Technological Solutions cannot Stand Alone? Reconfiguring ICT in the support of learning in Swedish higher education[1]

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ABSTRACT:

This paper reports a 3-year project on internet based assessment funded under the Minerva area of the European Commission. The paper 1) reports the use of ICT in response to the challenges posed by recent changes in Swedish higher education; 2) discusses the association of the learning society with constructivist assessment: and 3) reports and discusses the experiences of the 3-year development project. Overall, the Swedish experiences suggest that technological solutions cannot stand alone. They places cognitive, emotional and organisational demands on teachers and students that also shape the penetration of ICT practices, like internet based assessment, into the configuration of teaching and learning in Swedish higher education.

Introduction

This paper reports on the work carried out within the framework of the Minerva project *Internet-based assessment in distance education* at Umeå university.

Umeå's contribution to the project has been development activities centred around the implementation of internet-based assessment. The strategy has been a bottom-up perspective, an interplay between user-steered practice and action-research with the teacher and the student as the centre of attention.

The Swedish challenge

State education in Sweden was started to meet the needs of a more and more complicated society. Education has great importance for the society not least to preserve and develop democracy. Education is also important for Sweden's international competitiveness, economic growth and its status as a leading knowledge nation. Education also plays a role in Sweden in fostering equity and increased employment. Thus, concepts like flexibility, lifelong learning, democracy and citizenship feature prominently in Swedish educational debates.

In the 1977 higher education reform emphasized the conception of recurrent education. Institutes of higher education started short freestanding courses where the students could choose courses and accumulate credits. The result of the increasing flexibility was that the students need greater freedom, in life-long learning, to move between working life and education. Life-long learning, at all stages, comprises both life-long and life-wide learning. Increasingly, it focuses upon the capacity to handle physical and intellectual tools. The Swedish "Nätuniversitetet" (Prop. 2001/02:15), has been a national initiative offering flexible courses for life-long learning.

The political aspiration to increase the number of university student implies that the number of study places will increase (Högskoleverket, 2002). Funds has been allocated for further expansion in the near future, including the possibility of working part-time, and studying through distance education (Prop. 2001/02:15). One of the Swedish government's ambitions is that the social composition of higher education will change in favour of greater participation from social groups previously marginalised.

The character of the universities in Sweden has changed from elite to mass institution during the second half of the 1900s. During the 1990s the number of students in Swedish higher education has increased by more than 50 percent. Currently, 40% of students leaving upper secondary school (gymnasium) enter higher education before they reach the age of 25. The government goal is 50%. When this expectation is fulfilled, higher education in Sweden will become a common educational pathway for all citizens - in the same way that upper secondary school acquired the same role during the 1980s. (SOU 2000:47, s 31). During the same period, however, there has been a decrease in the student/teacher ratio. Working practices in universities have changed. Students, for instance, are taught in large groups where the possibility of asking questions is reduced.

Internationally seen, participation of young people in higher education in Sweden was relatively low in the 1990s. Approximately 10 percent of the Swedish population in the age

range 17-34 participated in higher education studies. In Finland the corresponding figure has been 15 percent, with higher participation in Denmark and Norway. Despite the fact that the number of places and the number of admissions in higher education in Sweden have increase considerably there has been a decrease in the participation of 19 year-olds (SCB, 1999).

Instead, many students pursue a career of recurrent education, starting their studies later and including long breaks from study (Högskoleverket, 2002). This has led to wide variations, not only in the age of students but also in their previous knowledge, experiences, social and ethnic background, language proficiency and study goals (SOU 2001:13). Sweden, therefore, is on the way to developing a learning society.

Efficiency and ICT

At the same time, expansion has its costs. For instance, the official auditors have indicated that savings could be made by increasing the efficiency of higher education. Here, the model for reform is the application of industrial and commercial practices. As the steam engine and the extension of water power at the end of 1700s and the beginning of 1800s were of decisive importance for growth of industrialisation, the introduction of control and communication technologies in industry have had an equivalent impact during the last decades (Beniger, 1986).

A similar transfer has been attempted in the education industry. As late as 1985, computers were used only by a small elite for word processing and simple calculations. There has been a strong pressure in higher education to use the new technology to make education accessible to more people, to increase quality in education, and to increase productivity. Great expectations, therefore, have been tied to the introduction of new information and communication technology (ICT) into education.

