

The Struggle for Balance in the Use of Quantitative and Qualitative Online Assessment Tasks

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Abstract

Online learning environments offer perhaps the most efficient methods yet for providing objective, quantitative assessment tasks for students. In the current resource-stretched tertiary education climate these methods are perceived as time and cost effective, and often educationally sound, particularly when appropriate feedback is provided. A wide range of research on recent online assessment tools supports this claim. As yet there is little research which addresses the value of qualitative techniques in such contexts, and even less which examines the issues associated with the integration of both types of assessment tasks within the same context. This tension in the research requires examination and it is the purpose of this paper to not only investigate the recent neglect of qualitative assessment in online education but to consider potential solutions to this struggle for balance between quantitative and qualitative online assessment techniques. Previous work outlining a suggested set of criteria for designing and implementing qualitative online assessment tasks is used to address the challenge of designing practical guidelines by which balanced assessment methods can be implemented.

Keywords

Assessment, Online, Computer-based, Web-based

Introduction

The enthusiasm to adopt new online learning technologies in the tertiary education sector inevitably influences the way assessment techniques are selected, designed and implemented. As this trend increases, the specific “need for an electronic means to assess learning also increases” (Cooley & Nun Yi, 1998, p. 1). Too often, educational materials from face-to-face or distance environments are translated into online courses without any supporting pedagogical transformation. Because much current research focuses on particular aspects of the internet which can be best exploited for online learning, contemporary educators are beginning to take up the challenge to specifically design online courses for this environment.

The evolution and adoption of this new online learning context influences the way students are being assessed. The impact of such assessment choices are immense and can have “far-reaching, unintended consequences” (Thorpe, 1998, p. 268); they have the capacity to dictate the course structure and the individual student’s learning experiences. Although Taylor and Maor (2000) are concerned that within the new online context, “the traditional teacher centred knowledge transmission metaphor (efficient delivery to individual passive absorbers) will prevail”, they also recognise that “the new technology offers unique prospects for promoting reflective and collaborative learning” (p. 1). So, while there are definitely opportunities to implement qualitative assessment techniques into online learning environments, the incentives to use quantitative techniques are, at this stage, seemingly more attractive and widespread. This perspective, combined with an awareness of the advantages of sound qualitative assessment techniques, provided the following theoretical framework.

The perspective of two instructional designers

For the purposes of this paper, we consider quantitative assessment to involve objective questioning, and to commonly take the form of multiple choice tests, short answer questions and factual, technical problems such as labelling diagrams or solving mathematical problems. Such questions are generally quite “closed”, having one “right” answer. On the other hand, we consider qualitative assessment tasks to be open-ended and more subjective in nature, including portfolios, reflective journals, case-based scenarios and well-designed collaborative projects. In response to these tasks, students submit a wide variety of work, and generally have a large degree of choice and creativity to produce their own unique solutions. A perfect definition is impossible, and we recognise that there is sometimes a substantial overlap between the two categories, but this paper will categorise quantitative and qualitative assessment in these ways.

We also subscribe to the generalisation that assessment drives student learning (Donnan, 1996; Hargreaves, 1997; Ramsden, 1992). More specifically, “assessment has been recognised as a driver of students’

approaches to study in distance education no less than in campus based settings” (Thorpe, 1998, p. 265). Such a viewpoint cannot be neglected when analysing assessment in online learning, the next generation of distance education. As such, assessment should be one of the first design considerations when preparing an online course, and be seamlessly integrated into the course, not “tacked on” as an afterthought.

Initially, our constructivist backgrounds led us to work almost exclusively with qualitative, authentic, online assessment tasks. It was this bias which led us to detect the extensive use of quantitative assessment in current online practice. Our subsequent pedagogical adjustment, or paradigm shift, has enabled us to appreciate the value of using both qualitative *and* quantitative assessment strategies and the benefits of adopting a balanced approach. An examination of the research related to current online learning indicates a substantial lack of information or even interest in qualitative assessment when compared to studies based on quantitative assessment. More importantly, the research gap also indicates a failure to consider the need to design courses which incorporate a combination of the best characteristics of *both* types of assessment.

Researchers tend to espouse either view without acknowledging the credence of the other. As instructional designers we regularly confront this tension and have recently attempted to explore the benefits of both sides. In this paper, by building on previous work in which we developed a set of criteria for designing effective qualitative online assessment tasks, we will propose a set of practical working guidelines for designing online assessment which use the best qualities of both quantitative and qualitative tasks.

Current Theory and Practice of Online Assessment

Quantitative online assessment: Perceptions of overuse

In general, quantitative assessment methods are those which “focus on recognition, recall, are quick, atomistic, measure surface learning, are based on course objectives, and are conducted out of context” (Fetherston, 1998, p. 1). However, with some variations, these tasks can be improved to the point where they become valuable components of the learning process. The particular affordances of the internet have made the use of online quantitative assessment techniques both popular and relatively straightforward, as supported by the research discussed below. Recent

changes in university structures and the reduced availability of resources for the higher education sector in general has coincided with the advent of the new online technologies. Pritchett and Zakrzewski (1996) report that institutional changes in higher education have increased the need for objective and efficient assessment. They discuss the use of *Question Mark Designer* which “has made the production of attractive interactive test materials a very much easier task for the non-computer specialist” (p. 242). Similarly, Peat (2000) recognises the need to implement assessment strategies which take into account the lack of resources and the need to constrain costs.

