classmates (Hoey, 1998). *People tend to lose interest if there's nobody on the other side who cares if I'm here or not,* (Svetcov, 2000). The best thing with online courses is that the students can work when they wish at their own pace and where they wish (Hoey, 1998).

Much attention give to ICT

Great expectations are tied to the new information and communication technology (ICT). Computers were, as late as 1985, used only by a little elite for word processing and simple calculation. Fifteen years later more than half of the Swedish people have access to the Internet (Sörlin & Törnqvist, 2000). In November 2000 more than four million person in Sweden between 12 to 79 year old surfed on the internet. 93 percent of the men in the group surfed some times during the month (Computer Sweden, 2000). Today students and teachers can communicate over the Internet with cheap cameras and microphones which gives interaction to every Internet connected computer (Blotzer, 2000). With access to video- and sound streaming the Internet will be the obvious choice within areas where there is access to computers (Dunn, 2000).

New possibilities (ICT), new alternatives

The transformation of higher education is becoming visible. One off the most important attributes is that the boundary between time and space is being eliminated. With asynchrony distribution on the Internet the same course can be taken in South Africa, Australia or in China. Students can receive credits from different parts of the world and send them to their ‘home’university (Dunn, 2000).

> *Students will be able to shop around, taking a course from any institution that offers a good one. Degree-granting institutions will have to accommodate this. Students will learn what they want to learn rather than what some faculty committee decided was the best political compromise* (Svetcov, 2000).

Many of today’s universities, especially in the United States, will be examining and accrediting universities. The Association of Governing Boards in the United States predict that one third of the existing independent schools and universities will close within the nearest 10 years. Yet, as the numbers of traditional universities decline, the number of those who offer higher education will increase. Publishers, companies, and commercial and non-commercial organizations will share the education trade. These actors will sell courses direct to the students and eliminate the universities as a middleman. The future virtual universities will not be an individual institution, but a gateway for an education organizer who will collectively distribute customised education to students in a time and place. It is claimed that this will be the dominant form of higher education in 2025 (Dunn, 2000).

Supporting learning rather than selection

The increasing numbers of students makes it difficult for teachers to mark and return individual feedback to the students. The use of formative online assessment, however, allows students to test out their knowledge and get immediate feedback. However there is a danger that the students look at the result and the feedback as a confirmation of their adequate understanding than like a way to discover areas of their weakness (Judge, 1999).

How can we use information technology to transfer learning? Teachers can use systems that provide them with tools for analysing and tracking students responses. Teachers can use it for helping students with problems or identifying questions that are more or less bad. The strength with this tool is that it can promote students learning.

There is an ongoing discussion about learning, just as there are competing theories of learning. Methods of assessment are also determined by our beliefs about learning. In this paper we suggest that assessment can support learning as well as measure learning through internet based processes. An important purpose of using online assessment is the possibility of giving students immediate feedback on their understanding of course material (Judge, 1999). It is important that the student feedback is of a high quality to enhance the learning process. The students need not only feedback on how well they have done but also on what they haven't understood and help to improve their understanding (Ramsden, 1992).

The use of online assessment has the advantage of enabling student responses to be marked and analysed with relative ease and speed. Properly designed online assessment allows students to test their knowledge of a topic and get immediate feedback. Important questions remain about how and whether students organize, structure, and use this information in context to solve complex problems (Miller, 1999).

Low versus high-stakes assessment

When assessment is used for high-stake purposes, it must meet high standards of reliability and validity. When tests are used for low-stakes assessment, the teacher considers many pieces of information when making decisions about students, testing standards can be a bit more relaxed (What is a test, 1997). High-stakes testing programs frequently result in improved test score, but such improvement does not necessarily imply a rise in the quality of education or a better educated student population (Moss, 1992). Test security is also an important issue in all high-stake assessment. This is not a problem in low-stake assessment. Low-stake online assessment can be offered to the students at the place and time that is convenient for them. Students can be assessed at their desks or from their portables over a mobile phone line. It is not necessary to drag students into the classroom just to assess them. Less time and money wasted on travel to the assessment centre (Kleeman, 1998).

Are online students as qualified as campus students? Online students have showed they are equal successful (Smeaton, 1999) ore more successful measured in terms of examination results (Redding, 2000). Other studies shows that online students could perform at least as good as traditional students (Dutton, 1999). Another study has shown that the performance of students examined in Internet based items was statistical significant higher then in the campusbased items (Fredda, 2000). Jon Losak, vice president in research and planning at Nova Southeastern University at Fort Lauderdale has come to the same result. During the sex last years have his institution carried out more than 24 studies comparing online students performance with their classroom counterparts. They analyzed among other things frequency of graduation, time to graduation and knowledge acquisition. The students performed as well or better in online courses (Caudron, 2001). Thomas Russell, at North Carolina State University, has catalogued 365 studies addressing this specific question. He concludes that there were no significant difference in academic outcomes between the two groups (Russell, 2000).