The new technology assumes that students are less dependent upon time and place and that they have easy access to e-mail and broadband (e.g. at home). Swedish higher education has been transformed by the emergence of e-education hybrids or blends. Independent and flexible life-long learning is the new paradigm. Through courses distributed through a decentralized net-university, students will be able to receive credits from different parts of the world and cash them in at their 'home' university.

> 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).

Yet, as they shop around, an accreditation issue arises. What is the basis of the mutual recognition of courses? This issue is formally addressed in the *Bologna process* devoted to creating a European framework of accreditation and assessment. Inevitably too, the Bologna process focuses on the assessment of performance. Yet, it is clear from a Swedish official comment on the Bologna process, that there is no consensus about assessment (Ministry of Education, 2004). Although a key element of the learning society, it is still a need of critical review – of the kind conducted as part of our Minerva project: *Internet-based assessment in distance education*.

Assessment

Assessment has many different purposes. It is used, among other things to pass students on courses and items, it regulates entry to higher courses and it also guarantees the quality of students knowledge and skills when they complete their formal education. Broad outlines and rules for assessment are often clearly stated in course documents. Something generally missing, however, is an assessment of the demands that can be placed on the assessment itself. Issues of reliability, relevance and how to value the students knowledge and skills receive insufficient attention. Assessment is left in the hands of the individual teacher. In practice, institutes of higher education in Sweden have no regulations concerning their own assessment practices (Wedman, 2000).

Assessment is one of the most potent forces influencing what teacher should concentrate on in their teaching and what students should concentrate in their learning. Assessment sends a message to students about what is important to learn. Assessment is far from being merely a technical process. Rather, it is deeply implicated in, and may have serious consequences for the lives of those it touches (Johnston et al., 1995, p. 359 in Black & Wiliam, 1998, p. 12).

This point is clearly made by Messick:

> *Once it is denied that the intended goals of the proposed test use are the sole basis for judging worth, the value of the testing must depend on the total set of effects it achieves, whether intended or not (Messick, 1989, p. 85).*

In turn, some authors claim that there is a need for a 'paradigm shift' in assessment, a shift from the current assessment paradigm to the 'problem-solving paradigm', a shift from a testing culture to an assessment culture. Further, this shift is associated with a shift from mental measurement to the assessment of learning (Gipps, 1994, chapter 9, Black & Wiliam, 1998, p. 45). These paradigm differences can be illustrated through three distinctions made in assessment theory and practice: 1) formative *versus* summative assessment, 2) divergent *versus* convergent assessment and 3) high *versus* low stakes testing.

Formative and Summative

We can think about the function of assessment partly, at a methodological level, as the 'goals' of the assessment and partly, in a sociological or pedagogical context, as the 'roles' of assessment (Scriven, 1967). The terms formative and summative, linked to the roles of assessment, first appeared in Scriven's article "The Methodology of Evaluation" (1967). But how does assessment fit the distinction between formative and summative? Summative assessment is used at the end of a unit of teaching to ascertain, summarise and communicate to the student and others what has been learned. Summative assessment generates coded information; formative assessment utilises reference- or standard-based information. Black & Wiliam (1998) define formative assessment as follows:

> *all those activities undertaken by teachers, and/or by their students, which provide information to be used as feedback to modify the teaching and learning activities in which they are engaged (p. 2).*

Formative assessment aims to support learning. If teachers make an effort to develop formative assessment it can take them closer to the students learning and give the students a more active role in their own learning (Black, 2001). Further, such assessment can be seen as integral to learning. Students have to be active in their own assessment and picture their own

learning in the light of an understanding of what it means to extend their learning (Black & Wiliam, 1998, p. 22). Black and Wiliam also assert (p. 14) that the core activity of formative assessment rests on the perception, by the learner, of a gap between a desired goal and his or her present state; and in the action taken by the learner to close that gap in order to attain the desired goal.

Convergent and Divergent

Convergent and divergent assessment arise 'from teacher's differing views of learning and the relationship of assessment to the process of intervening to support learning'. The key issue in convergent assessment is to find out whether the student has a predetermined specific kind of knowledge, understanding or skills. It focuses on students' knowledge, understanding and skills in proportion to the curriculum. It prefers pseudo-open questioning and focuses on contrasting error responses and correct responses. It assesses in a linear way and the assessment is made of the student and executed by the teacher. Divergent assessment, on the other hand, has students' understanding in focus, has an aim to find out what a student know or can do. The assessment is performed by the teacher and the student together. It is characterized by flexible planning, open forms of recording, emphasis on the learners understanding, open tasks, open questioning and descriptive, qualitative feedback. Divergent assessment strives towards teaching in the zone of proximal development (Torrance & Pryor, 1998).

