

# **e-Learning Support for Formative Assessment of Coursework**

Eva Heinrich, John Milne, Annabel Ramsay  
{e.heinrich, j.d.milne, a.ramsay}@massey.ac.nz

## **Abstract**

Assessment for learning is conducted with tasks that give students freedom of response and with outcomes that form part of the coursework. Such assessment is linked to higher-order skills such as analysis, synthesis and evaluation and its value is clearly established in the literature. The term 'essay-type assessment' can be used to summarise these characteristics. The research reported on here investigates how e-learning can increase the uptake and quality of essay-type assessment. Findings from a literature review, a survey and interviews are presented. The literature review comprised all leading journals in e-learning back to the year 2001 and looked for articles on theory and tools. The survey was conducted at the authors' university and focused on the use of essay-type assessment in practice, covering both general characteristics and the use of e-learning tools. The interviews were carried out at four tertiary institutions in New Zealand and aimed at gaining an in-depths understanding of issues around current practice, knowledge of assessment theories and tools. Preliminary analysis shows that the e-learning community has largely neglected the educationally important area of essay-type assessment. E-learning effort, and following on from there acceptance, has been largely put into assessment with selection-type items characterised by the multiple choice approach. Some promising e-learning tools for essay-type assessment are now available but the use of these tools is not widespread and consequently, their educational effectiveness has not yet been confirmed. The findings of the research show the importance of institutional support structures to facilitate the uptake of e-learning tools. This applies in general to e-learning but particularly to assessment, as this is an area in which students do not tolerate computer malfunctions.

## **1 Introduction**

Assessment is an important component of education that has to be seen in a wider context of educational goals, course design and student motivation. Education in general and specifically higher education should prepare students for life-long and autonomous learning. Assessment plays a central role in higher education and should facilitate these goals. Assessment must be designed in context of the teaching and learning strategy of a course (Kendle & Northcote, 2000; Macdonald, 2003; Muirhead, 2002). There must be a commitment to a pedagogical rationale for the assessment design (O'Reilly, 2005). Assessment should be student-centred to enable meaningful and relevant learning experiences (Muirhead, 2002). Meaningful and constructive assessments need to challenge students to think critically and should encourage students' interest in learning (Leathwood, 2005). As it is widely acknowledged that assessment drives student learning and directs student effort, assessment design must be planned accordingly and must be an integral part of course design (Kendle & Northcote, 2000). Assessment tasks influence the direction and quality of student learning (MacLellan, 2004). To move forward students need to be given more responsibility for assessment processes (Nicol & Macfarlane-Dick, 2006)

**Acknowledgement:** The research reported on here has been partially funded by an E-Learning Collaborative Development Fund grant by the Tertiary Education Commission, New Zealand.

and must be encouraged to participate (Taras, 2002). Unfortunately, assessment in higher education does not yet give enough consideration to educational goals, assessment design and impact on students (Nicol & Macfarlane-Dick, 2006; Taras, 2002).

In this context the research reported here focuses on assessment for learning that is conducted with tasks that give students freedom of response and with outcomes that form part of the coursework. The term 'essay-type assessment' is used to summarise these characteristics. This includes assessment where students have to write essays but can also include reports, programming projects, diagrams, calculations, design projects or drawings. To investigate the role e-learning plays currently in regard to uptake and quality of essay-type assessment three approaches have been followed. A comprehensive review of e-learning literature was conducted, academics at the authors' university have been surveyed and colleagues at four New Zealand institutions have been interviewed. This paper provides a brief overview of each of the approaches before attempting to define the status of essay-type assessment supported by e-learning.

## **2 Report on Literature Review**

The literature review reported on here had two main aims. The first aim was to establish the characteristics and importance of formative, coursework assessment. The second aim was to identify e-learning techniques, tools and approaches for this type of assessment, to discuss what is known about their effectiveness and to uncover factors influencing uptake.

For the first aim key articles and books that have shaped current theory on formative assessment of student work were identified and analysed. For the second aim a comprehensive search of e-learning literature from 2001 to the present was conducted, including over 580 journals editions and conference proceedings. This paper summarises two subsections of the literature review: the types of e-tools available to support essay-type assessment and the issues concerning stakeholders involved in assessment.

