

Achieving enriched learning experience through blending computer-mediated and conventional assessment methods

Paula Hodgson

Hong Kong Polytechnic University, Hong Kong

Written examinations typically allow students to demonstrate their understanding of theoretical concepts. However, students need to demonstrate a range of practical skills and familiarity with discipline-based knowledge. This paper first discusses the benefits and limitations of different types of online assessment activity, including (1) computer-generated tasks, (2) asynchronous discussions, and (3) e-portfolios. Suggestions are included on ways to align these methods with learning goals related to mastery of subject knowledge and skills development in different disciplines. The second part of the paper presents three cases and discusses how conventional and computer-based assessment activities can be implemented to achieve an enriched learning experience.

Introduction

Future graduates are expected to demonstrate a range of practical and analytical skills as well as familiarity with discipline-based knowledge. In addition to subject-specific knowledge and skills, the graduate profile of many universities includes generic skills such as the ability to reflect on acquired knowledge, to think critically and to communicate ideas. Discipline-specific aspects of these graduate profiles may also reflect the requirements of professional bodies or accreditation agencies. Assessment of student learning must align with and reflect these different elements. This paper will discuss current challenges faced by educators, and how they can integrate the use of online methods with traditional forms of assessment to achieve practical, sustainable and educationally sound solutions.

The ways in which student learning is assessed fall into two main categories: formative assessment, in which regular feedback is provided to students so that they can learn from the experience; and summative assessment, which acts as a measure of learner performance (Miller et al. 1998). Assessment of student learning can be conducted in a number of ways, either singly or in combination, and can include activities such as research and analysis, a dissertation or thesis, a project, a portfolio of work, clinical fieldwork, laboratory work, independent and self-directed study, an oral presentation, and original writing (Glasner 1999; Knight 2002).

Written examinations, which are still the most common form of assessment, typically allow students to demonstrate their understanding of theoretical concepts. However, with the increasing use of information and communications technology (ICT) in education, levels of achievement of a broader range of knowledge and skills can be assessed, both formatively to support further learning, and summatively to measure learner performance. Many academic subjects now use both traditional and innovative assessment methods (Glasner 1999).

To outline the growing range of opportunities for technology-facilitated assessment, I describe a range of computer-mediated assessment tasks and discuss the advantages of these methods of assessment. In the second part of the paper, I present three cases that illustrate how these tasks dovetail with conventional assessment activities.

Options for computer-mediated assessment of learning

New technologies support a range of alternative methods of assessment. From among these options, I have focused on three types of ICT-supported assessment activity: (1) computer-generated assessment tasks, (2) asynchronous

discussions, and (3) e-portfolios. I describe each and discuss their advantages and limitations as a form of assessment.

Computer-generated assessment tasks

Computer-generated assessment tasks can include multiple-choice questions (MCQs), true-or-false questions, drag and drop, and fill-in-the-blanks type of activity. Many academics choose to assess students on their understanding of course content objectively through closed-ended MCQ tests or examinations. In this way, students can be assessed on recall of factual information or on the ability to apply theories or principles to solve problems. Scouller and Prosser (1994) noted that the use of this type of assessment activity, particularly in the sciences, is on the rise as class sizes get bigger in tertiary institutions. The advantage of this type of assessment is that students are encouraged to review their conceptual understanding and be more aware of their performance level because they can receive immediate feedback after completing the activity.

Electronic quizzes allow teachers to administer this type of assessment efficiently. Teachers can examine how individual students perform and can easily identify any misconceptions widely held by the cohort from an analysis of the results.

Although this type of assessment activity can assess students efficiently and objectively on their knowledge of subject matter, common forms of MCQ testing cannot assess student capabilities in analysing, evaluating and synthesizing knowledge, or the broad range of professional skills that may be required. These skills are better assessed through other methods such as computerized adaptive tests. Some teachers also use commercial computerized simulation for assessment, integrating these programs to address the theories that are being taught. Some parameters in programmes can be modified, allowing teachers to make responsive changes to reflect current real-world events or issues. Scores can be generated automatically from complex responses in this type of programme so that results reflect professional actions or judgement; some programmes will reflect problem-solving ability, while other tests can evaluate response time and sequence of actions (Luecht and Clauser 2002).