High and Low Stakes

High stakes assessment entails a close association between assessment outcomes and social outcomes. The stakes are high because the consequences of failure are considerable. Typically, high stakes assessment affects the life chances of students. Another problem with high stakes assessment is that it tends to inflate students' measured achievement – because teachers play the high stakes game and teach to the test. Such improvement, however, does not necessarily imply a corresponding rise in the quality of education, or the existence of a better educated student population (Moss, 1992). Through this corruption of teaching and learning, high-stakes assessment stresses basic skills, leading to a narrowing of the curriculum.

On the other hand low-stakes assessment does not have the same implications. Indeed, its social consequences may be positive, when it is used to guide teaching and learning, rather than to make possibly irreversible decisions about different educational journeys that students can take in the future. Linn has made a similar point, arising from his work on high stakes assessment:

> *As someone who has spent his entire career doing research, writing, and thinking about educational testing and assessment issues, I would like to conclude by summarising a compelling case showing that the major uses of tests for student and school accountability during the last 50 years have improved education and student learning in dramatic ways. Unfortunately, this is not my conclusion. Instead, I am led to conclude that in most cases the instruments and technology have not been up to the demands that have been placed upon them by high stakes accountability. Assessment systems that are useful monitors lose much of their dependability and credibility for that purpose when high stakes are attached to them. The unintended negative affects of the high stakes accountability uses often outweigh the intended positive effects. (2000, p. 14).*

One result of this negative evaluation of high-stakes assessment is that it has started a wider discussion about testing programmes. Among other things, it has increased calls for moving classroom assessment closer to students and their learning (e.g. Linn, 1998, Shepard, 2000).

To enhance the positive impact of assessment and to minimize its negative effects, Linn (1998) suggest that it is a necessity that have a variety of ways to assess student. The teachers cannot rely on a single high-stakes test when they judge the students. It is important to use multiple indicators when judging the students. The key to long term success is to create a culture that accentuates the intended positive effects and reduces the negative effects of the assessments that are used.

Assessment processes are, at heart, social processes, taking place in social settings, conducted by, on and for social actors. There are (largely implicit) expectations and agreements negotiated between students and teachers. A feature of such contracts is that they serve to delimit 'legitimate' educational activity by the teacher. Thus, all testing has to take account of these social phenomena in the design and administration of its instruments.

Constructivist assessment and Feedback

Assessment theory has at least two histories and two sets of assumptions. These histories and assumptions are often confused. The work of Sfard (Israel), Wells (Canada), Linn and Shepard (USA) and Wiliam, Torrance and Black (UK) has been relevant to this clarification. Lorrie Shepard suggests for instance that the learning paradigm that dominate in the USA in the 20th century included behaviorist learning theories, hereditarian theories of intelligence and individual difference. The key assumption behind this model was that learning is hierarchical, sequential and occurs `by accumulating atomized bits of knowledge' (2000, p. 6). Learning was regarded as the accumulation of stimulus response associations. In turn, these various respective psychological theories were served by assessment theories based on `scientific measurement of ability and achievement'. (2001, p. 1068). This paradigm took shape early in the 1900s.

By the end of 1900s, evidence, for instance, on the negative impact of labelling children led to a re-assessment of learning. By the millennium the intellectual climate meant that: `most scientists and educated citizens´ assigned a `much more limited role to heredity´. They recognized the multidimensional nature of ability´, and they were `aware of the large effect of past learning opportunities on both test performance and future learning´. Shepard (2001) characterized U.S. practice at that time as a mismatch of traditional testing, on the one hand and instruction influenced by an emergent paradigm, on the other. Theories from the past, that learning is like building a brick wall, layer by layer, served as a default framework for the assessment of learning. She highlighted the absence, therefore, of a valid connection between assessment and instruction. (p. 1067)

Two American researchers, Duffy and Cunningham (1996), describe the brick wall theory as the `objectivist' model. Knowledge is transferred from the teacher to the student, the reception of knowledge is passive, and such learning is unreflective. Learning, therefore, is about acquiring knowledge; instruction is about delivering knowledge; and assessment is about the measurement of knowledge gains. The alternative model which they characterized (1996, p. 175) as the 'constructivist' view makes a crucial distinction between the activities of learning and the activities of instruction or teaching:

> *1) learning is an active process of constructing rather than acquiring knowledge,*
> *and (2) instruction is a process of supporting the construction rather than*
> *communicating knowledge (Duffy and Cunningham 1996, p.171)*

In this context assessment is also devoted to supporting the construction of knowledge. What then, is the relationship between teaching and assessment?