### *Types of e-tools available to support essay-type assessment*

By its nature essay-type assessment needs the attention of a human marker to understand the student's work, set it in context of marking criteria, provide formative feedback and decide on summative marks. In this context Stephens et al. (2001) suggest features lecturers would need in an ideal computer marking and management tool. The items suggested are:

- A way of providing feedback that is easy to use e.g. an electronic pen;
- Support of all types of submission including electronic student submission of various file types;
- Centralised pre-testing for plagiarism;
- A comments bank that is easy to edit and develops during marking;
- The support of marking schemes that vary from simple to sophisticated;
- Automatic grade and report computation;
- Electronic feedback via student email;
- Electronic storage of marked work and lecturer's comments, marks and annotations;
- Easy links to university central systems.

Today's widely used learning management systems (LMS) provide basic support around the management of assignments. These systems allow the lecturer to setup an assignment definition, the students to submit their assignments, the lecturer to access the student submissions and to return marked assignments, and the students to retrieve their marked assignments. Setting up an assignment definition includes the specification of parameters for due dates, extension periods or multiple submissions. The LMS relieves the individual lecturer of the responsibilities for secure access and safe storage. The student prepares the assignment outside the LMS, using general purpose tools, submits the assignment and receives results via a web-browser interface.

While the support given is helpful to lecturers some of the functionality provided by LMS is not easy to use or is limited. For instance, the return of marked assignments to students requires very repetitive work, as the assignments have to be returned individually to each student. More advanced tasks, like the allocation of markers to individual assignments or the exchange of marking information among markers, are not handled by these tools. There is no way to specify which students have submitted an assignment together and to return the appropriate feedback to all members of a group. One cannot indicate the marking status of an assignment. Labelling an assignment during marking as 'in progress', 'marked' or 'revisit' would be a good way to facilitate the marking process, especially when multiple markers are involved. Most critically, little support is provided for the actual marking task. LMS assignment tools provide markers with the facility to enter comments for an assignment in its entirety. There is no way to link a comment to a specific part of an assignment. Scoring rubrics, that form an essential part of educationally sound marking, are not supported.

Marking of electronic copies of assignments directly and annotating these with feedback is possible with general purpose tools like word processors or PDF writer software. Word processors can be used to write documents for the essay task description, the scoring rubric and general feedback. They can also be useful for commenting on essays. Generic approaches provide a base level of functionality and their clever use can support marking to a certain degree. Frequently-used comments can be collected in a separate document and suitable comments can be pasted into an essay. For each student a separate summary sheet can be written, containing a copy of the scoring rubric, an overall comment for the essay and the marks awarded.

The disadvantage of generic tools is that they do not provide any of the specifics demanded in the assessment theories. As a consequence, the individual marker needs to spend considerable effort in customising the generic tools and then in living with the work-arounds while marking each essay. There are two main problems with this approach. Firstly, the markers need to be very familiar with the assessment theories as they do not receive any guidance from their tools. Secondly, marking, especially formative marking, is an inherently time-consuming activity. Without efficient tool support it is likely that markers will restrict their efforts in commenting and interacting with co-markers to a minimum. What suffers is the quality of marking and opportunities for learning and teaching are missed. While working with generic tools can provide valuable support to teachers and markers, the use of specialised marking applications should have preference.

Dedicated marking applications provide lecturers with more specialised support than LMS or generic software and are geared towards the marking process. Such tools

incorporate some form of scoring rubric. This makes the scoring rubric available in the immediate marking context. Frequently-used comments are attached directly to the rubrics and feedback can be related to the categories within the rubric. This makes the task of the marker more efficient and provides the student with more information. Most of the tools automatically create a summary sheet for each student. This means less time consuming manual steps for the marker and more informative content for the student. A further element of advanced support is the ability to extract all marking comments across the essays of a whole class, allowing the instructor to quickly assess the suitability of the wording of the comments and to get an insight into the knowledge level of the class. This is especially important if the instructor has not marked the essays by themselves but has called on the help of markers. Once the task of assessing the individual assignments is performed the strengths of computer programs in performing repetitive steps should kick in. A computer tool should be available to automatically extract all comments and marks from the essays for a whole class and return these, together with generic information like the scoring sheet, to each individual student. A few new e-learning tools provide such services. An example of these include MarkTool and WebCTConnect (Heinrich, 2006), Markers assistant (Wells, 2006) and Assessi (Laird and Baxter, 2005).