Asynchronous discussions

Providing a virtual space for students to discuss the subject matter and construct social networks with their peers also allows online forums to be used as a tool for assessment. Students can extend their intellectual dialogue with peers and teachers after, or instead of, attending face-to-face sessions. Structured tasks can be set up where students are required to check and respond to questions or problem statements in these forums. The asynchronous nature of the discussion allows time for them to search for additional information or to reflect before making a submission. Students can be asked to debate or make comments on topics, present sound evidence, and support contributions with reliable references from their discipline areas.

This type of online activity presents a high degree of intellectual challenge when students are required to analyse and comment on information and its sources. More importantly, the online environment provides a channel through which learning conversations can develop; students can receive individualized feedback and learn from the different perspectives presented by others during asynchronous discussion activities (Laurillard 2000). To extend opportunities for collaborative learning, teachers can structure tasks so that students are required to respond to contributions from peers after they have contributed their own original ideas. This can also be integrated into a simulated environment, for example, where students are assigned different roles in a company or organization. They can then be assessed on both their cognitive ability and their contribution to co-construction of knowledge. To increase their level of responsibility and develop critical thinking, students can be formed into discussion groups with a task to complete. By providing each group with clear guidelines and models of good marking, they can then be required to provide feedback to peer groups (Robinson 1999). Students may be assessed on how they contribute to group processes and also individually if they are required to submit individual contributions.

E-portfolios

Compiling evidence of initial ideas and developing lines of thought, together with the details of the final product, is already commonplace in some subjects, notably art and design and architecture. However, a portfolio can also be used in other disciplines to present exemplary work that best illustrates a student's capability (Brown 1999; Gibbs

1995). Barrett (2005) claims that students have better intrinsic motivation because they establish a sense of ownership through the process of constructing their portfolios.

When presenting evidence of learning outcomes in an electronic format, samples of work may range from typical written format to visual and audio components, allowing students with diverse talents alternative creative ways to demonstrate their competence. While the concept of an e-portfolio as an assessment tool is relatively new, there are some who believe it will bring significant change to the assessment of student learning (Cotterill, Bradley & Hammond 2006).

To summarize, the assessment activities discussed above offer increased potential to (1) provide prompt and therefore useful feedback to students; (2) consolidate concepts and bring multiple perspectives to the learning process; (3) demonstrate skills and knowledge with applied theories; (4) allow students to document their learning history, which may be used as part of their career portfolio; and (5) promote deeper learning and provide greater evidence of student achievement than can be collected through traditional summative assessment methods. However, it must be noted that when students are expected to engage with non-conventional assessment activities, it is critical that clear guidelines are provided on what kind of task they have to perform, what aspects will be assessed and the criteria for assessment (Gibbs 1995). Students need to be informed of the key objectives of online activities (Gopinath and Sawyer 1999). Teachers may wish to stipulate a minimum entry-level qualification for participation in online forum activities (Salmon 2002). More importantly, teachers need to know how these activities can be structured and implemented so that they can integrate them into the courses they teach.

Case studies of blended mode of assessment

Teachers at the Hong Kong Polytechnic University have been well supported to integrate ICT into teaching for eight years. The campus is fully equipped, and staff can access the Internet in teaching venues. Given support from some heads of department, a growing number of teachers are ready to take on the challenges. Three cases are drawn from the university's School of Nursing. The nursing programmes aim to provide students with opportunities to acquire theories and to apply them in practice. Nursing students are required to develop competent caring professional skills, practise reflection on action and acquire a professional attitude in the programmes. To assess whether students have developed these attributes, a mix of assessment activities, including a conventional summative written examination has been applied.