The old paradigm fostered an atomistic view of both learning and the measurement of learning. The new paradigm, constructivism, stresses that all human knowledge is constructed (or reconstructed). Individuals organize information in their own way, transcending their own – and pre-existing - knowledge structures. Moreover, the new paradigm entails cognitive development through social experience. Individuals are introduced to new ways of thinking, with the help of social experiences that serve as 'scaffolding' (Shepard, 2001, p. 1075). One form of instructional scaffolding, provided by teachers, takes the form of assessment dialogues. Learners, that is, are helped into new ways of thinking by resources - words, ideas, values, symbol systems - mediated through dialogue. Shepard (2001) asserts that teaching, in the 21st century, should pay closer attention to this view of mediated learning. By using dialogic teaching, teachers not only offer learners new knowledge but also new understanding (p. 1076). Through such understanding, according to Shepard (2001), the learner can transfer knowledge from one context to another. These, understanding therefore, become 'robust', enabling the transfer of knowledge and understandings. (p. 1076).

Shepard stress that the teacher has to be a resource, a 'guide in the learning process, rather than as an evaluator'. Scaffolding emphasizes mastery-based feedback rather than normative evaluation. Assessment 'errors and mistakes' are seen as a 'normal part of learning'. Dialogue through scaffolding takes place in students' zones of proximal development, learning environments where, she suggest, learners can participate in 'active inquiry and discussion of challenging problems' (p. 1077).

Dialogue implies feedback and, as Diana Laurillard has commented;

> *action without feedback is completely unproductive for a learner. As we learn*
> *about the world through acting on it, there is continual feedback of some kind,*
> *and if we can make the right connection between action and feedback, then we*
> *can adjust the action accordingly and this constitutes an aspect of learning. And it*
> *is not just getting feedback that is important, but also being able to use it. (1993, p*
> *61).*

Feedback is crucial in formative assessment and, according to Ramaprasad (1983), bridges the gap between actual performance and a standard. Black & Wiliam also assert that there is an overlap between formative assessment and feedback. Because of its centrality in formative assessment, it is necessary to explore and clarify the concept of feedback (Black & Wiliam, 1998, p. 39).

Ramaprasad (1983) defines feedback in terms of two activities: (1) identification of a gap between the actual level and the reference level of a system parameter; and (2) utilization of information which is used to alter the gap in some way (p. 4). For feedback to exist, the information about the gap must be used to alter the gap. If the information is not actually used in altering the gap, then feedback has not taken place (Black & Wiliam, 1998, p. 39).

If the term feedback refers to any information that is provided to the performer, such performance can be evaluated either in its own terms, or by comparing it with a reference standard. Adopting the definition proposed by Sadler (1998), we would argue that the feedback in any assessment is only formative when comparison of actual and reference levels yields information which is then used to alter the gap. As Sadler remarks, 'If the information is simply recorded … or is too deeply coded (for example, as a summary grade given by the teacher) to lead to appropriate action, the control loop cannot be closed' (p. 121). Sadler's discussion of the control loop extended to defining the 'indispensable conditions for improvement' as being that 'the *student...*is able to monitor continuously the quality of what is being produced *during the act of production itself'* (Sadler, 1989, p. 121). Sadler's insights have been seminal in the discussion of assessment. Feedback, therefore, can be seen either as a behaviorist response or a constructivist response. In the latter case, as Sadler suggests, the constructivist dimension relates to feedback that fosters 'new' or 'robust' understandings.

Black and Wiliam (1998) recognised that constructivist feedback requires a cognitive theory which links learners understanding, their interactions with assessment tasks and the design of such tasks.