#### *Stakeholders involved in assessment*

The main stakeholders involved in education are the students and teaching staff, supported by others in their institutions. Each of these stakeholder groups has its own complex set of expectations, needs and constraints. The following sections highlight important issues concerning the stakeholders in relationship to assessment in general and the use of e-learning for assessment in particular.

According to the literature review undertaken students raise two major concerns regarding assessment. The first of these concerns raised is that students question the fairness of assessment. A negative perception of fairness in turn has a negative impact on performance. It has been stated that the use of e-learning tools might help to make assessment more transparent to students. The second major student concern relates to feedback with students being unsatisfied with the level of feedback they receive. Feedback often is too vague and low-level. Further, students do not know how to take advantage of feedback and ask for opportunities of dialog with tutors to discuss how to learn from feedback. This is an area where the strengths of e-learning tools in facilitating communication could be used to advantage fairly easily.

A very practical issue relates to the readability of handwritten comments. Typed comments are easier to read and, if looked at on screen, have the additional advantages of various display sizes and of searching and sorting. What is required to make it practical for the marker to type comments are suitable marking systems. Such systems need to facilitate commenting on multiple levels, 'inline', on specific issues and as summary.

A number of different groups of staff are involved in the assessment process. There are the academics or teachers who are responsible for the design of the assessment, including choice of the assessment format, links to learning outcomes and overall responsibility. Tutors play a role in preparing students for assessment, conducting assessment steps and responding to post-assessment questions from students. Markers, often employed on a casual basis, work with marking guidelines to assess student work summatively and provide feedback. Administrative staff deal with the handling of student work, in receiving and returning copies, and keeping track of

submission details and marks. Technical staff can be involved in the setup and monitoring of assessment systems. In many cases one individual will fulfil several or even all of the roles described.

The use of e-systems for assessment can have various positive effects, like increased awareness of staff regarding assessment approaches and time savings and efficiency gains. The selection of e-learning tools for assessment must be guided by the pedagogical design of the assessment. Staff must take control and match tool use to their assessment approach and learning goals identified for their students. The primary focus needs to be on pedagogical improvements. While productivity gains will be important large gains can only be hoped for in the medium to long term when technology and the processes mature.

Essential to the successful adoption of e-systems for assessment and e-learning tools in general is a strong support network for staff. This includes cooperation among all staff involved in the assessment process, including technical support personnel, as well as general support from colleagues and departments. It is essential that suitable e-systems are efficient and easy to use. Overall, the use of e-systems to support essay-type and other formative assessment approaches is not yet wide-spread. Approaches are being developed and trialled but these approaches are still largely limited to early adopters who are actively seeking to improve teaching and learning via e-tools for assessment.

Institutional support is crucial for the successful adoption of e-learning tools for assessment. The introduction of a new assessment programme requires planning and foresight. Uptake should be motivated not mandated and promoted both horizontally among colleagues as well as top-down by learning technologists. An institutional strategy is important to guide departments in the selection of appropriate approaches and tools. Without such strategy individual departments will choose varying systems, causing a range of negative consequences. Students will have to cope with different interfaces, there will be increased licence costs, and higher demands on administrative and technical support. Institutions need to create a support network of experienced colleagues and learning technologists. Institutions need to put supportive procedures in place, show long-term commitment, provide secure funding and a strong infrastructure.

Selecting the most appropriate e-learning environments is a difficult undertaking. One issue is the specific knowledge that is required, on technical, instructional and institutional levels. Generally teaching staff will not possess this knowledge. Other issues relate to the complex network of stakeholders and systems in place in higher education institutions. Teaching staff cannot work in isolation and their system choices will affect others, students, colleagues and administrators. Every e-learning or assessment system needs to function in context of other computer systems. For these reasons institutions must take a leading role in the selection and implementation of e-learning environments.