Evaluations of student learning and their experiences in completing blended assessment activities were conducted between 2003 and 2005. Student perceptions were collected through course-end surveys. Findings were triangulated with focus group interviews.

Authentic learning activity and computer-based MCQs

The higher diploma in nursing aims to strengthen skills and knowledge to care for patients with neurological, musculoskeletal, integumentary, ophthalmological, and ear, nose and throat disorders. Nursing care involves both cognitive and affective domains of learning. In this course, 60 percent of the overall grade was allocated to theoretical understanding, with 20 percent assessed through computer-based MCQ activities and 40 percent in the final written examination. The remaining 40 percent was for group projects that allowed students to demonstrate their professional skills and values in practice in group projects. This involved laboratory practice with peer feedback and authentic paired activities.

Students were required to conduct a pairing-up activity in which they took on the roles of nurse and patient with impairment. Students were expected to experience how to take care of patients, and also being a patient with either a visual impairment, or requiring the use of a wheelchair, crutches or walking frame to participate in community life. These 'patients' were taken into the community on public transport, to dine in a self-service restaurant, to go shopping and to access a public convenience. This learning activity was overwhelmingly successful, with students reporting how much they learned by putting themselves in the position of being a patient. After the pairing-up activities, they were asked to report and reflect on the experience and submit their comments on an online forum. Although each student experienced only one type of impairment, they could read about other types of physical impairment. The

paired activity was assessed using criteria that were also disseminated on the website. Students were assessed on their experience of the activity, their attentiveness in providing professional care to their patient, their ability to devise plans of action when facing difficulties, their ability to anticipate problems or physical hazards, and to apply the experience for care planning in the future.

Both the MCQs and the paired activities were valued highly by students in the course-end survey. On the one hand, the online quizzes reinforced what students had learned. On the other hand, the paired activity was highly valued by these student nurses because they developed a better understanding from the patient's perspective through the activity. In the focus group interview, students could vividly remember experiences that had occurred six months ago because they had had the personal experience.

While summative assessment can test students' theoretical understanding of clinical practice, posting reflections on pairing-up activities can provide further reinforcement of theory and develop a broader perspective.

Online case discussion and report writing

Students studying nursing care were required to demonstrate the ability to assess clinical cases and subsequently design healthcare plans as a key area of professional competence in nursing. On this course, information on cases was provided on the website. Students were encouraged to discuss the issues involved in the cases online for a few weeks before written reports were submitted. Participation marks were allocated for online contributions.

According to the end-of-course online student survey, to which 86 percent (76 of 89 students) responded, the online case discussion activities were highly valued. Students were asked if online discussions of the cases provided good ideas and comments so that they were able to hand in revised and improved work. The result was that 11 percent of the students strongly agreed, 57 percent agreed, 24 percent were undecided, 4 percent disagreed and 4 percent strongly disagreed. In the focus group interview (five students), interviewees reported that they had more relevant information and could learn about others' opinions. Besides, they could clarify misunderstandings through online discussions and subsequently avoided making mistakes when writing their reports.

All students agreed that they had few opportunities to express their ideas in tutorials due to the limited class hours and the relatively large class size. However, online discussions certainly provided more opportunities for students to discuss issues. Students affirmed the appropriateness of conducting online discussions.

Sharing placement experience and e-portfolio

Students were expected to develop a comprehensive understanding of caring and therapeutic management for patients suffering from various kinds of disease. To assess factual conceptual understanding, a quiz carrying 10 percent of the overall course grade was set in the middle of the semester; 30 percent was assigned to participation and discussion in problem-based tutorials and 30 percent was allocated to the written examination at the end of the semester. Based on learning experiences in the clinical practical, 30 percent was allocated to group tasks, and students were required to complete two assignments and to compile their reflections in e-portfolios.