> *In other words, the quality of the feedback provided becomes a feature of any procedure for formative or constructivist assessment (Black & Wiliam, 1998, p. 28).*

Shepard stress that a constructivist learning paradigm requires new assessment practices:

> *classroom assessment must change in two fundamentally important ways. First, its form and content must be changed to better represent important thinking and problem solving skills in each of the disciplines. Second, the way that assessment is used in classrooms and how it is regarded by teachers and students must change. The content of assessments should match challenging subject matter standards and be connected to contexts of application (Shepard, 2000, p. 11).*

Such a constructivist assessment paradigm will contain, according to Shepard, student self-assessment and feedback from peers, as a `central part of the social processes that mediates the development of intellectual abilities, construction of knowledge, and formation of students' identities' (p. 2). A constructivist assessment paradigm will look `to assessment as a source of insight and help instead of it being the occasion for meting out rewards and punishments' (p. 15). Assessment has to be more useful and helpful in the learning process and therefore must be moved into the middle of the teaching and learning process, becoming `integral to Vygotsky's idea of a zone of proximal development' (p. 16).

Sweden is committed to the Learning Society and the extension of access to education and knowledge. Much attention has been given to ICT as a solution to this problem surrounding teaching and learning in Swedish universities. It was believed that ICT could play a crucial role in improving teaching and learning and could facilitate constructivist modes of education such as autonomous or self-directed learning, collaborative learning and reflective learning. ICT has been seen as a tool to help learners to construct their own knowledge. Methods of assessment are determined by our beliefs about learning. In education, new technologies create new contexts for assessment. They are not merely sharper tools for solving old problems. An important purpose of using new technologies for constructivist assessment is

the possibility of giving students feedback. The increasing numbers of students makes it difficult for teachers to give individual feedback to the students. How can educational practitioners integrate ICT in educational practice to innovate learning and teaching? Can ICT play an important role in creating learning environments that are conducive to students' learning? Can internet-based assessment be used to support learning for all students?

Aim and methods

The project discussed in the remainder of this paper has been implemented with support from the European commission (EU) and the Swedish Agency for Distance Education (DISTUM). It involved teachers and students from different departments at Umeå University. In common with other universities, Umeå University is constantly monitoring good practice in teaching and learning, and seeking innovative ways to improve the learning opportunities offered to students. In this climate it was decided to pilot internet-based assessment during a three years project.

The goals of the project were to:

1. develop material, methods and tools for internet-based assessment

2. train teachers in assessment theory and internet-based test construction and test administration.

3. support teachers in the development and implementation of internet-based assessment.

4. develop a web portal with a resource centre to support interested teachers, and

5. generate new knowledge in this area.

Activities

The project activities started 2002 when all teachers in the university were invited to participate. Training of the teachers who opted to participate comprised seminars about question construction validity/reliability, and different assessment methods and software training was covered in ten workshops.

One hundred and eighty eight teachers participated in these activities. The teachers planned to use internet-based assessment in 25 courses with 108 separate assessments. In the end, only 10 teachers reached the stage where they adopted internet-based assessment, and used it for 47 different course assessments.

A conspicuous feature of the project has been the contrast between the large initial interest among teachers and the considerable drop out when it comes to active participation in the project. This was particularly noticeable in the turn-out from our first workshop. Of the 30 participants in the workshop, only three wanted to be actively involved. Thus, it is obvious that curiosity existed but that there was something else which makes people reluctant to commit themselves.

To study this discrepancy more closely unstructured telephone interviews was carried out in February 2003 with 19 of the workshop participants who did not join the project. After the assessments a questionnaire was also filled in by the teachers and the students to gather their view of assessment in general and internet-based assessment in particular.

All of the ten teachers who had conducted assessments returned the questionnaire. They were six men and four women, representing: Arts and social science (4), Medicine (3), Science and technology (2) and Teacher education (1). All but one teacher were experienced with more than five years of teaching and the age of the teachers ranged from 30 to just over 60. There were seven lecturers, two senior lecturers and one professor. Thus the group covered the range of university teaching staff.

The total number of students who participated in assessments was 808. A voluntary questionnaire was distributed on-line after that they had finished their assessment. The total number of students who contributed to the survey was 160 (20%). The low response rate can partly be explained by technical problems in retrieving the forms and by the 'voluntary' status of such feedback.

The distribution of students ages was:
        21 – 24 61%;
        25 – 35 27% and
        12% older than 35.

The male - female representation was 60% - 40%.

Subjects represented was:
        Medicine 51%;
        Arts and social science 29%;
        Science and technology 13% and
        Teacher education 8%.