### **3 Report on Survey**

A survey on 'E-learning tools in support of marking and management of essay-type assignments' was conducted at Massey University in June 2006 (Heinrich, 2006). The purpose of the survey was to examine the use of e-learning tools in support of marking and management of essay-type assignments at Massey University, with specific focus on the WebCT assignment tool and two applications developed at

Massey, MarkTool and WebCTConnect (available at <http://www-ist.massey.ac.nz/marktool/>). The survey was conducted via email. The invitation to participate was sent directly to subscribers of two electronic mailing lists related to WebCT, the university's learning management system, and to teaching issues. This distribution reached about 1000 potential participants.

The survey attracted a response rate of about 10% and a coverage of roughly 5% of all staff involved in assignment marking for Massey University. Like the literature review reported on earlier the survey dealt with essay-type assignments. A wide coverage of subject areas was achieved, including: biology, business studies, chemistry, computing, education, engineering, finance, geology, history, languages, management, mathematics, microbiology, psychology, statistics, veterinary science. This indicates that the participants were distributed across the colleges of the university.

The survey questions were designed to develop an idea of both general assignment marking practise and tool use. It was asked if the academic uses a marking scheme, marks themselves and/or with the help of markers and which type of feedback is provided to the students. Another set of questions focused on parameters for submission of assignments, return of marking results, and media formats, like text, images, audio, contained in assignments and feedback. The questions on tool use were specific in asking about the use of tools for the various aspects of assignment management and marking. The questions took into consideration if a respondent had stated actual tool use or not, in which case the questions focused on perceived usefulness of the tools.

WebCT has been the university's official learning management system for many years. The university's Training and Development Unit runs courses for staff that include the WebCT assignment tool. The lack of familiarity with the WebCT assignment tool (less than half of the respondents know the tool) and use of the tool (only about 10% of respondents said they use the tool) was surprising. According to the survey results about 20% of assignments are group assignments. The largest number of submissions per assignment reported was 1500; the average number was around 80. Most assignments contain a mixture of text and other elements. For more than half of the assignments students had to submit in more than one format. Submission as hardcopy is the dominant form with 90%, followed by email with 30% and WebCT with 15%. Half of all assignments are marked by marking teams. For all assignments some form of feedback is given, by writing directly on the assignment and/or via a marking sheet. While in most cases the person responsible for an assignment marks at least some assignments themselves, this seems not to be the case for 10 – 20% of assignments. This could indicate an issue with the quality control of markers and should be investigated more closely.

The respondents showed the strongest interest in the features of the e-learning tools that directly relate to marking in a formative way. These features concern the direct commenting on assignment pages, the use of summary sheets, the use of marking schemes and the collection of frequently-used-comments. This result indicates that the participants are aware of the issues important for high-quality formative marking.

The survey results regarding the use of WebCT to assist the assignments marking and management process were disappointing. Only 40% of respondents know the WebCT assignment tool and only 10% use the tool. With hardcopy submissions dominating there is little opportunity for taking advantage of the strengths of electronic

environments for recording submissions, managing marks and returning results. Where non-specialist tools, for example email for submission, is used time consuming and error prone manual processes are required. The management of the assignment process is an area where the use of tools would bring immediate advantages. Even just the use of the WebCT assignment tool, which has been available at Massey for years, would increase efficiency immensely.

The survey has shown very little evidence of the use of e-learning tools for the actual core task of marking, which is providing feedback according to clearly defined marking guidelines. While the marking itself cannot be carried out by computers electronic tools can provide strong assistance in guiding the marker, in increasing efficiency and in coordinating marking teams. Ultimately, this support can amount to an increase in the quality of marking, in turn leading to better learning opportunities for students. Tools like MarkTool and WebCTConnect already offer most of the functionality required to support marking. Yet, without the base step of electronic assignment submission, for example via WebCT, such tools cannot be used.

What needs to be achieved should be the full cycle – electronic assignment submission, marking of electronic assignment copies, return of marking results (feedback and marks) in electronic form. While there always will be exceptions where this process is not possible or desirable, for the majority of cases it would increase efficiency and potentially quality. According to this survey the current ratio of paper vs. electronic is 9:1 – an aim could be to turn this ratio the other way round.