Need for exploration of these new possibilities and contexts

The new information and communication technology offer possibilities for new learning and assessment mode. One of the most important advantages with online assessment is the function as an aid for the students learning. The students can be offered assessment independent time and place and the teacher can integrate multimedia, simulation and graphics into the assessment. Another advantage with online assessment is saving in time and costs. In times with an increasing number off students and decreasing resources for teacher jobs means quicker amending and immediate feedback a better economical resource exploiting and that the teacher can mind more off the time for tutoring the students. Therefore it is important that the new technology is made feasible for interested teachers. However the question must be asked how this form of assessment affects learning and the quality of the education. Research about effects and use of online assessment assists the development and implementation of new forms of assessment. An interaction between pedagogical research and practical development of online assessment is therefore important. The general aim of the project discussed in this paper was to explore the application of these ideas to teaching and learning in higher education.

The Project

The project has been implemented with support from the Swedish Agency for Distance Education (Distum) and involves teachers and students from Department of Radiation Sciences at Umeå University. In common with other departments, Department of Radiation Science are constantly monitoring good practice in teaching and learning, and seeking innovative ways to improve the learning opportunities offered to students. It was in this climate it was decided to pilot online assessment during four weeks of a distance course in Medical Technology. The course aim was to introduce *Medical Technology* through an outline of different approaches and technical aids within medical diagnostics, treatment and evaluation. The name of the online section was *Bio potentials* which treated origins and transmission in humans, measurement of bio potentials and their medical benefits. The course target group was 20 online students of nursing/care in the Medical Technology field.

Activities

Training of the teachers comprised four seminars about question construction validity/reliability, and different assessment methods. Software training was covered in a one day of workshop.

The student assessment partly comprised individual-assessment and partly self-assessment. The individual-assessment assignment was to produce a poster to be presented on the web. The self-assessment used an online question database that the students accessed over a period of two weeks.

Early in the project a pre-questionnaire was filled in by the teachers in the course to gather teachers view of assessment in generally and online assessment. Since questionnaires can be limited, a structured pre-interview was held with the teachers. After the assessment period, and at the end of the course, a post-questionnaire was circulated and post-interviews were conducted.

To get the student view of using online assessment a questionnaire was distributed. The response rate was 85 percent. The data was collected between December 2000 to April 2001.

Outcome

The teachers view was that:

- online assessment was positive and that they would do it again
- online assessment was time-saving
- online assessment afford an ample statistical analyses of the assessment questions

- online assessment empowered generating of a couple of reports for analyse of the students performance
- online assessment could be to significantly help in learning and rehearsal
- online assessment make it possible for teachers/tutors to afford more feedback than it would be possible with paper based assessment
- online assessment increase the pace of result feedback and comments to the students
- an important advantage with online assessment is that the students can work at their own rate and as often they need

The Student view was that:

- online assessment gave possibilities for quick feedback
- online assessment was a good support for learning
- a big advantage with online assessment was that they was allowed to take the time they needed for the assessment
- online assessment had good access
- they saw many advantages with using internet in assessment
- they in the future would prefer online assessment over paper based assessment
- that they would be delighted to attend more courses with online assessment

Reflections

One of the most important advantages with online assessment is its function as an aid for the students learning. Another advantage is that the student can be offered assessment independent of time and place and that online assessment is time and cost saving. Therefore it is important that the new technology is made amenable and practical for interested teachers.

The first part in the assessment process, and the hardest, is to create the questions. It is important to think carefully about what it is students are required to know, and what common misconceptions there might be. The content validity in the assessment is very important and the teachers in the course were successful in that matter. The overall goal for the assessment was to enhance students learning. Most of the students also thought that they learnt a lot during the assessment.

Another important matter is what level of knowledge the assessment demand. An important goal for teachers is to enhance students higher level thinking. Therefore it is important that teachers have and take time to construct statements that demand students higher level thinking.

The most important thing for teacher is to have time to problemize the assessment concept and discuss with colleagues question construction, validity and reliability. Therefore, the project started with some discussion seminars where teachers could reflect together. Next the teachers were trained in the software package.

The biggest problem in the project however was not to train the teachers in handling the system but gaining access to the server. The university computer central had problems to get the server run.

All students in the course considered that the best thing with online assessment was that they could take the time they needed to realise the assessment. We have all different learning styles and it take different time for us to learn. Therefore it is important that the students can take the time they need to realize the assessment. The students would, if they could choose, have frequent assessments rather than a single assessment at the end of the course. That is a challenge for the teachers to meet the students' wishes in that way.

It is apparent that the students view is that formative online assessment affected their learning and that it attracts them to that degree that hardly any students wanted to go back to paper and pencil. It is apparent that the students view is that online assessment could increase flexible learning.

The innovation had an impact. The character of this impact can be seen in the students claim that they prefer online assessment before pencil and paper. What other effects the innovate had on the students styles of learning cannot be established from this research. In short, the introduction of online assessment has affected students learning, but analysis of qualitative changes in students learning must remain the focus of another study.

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Author:
Bertil, Roos
Umeå University, Department of Education
SE-901 87 Umeå, Sweden
Email – Bertil.Roos@pedag.umu.se