Results

Why the low participation of teachers? The telephone interview in February 2003 revelaed that three teachers had taken new posts and were no longer involved in teaching. Six teachers were not interested at all, and gave the following reasons:

- ? internet-based assessment did not meet their wish to continue using essay-type questions.
- ? they used a different net platform and would find it too time-consuming to learn another application.
- ? They felt that they would be unable to make the necessary investment of time.

Ten teachers said that they were still interested, but they felt that they could not commit themselves early in 2003. Some of them thought that it would take a long time to learn the program and that, therefore, they could not commit themselves. They would prefer a guaranteed long-term investment in the program.

From the questionnaire, we learnt that the group of teachers were quite homogenous in terms of their experience with computers and the internet. A positive attitude to the new technology was also demonstrated by their willingness to use the internet in assignments and assessment tasks – only one teacher said they rarely used the Net for such tasks, and two found it unimportant to use the net for assessment. Nine of the ten participants described their attitude towards internet-based assessment as positive.

In one part of the questionnaire the teachers were asked to estimate to what extent factors limited their possibility to use internet-based assessment. Such factors were lack of support, competence, computers and programmes, time, and lack of interest. Of these factors, lack of time appears to be the most important factor, mentioned by all participants, nine pointing it out as significant. Other factors mentioned by some were lack of support and lack of competence, but only to a small degree. Our questionnaire suggests that teachers prefer to have control. The willingness to use internet-based assessment was not affected by assistance to creating an assessment and/or computerising it. The figures (eight) were the same as for the willingness to use internet-based assessment when the teachers had to carry out all the work themselves. The positive attitude towards internet-based assessment was also demonstrated by the fact that nine of the ten participants said that they would continue to use internet-based assessment in the future, the one deviant answer was 'maybe.'

Generally speaking, the teachers felt that most groups (teachers, students, technical staff and departmental board) were positive to the use of internet-based assessment. It was thought that there was no anxiety about using internet-based assessment and the internet among the students.

In one section of the questionnaire the teachers were asked to compare internet-based assessment with the traditional paper-based assessment. Most of the answers were predictable (e.g. internet-based assessment facilitates statistical analysis), but a few are worth mentioning: Seven out of the ten believed that internet-based assessment offered a higher degree of objectivity in marking. It was also felt that internet-based assessment could offer more feedback than in the case of the traditional paper-based assessment.

When we look at how the teachers used internet-based assessment, the following picture emerges: The test was most often used for diagnostic assessment (5) and not formative (1) or summative (1). This seems to be in line with the general view of the teachers that IBE can be of considerable support for learning (6 agreed, 4 definitely agreed). Five teachers used a bank of questions from which questions were randomly picked out for tests. This made it possible for the students to take the tests several times without getting the same questions.

The program used within the project was Question Mark Perception® which enabled teachers to create questions of different types. The questionnaire shows that most of the teachers tried to make use of this variation, but multiple choice questions predominated (used by all teachers).

In most cases internet-based assessment was used with some other kind of assessment – paper-based assessment, but also practical exercises (in medicine and technology). This also meant that the weight given to the internet-based assessment in relation to the other was typically low, below 40%.

Most teachers joined the project because they saw this as an opportunity to support the students' learning.

Overall, the teachers view was that:
- ? internet-based assessment was positive and that they would do it again
- ? internet-based assessment was time-saving
- ? internet-based assessment afford an ample statistical analyses of the assessment questions

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

From the student survey one can clearly see that a large group (71%) prefer continuous assessments consisting of several smaller assessments compared to one large, more traditional, assessment at the end of the course. Arguments that continuous assessment affects the attitude to studies in a positive way and identifies early stragglers can also be found. When asked about what size, in credits, a continuous assessment should have, 49% answer 1 – 3 credits, 42% 5 credits (1 credit corresponds to one week's full time study). This result can be seen as somewhat contradictory as the average size of Swedish academic courses is 5 credit points. One interpretation can be that many of the students see such continuous assessment as separate from the formal course assessment.

When it comes to their own experience of internet based assessments, the student survey suggested that the assessments had been representative of the material on the courses and in line with the course objectives. The questions posed were easy to understand and 83% says that they had a suitable level of difficulty. For the most subjects represented, 64% regard multiple choice questions as an appropriate method to use. The general opinion with using internet-based assessment did not mention any greater problems with accessibility. The students did not express any deeper concern about the risk of cheating using internet-based assessment compared to a traditional course assessment. Many of the students (71%) saw advantages using internet-based assessment and signalled a positive attitude to internet-based assessment from other course participants. A majority, 83%, says that they would gladly participate in courses with internet-based assessment.