The responses to the questions and the individual comments provided demonstrated that the staff involved in the marking of assignments at Massey clearly recognise the potential for the use of e-learning tools in this area. Staff showed willingness to use the tools. What the university needs to address are clear policies and guidelines, especially in the area of distance learning. The information on availability of applications needs to be improved. Adequate training, possibly on individual basis, must be provided to staff.

#### **4 Report on Interviews**

Around 90 interviews with academics at four New Zealand tertiary institutions were conducted. The aim of conducting the interviews was to develop a picture of best practise on the use of e-learning techniques and tools for essay-type assessment. The sampling of the interviewees was purposive, looking for individuals known within their institutions for their engagement in this area. The interviews were structured around seven main questions, asking for characteristics of assessment conducted, the use of e-tools, views on advantages and disadvantages of tool use, and factors determining tool use. Additionally, demographic information on subject area, years of teaching experience and course context was collected.

The interviews were transcribed and analysed with the help of qualitative analysis software. The analysis focused on four main themes: benefits, needs, motivation and educational aspects of feedback. Essay-type assessment is predominantly formative and as such depends on the quality of feedback given to students. It was therefore seen as essential to analyse interview responses in regard to tool use linked to the provision of high quality feedback. Benefits for both students and academics as seen by the interviewees were investigated and related to the motivation of academics for applying tools. Benefits and motivation must be balanced with needs, like the requirements for support. The drive for this analysis direction was to be able to

showcase advantages stemming from the use of e-tools for essay-type assessment and to identify the support structure required by academics. For each of the four main themes more detailed analysis directions evolved while working with the interview data.

This paper focuses on the preliminary analysis of the needs of academics when discussing feedback and use of e-learning tools. These needs were divided into four different themes. The first theme related to general needs that arose from being a lecturer or a marker, such as class size, availability of tutors and institutional support. The second need related to specific teacher needs, which included more unique and idiosyncratic needs of an individual teacher, such as the need to use paper and mark in different locations. The third need involved specific technological needs or wishes for improvements related to individual tools. These needs impact on student needs, as staff needs in turn impact on the learning needs of students. Therefore, fourthly, student needs were also identified by the lecturers.

#### *General needs related to being a lecturer*

One of the practical challenges around essay-type assessment is the time consuming nature of the marking that has to be performed by a human expert. Consistent with this finding, one of the most common needs that emerged from the interviews was for more time. A number of lecturers suggested that they needed more time to give good quality feedback to students. Linked to time was class size. Lecturers with larger class sizes commented that they could provide better feedback if they had smaller classes, and some of those with small classes suggested they could not provide the feedback they did if they had a larger class size. Therefore, it seemed that balancing time taken to give feedback against the size of the class was an important consideration.

Both class size and funding dictated the availability of tutors to assist lecturers with assessment and marking. Most lecturers with large class sizes generally had access to tutors or markers to assist with marking, provided there was funding available. In this case, there was a need for lecturers to spend time organising tutors and ensuring that there was clear and consistent marking and communication among tutors. For those who did not have access to tutors, sometimes the amount of feedback given to students was not as extensive as lecturers would have liked due to a lack of time.

Time taken to set up new e-learning tools and the time for lecturers to learn how they worked was another need that lecturers mentioned, and something some felt lecturers did not have. Some mentioned the perceived time that this takes could be seen as a disincentive for lecturers thinking about using an e-learning tool and emphasised that lecturers needed more institutional support to develop and learn about new tools.

#### *Specific needs of the lecturer*

There were a number of more specific needs of lecturers that emerged from the interviews. The need to read on a screen versus reading on paper was one factor that a number of lecturers commented on. Although most lecturers marked on screen, a number commented that it was not as easy as reading on paper. Some lecturers found it more difficult to read on screen than to read on paper, and had to consciously make an effort to increase the font size and remain free from distractions in order to do so. Some also noted a need for two screens to enable them to flick between a student's assignment and their own feedback comments. However, having to work on one or more screens prevented some lecturers from working at home or in different locations where these facilities were not available.