Nurses are required to communicate well with other clinical professionals and to make professional judgements in their actions. These student nurses had to synthesize what was learned in theory, consolidate these concepts in practice, and reflect on their actions against professional practice in the clinical environment. Furthermore, each group was expected to provide constructive feedback to peer groups. Individual groups were required to revise their draft work after they had received feedback from peer groups.

The teacher strongly encouraged the students to continue communicating both on campus and in the placement period. To provide a virtual space for student nurses to communicate openly and privately with team members, online forums were set up. Across the whole semester, students shared their experiences on clinical placement between peers and with the teacher in 190 messages of non-graded online activity. For graded activities, there were 106 messages on group tasks and peer group evaluations in private forums. Finally, there were 105 messages on reflective journals.

According to the end-of-course student survey (66 responded out of 129), slightly over 70 percent of respondents

indicated a positive impact from sharing placement experiences. In a focus group interview, the interviewees expressed a preference for face-to-face discussion, communicating via mobile phone and sharing documents through ICQ or email in Chinese. As English is a second language and Cantonese their spoken language, students found it easier and more direct to express their feelings and emotions in their first language. It is not surprising to find that this group of students indicated a preference for posting questions through email to sending messages for discussion in an open forum.

Detailed guidelines on peer group evaluation were available on the Web, and students found that reading peer feedback was generally helpful, as indicated in the survey. There was clear evidence that students found it useful to review peer work. However, about half the respondents did not like to 'criticize other's work online'. While all the online comments were posted with authors' names, Chinese students, because of cultural constraints, do not find it easy to comment openly on others. In focus group interviews, some students commented that the peer review process helped learning, while others were not clear about the criteria for conducting the review. Some stated that it was difficult for them to comment on others' work because comments were not based on factual information from references.

Using e-portfolios for assessment was a new experience for this group of students, and feelings about this task were mixed: 52 percent of respondents in the survey indicated their preference for e-portfolios, because peer review and group discussion had enriched the whole learning process and broadened individual perspectives. A few students in the focus group interview appreciated the underlying concept of an e-portfolio as a collection of one's own representative personal ideas or work. However, 38 percent of respondents had reservations, and some interviewees commented on the amount of time spent preparing portfolios.

Overall, the teacher designed a new learning environment and integrated innovative assessment activities with the paper-based terminal examination on this course. Students were subjected to a variety of assessment activities, providing them with more opportunities to reflect on practical experience, develop multiple perspectives and become more critical in reviewing their professional practice.

Conclusions

There are a number of practical reasons why examinations are conducted as they currently are. However, they do not necessarily reflect the best way to promote or assess student learning. Aligned with sound educational principles, technological tools are being progressively accepted by teachers and students. Blending computer-mediated methods with conventional assessment activities can lead to a comprehensive, well-aligned, reliable and valid assessment system.

The use of ICT for assessment of student learning extends opportunities far beyond the scope of basic methods such as time-bounded summative final written examinations. Computer-based tests allow individual students to apply their knowledge and receive immediate feedback. In one respect, this may seem like a simple function but, in terms of learning, I believe it to be significant among the many benefits that computer-mediated learning has to offer. The use of online communication in various forms adds the benefits of multiple perspectives and social aspects of learning. Using the tools that technology provides, various types of formative assessment can be leveraged to promote and support enriched student learning throughout the lifecycle of a course. The positive impact on student learning and behaviour, together with the long-term reduction of staff workloads resulting from continuous online assessment initiatives, suggests that the area is worthy of further investment and investigation.

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Acknowledgements

Funding support from the University Grants Committee in Hong Kong and the Hong Kong Polytechnic University is gratefully acknowledged, as is the collaborative support of many colleagues in three local universities. I would like to extend special thanks to Dr Paul Lam, who worked closely with students to solicit the findings, and my gratitude to Dr Loretta Chung, Dr Edmond Tong and Dr Marian Wong, who adopted good teaching practice.