One interesting finding from the survey is that 44% says that the level of stress is lower, in 24% significantly lower using internet-based assessment compared to the traditional assessment situation. One interpretation of this result is that many students find the traditional assessment, fixed in place and time as stressful.

In the concept of formative assessments lies support for the students learning. Feedback is one such activity. From the survey, one can find that 63% of the students found the feedback given as very useful and 69% are satisfied with the feedback given. Most of the students, 90%, indicate that the feedback given was rapid and it was followed up by the teachers in a useful way (69%).

In the group of students, 57% says that the internet-based assessment activity made them learn and in 12% 'learn a lot' which supports the standpoint that internet-based assessment could be used in formative assessments. A majority, 82%, says that internet-based assessment is supportive when learning and 64% of the students says that their study strategy has been affected by internet-based assessment. A group of 76% regard internet-based assessment as a good form when is comes to course assessments.

Indications in the survey which speaks against formative assessment were that 64% says that they did not spend more time studying and 57% had not been more active, posing questions to their teachers. 53% of the students said that their experience of internet-based assessment is that it had only been used as a control tool. A very clear statement from the student group is that they did not have any influence on the form of the assessments.

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

Discussion

The advantage with internet-based assessment is that students can be offered assessments that are independent of time and place. Teachers can integrate multimedia, simulations and graphics. In this way, flexible learning at a distance can be advanced.

Internet-based assessment can mean that marking and updating of tests can take place quickly and simply, particularly with the use of questions databases. With the current increase in student numbers and the reduced allocation of resources to teachers, efficient marking, feedback and a better use of teaching resources becomes possible. Teachers can devote more time to student supervision. Such practices also facilitate the immediate integration of assessment outcomes into the records of the institution.

Assessment validity is a key issue in flexible life-long learning. Implementation of internet-based assessment offers increased assessment authenticity because a wider range of examination forms can be offered. In this way, internet-based assessment can also be linked to current initiatives in auditing and quality assurance.

Internet-based assessment is an area in need of development. Teachers' inquiries about this new area are increasing. The telephone interviews with the teachers seem to suggest that long-term commitment on behalf of the university or other organisation may be instrumental in encouraging teachers' to change their practice. Many teachers in Swedish universities work under stress and they are reluctant to involve themselves in projects unless they can assess, in advance, professional rewards and side-effects.

The conflict between professional curiosity and teacher commitment is pervasive. It is clear that many teachers are keen to try new methods, yet few teachers have sufficient spare time. They look very carefully at a prospect before they get actively involved. Thus, successful implementation of a project of this type may require that teachers are guaranteed long-term institutional commitment, including a reduction of their teaching hours in the initial stage.

Lack of knowledge makes it difficult to identify the relevant factors that distinguish internet-based from other types of assessment. Similarly, questions have been raised about how such assessment can affect the form and quality of student learning. To this end, the project has

created new knowledge through the attention it has given to the specialist feedback required in constructivist assessment.

The projects resources, however, have make it possible for interested teachers to try out new forms of assessment. One of the most important advantages with internet-based assessment is that it can support for student learning, and also be used for diagnosis and self-assessment.

It is well-known that examinations have a steering influence on learning. An important pedagogic strategy is, therefore, to develop internet-based forms of assessment that satisfy both the teacher's need for evaluation and grading (summative assessment) and also the student's and the teacher's need for learning support (formative assessment).

Continuous implementation of formative internet-based assessment also implies raising the quality of distance education through high quality feed-back to the student and a closer integration of teaching and assessment. By using diagnostic assessment instruments, students can acquire information about their own strengths and weaknesses.

The teacher can also scrutinise the quality of test questions and test performance, thus tracking the performance of individual students. Question banks have been used to provide students with customised assessment as support for learning.

Research on internet-based assessment has encouraged development and implementation of new assessment forms. The interplay of educational research and the development of internet-based assessment is thus of great importance.

One of the most important advantages with internet-based 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. We have all different ways to learn and it take different time for us to learn. Therefore it is important that the students can take the time they need to use the assessments. Therefore it is important that the new technology is made amenable and practical for interested teachers.