### *Technology needs and wishes*

There are a number of devices that have been identified as having possible uses in the provision of feedback to students. Audio comments and audio visual feedback was a need identified by a number of lecturers. Lecturers commented that being able to give audio or visual feedback to students could save time in providing feedback, and make feedback clearer to students. Tablets are another possible piece of technology that could be used for feedback. With a hand-held pen and a tablet laptop markers can give feedback given in a similar way to handwritten comments. Tablets were also identified by a number of lecturers as a possible need in giving students feedback.

Other needs that were mentioned depended on the particular tool that the lecturer used. Some highlighted limitations of the tools that were used. For example, some lecturers complained that learning management systems were too clunky to use, or that they were not integrated with the centralised university system, and they wished for improvements in this area. Others wanted to use different programs or systems that were not yet supported by their institution.

### *Needs of the student*

Lecturers mentioned a number of specific needs of students based on specific e-systems. Communication was identified in the interviews as a need of students. When giving feedback to students, lecturers mentioned that communication was essential, as lecturer-student relationships were formed through this feedback. The use of discussion boards facilitated this communication that may not otherwise take place.

There were also a number of specific needs that lecturers noted. For example, one lecturer noted that currently once a course is finished, students should be able to access their archive of work and feedback that had been given on a learning management system, but at present once the course finishes the student no longer has access. This was identified as a possible need to facilitate ongoing student learning.

## **5 Summary and Conclusions**

The previous sections have provided a brief insight into three comprehensive studies into the relationships between e-learning and formative assessment with coursework. The literature review has given the theoretical underpinning. The importance of assessment for learning and the need for its careful planning and administration have been confirmed. The quantitative survey has provided insight into the situation at one New Zealand tertiary institution. This has shown low use of e-tools for essay-type assessment and a huge scope for both efficiency and quality gains. The qualitative interviews have shown both strong links to the theory uncovered in the literature review and to the situation indicated by the survey. What needs to be done now in further research is to consolidate the findings of the three investigations in more detail and to suggest a comprehensive plan for moving forward in the use of e-learning for formative assessment.

### **Literature**

Heinrich, E., & Lu, J. Y. (2005). Opportunities in learning from market student work. *ED-Media 2005 World Conference on Educational Multimedia, Hypermedia & Telecommunications*, 4470-4475.

Heinrich, E. (2006) Interpretation of Results of the Survey 'E-learning tools in support of marking and management of essay-type assignments'. Retrieved 9

February 2007 from <http://www-ist.massey.ac.nz/marktool/survey/SurveyInterpretation.pdf>

Kendle, A., & Northcote, M. (2000). *The Struggle for Balance in the Use of Quantitative and Qualitative Online Assessment Tasks*. Paper presented at the The 17th conference of the Australasian Society for Computers in Learning in Tertiary Education (ASCILITE). Coffs Harbour, NSW.

Laird.N.J. & Baxter G (2005) *Wicked Problems and Shared Meanings: Evaluating Design Competence*, International Conference on Design Education: Tradition and Modernity, National Institute of Design Ahmedabad, India March 2-4.

Leathwood, C. (2005). Assessment policy and practice in higher education: purpose, standards and equity. *Assessment & Evaluation in Higher Education*, 30(3), 307-324.

Macdonald, J. (2003). Assessing online collaborative learning: process and product. *Computers & Education*, 40(4), 377-391.

Maclellan, E. (2004). How convincing is alternative assessment for use in higher education? *Assessment & Evaluation in Higher Education*, 29(3), 311-321.

Muirhead, B. (2002). *Effective Online Assessment Strategies for Today's Colleges & Universities*.

Nicol, D. J., & Macfarlane-Dick, D. (2006). Formative assessment and self-regulated learning: a model and seven principles of good feedback practice. *Studies in Higher Education*, 31(2), 199-218.

O'Reilly, M. (2005). *Hallmarks of Excellence in Online Assessment*. Paper presented at the The First International Conference on Enhancing Teaching and Learning Through Assessment, Hong Kong Polytechnic University.

Taras, M. (2002). Using Assessment for Learning and Learning from Assessment. *Assessment & Evaluation in Higher Education*, 27(6), 501-510.

Wells, J. (2005) Markers Assistant, a software solution for the Management of the Assessment Process. Scheduled for publication in the International Journal on E-Learning (IJEL) 5:3.