The overall goal for the project was teacher development and enhancing students learning. An important goal for teachers is to enhance students´ higher level thinking. Therefore it is important that teachers have time to construct statements that demand students higher level thinking. An important thing for teacher is to have time to problematise assessment concept and discuss them with colleagues.

The introduction of internet-based assessment has affected students learning, but analysis of qualitative changes in students learning must remain the focus of another study.

Conclusions

The learning society requires a move away from teacher-centred education towards student-centred learning. This implies greater attention to constructivism. According to constructivist philosophy, knowledge is constructed by learners based on their mental and social activity. The student is no longer seen as a passive recipient of knowledge presented by an expert teacher. Students become active participants in their own learning process. In this process, students must be supported by teachers who have become advisers and facilitators, creating a learning environment which suits the needs of the students. Higher education needs to produce autonomous, self-directed and lifelong learners.

Internet-based assessment can, properly used, be an excellent tool for learning. The possibility to use individual feedback, enhances the individual learning process. Working with internet-based assessment, at a pace suitable to each individual student, lowers stress and promotes learning.

The teachers who join a project of this type do so because they are looking for a tool to support their teaching. In the results from the questionnaire this becomes evident in that the teachers primarily use internet-based assessment with some other kind of assessment. Thus the main purpose of using internet-based assessment is to help the students. This is also shown by the fact that it has been used for formative rather than summative purposes.

The new information and communication technology offer possibilities for new learning and assessment mode. One of the most important advantages with internet-based assessment is its function as an aid for the students learning. The students can be offered assessments independent of time and place and the teacher can integrate multimedia, simulation and graphics into the assessment. With an increasing number of students and decreasing resources individual feedback can be a better economical resource. 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 the effects and use of internet-based assessment assists the development and implementation of new forms of assessment. An interaction between pedagogical research and practical development of internet-based 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 work has investigated and capitalised on the opportunities offered by the new conjuncture in higher education. It has focused on teaching and assessment in higher education, and, in particular, on the new possibilities offered by the internet. The paramount task for the Umeå project has been to develop internet-based assessment that satisfies learners' need for support in their learning. In addition, the project acknowledges that, in Europe, both distance- and higher education have many possible futures; and that the creation of such futures is the task of, among other, teachers and students in higher education.

Internet-based assessment is big business. It is successfully used alongside the delivery of courses and, in a generalised form, to assess student competence. To this extent, it serves as a summative, convergent and high-stakes instrument. Yet, in that form, it is alien to the pedagogic practices of teachers. It is neither consciously integrated into course plans nor into the exchanges that teachers share with their students.

The project discussed in this paper builds on the view that assessment is central to dialogic pedagogic practice. It asks the question: how can assessment be built into teaching and, especially, the kind of teaching that takes place among adults in colleges, universities and other institutions of face to face or on-line learning?

Overall, the project has been developmental. Its task has been to bridge the gap that exists between the everyday practices of teachers and the ideals that are associated with on-line learning, on the one hand, and so-called 'alternative' or 'authentic' assessment, on the other hand. Moreover, the project has operated in the context of an assumption, held across national boundaries, that efficiency gains can be made by increasing student: staff ratios so that the unit costs of education are reduced.

The study described above record the experiences of the Swedish partner. In this final section, we try to distil the lessons learned from the study. We present them because we believe that they may be useful in other contexts.

1. internet-based assessment can change the conscious practices of teachers

2. internet-based assessment can changes the conscious practices of learners.

3. internet-based assessment can change the practices of teachers and learners in a direction that corresponds to the expressed goals of Swedish higher education in the 21st century.

4. Insofar as the introduction of internet-based assessment focuses attention on the fusion of learning and assessment, it may challenge the hegemonic status of summative, high-stakes and convergent assessment.

5. Extending educational assessment to include formative, divergent and low-stakes practices places cognitive, emotional and organisational demands on teachers and students. In other words, technical solutions cannot stand alone.

6. Successful penetration of internet-based assessment into the practices of teaching and learning requires that innovation is incremental - an activity built around cultural, hands-on change rather than top-down, technological innovation-by-substitution.

7. The penetration of internet-based assessment into the practices of teaching and learning requires an institutional horizon based on long-term pedagogic change - a horizon that extends, for instance, beyond the funding of piecemeal, project-based trials.

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