Web-based computer assessment systems “are suited primarily to disciplines ... which are knowledge based” (Buchanan, 1998, p. 78). This pattern, reflected in many currently used online assessment packages, has the capacity to evolve to such an extreme that the “what” of assessment is gradually restricted to objective, factually based knowledge. It is likely that students will “learn” such knowledge with predominantly surface learning strategies. Buchanan (1998) recognises the limitations associated with overusing objective based assessment and emphasises the importance of higher order thinking skills which are not always linked to such objective style assessment:

We also seek to ensure that our students develop “transferable skills” and “competences” ... such skills are difficult to develop or to assess through multiple choice tests (p. 78).

On the other hand, Zakrzewski and Bull (1998) argue that such assessment can actually test all forms of knowledge: “Objective testing can extend the variety of assessments, and test a range of different skills, knowledge and understanding” (p. 146). The effectiveness of objective assessment can be increased if it is designed appropriately and matches the type of knowledge it intends to test.

Perhaps the misappropriation of quantitative assessment techniques is one of the reasons that it has become traditionally, and maybe unfairly, linked to surface learning. However, the importance of using deep learning strategies even with factually based knowledge cannot be overlooked. Deep learners critically evaluate, compare and link ideas, create their own knowledge, and relate their learning to new situations (Biggs & Moore, 1993). They can operate at a practical or abstract level, utilise metacognitive skills, and are willing to contribute time and effort to the task at hand. So, rather than just *increasing* students’ knowledge, we should also be endeavouring to develop relational knowledge by emphasising the link between subjects across disciplines and the use of

similar skills in different domains. Development of creative, analytical and practical skills are just as important as acquiring new knowledge.

There have been numerous quantitative online assessment tools documented in recent research. For example, the Calmaeth online assessment tool (Judd, 1996), developed at the University of Western Australia, produces unique mathematical questions for each student, using standard question types with randomly generated numbers and gives extensive diagnostic feedback. *Question Mark Designer* provides an interface and database system for using multiple choice questions (Pritchett & Zakrzewski, 1996). An important aspect of this software is that students with poorer computer skills are not disadvantaged. Pritchett and Zakrzewski claim the software “presents a visually attractive question format to the student and is extremely user friendly, requiring minimum knowledge to navigate through the test” (p. 244). *BrainZone* is another online assessment tool which offers a range of presentation styles for objective questions, including multiple choice and short answers (Oelrichs & Bailey, 1998; Strassburger, 1997). To date it has been largely used as a formative assessment technique enabling students to learn new facts and concepts more systematically over the course of the semester. These methods are preferable to “cramming” before the final examination and, as such, students are provided with extensive diagnostic feedback on incorrect answers during the learning process when such feedback is most effective. *WebTest*, developed at Heriot-Watt University in the United Kingdom, is a similar online assessment tool to *Question Mark* and *BrainZone*. It has a range of comparable features, including random selection of questions, and the ability to include multimedia elements with questions. Data can be recorded on student use and is also available to academic staff to provide information on participation and performance (Doughty, 2000).

Online quantitative assessment tools have frequently been used exclusively as a means of formative assessment throughout a unit. Buchanan (1998) describes the use of the PsyCAL package which provided students with sets of multiple choice questions to answer via a website. Students were encouraged to use these question sets during teaching weeks set aside as self-directed study. The important feature of this package was that feedback to students did not automatically provide the answers to questions they answered incorrectly. Rather, it provided a list of suggested resources, and students were encouraged to research their answer before attempting the test again. This approach was designed to foster deeper learning through problem-based learning techniques, thus giving students more opportunities to take responsibility and control of their own learning progress. Peat (2000) favours such student involvement in assessment procedures:

The judicious use of self-assessment on the web is a viable option that can provide valuable information for students about their progress. (p. 1)

Conclusively, then, quantitative assessment, when used prudently, can assess and encourage both surface and deep learning. However, we believe that the recent reliance on quantitative online assessment techniques has contributed to an unbalanced practice of assessing knowledge which is predominantly objective.

It is plain to see why the affordances of the online environment have made quantitative assessment techniques so popular, especially those which can

be automatically marked and provide detailed feedback to students about their performance. Such functions are particularly useful for meeting the demands of large classes (Thorpe, 1998). Assessment tools which require students to respond with true or false answers, short closed answers or to select an answer from a number of choices can be assessed in such a manner. When quantitative online assessment techniques have high quality feedback mechanisms, they are especially valuable. Bernard and Naidu (1992) found that providing students merely with right/wrong feedback “had virtually no effect” (p. 2). However, meaningful, substantive correction met with much greater results.

Qualitative online assessment: A renewed perspective

The use of qualitative assessment strategies can promote content synthesis and allow students to take control of their own learning. This constructivist approach to learning supports the view that learners have final responsibility for their own learning; active learning processes are preferred and the importance of the learner’s point of view is recognised (Biggs & Moore, 1993). Additionally, if such assessment incorporates two types of learner interactivity, social and individual, reflecting Taylor’s (1996) view of the value of interactive learning processes, the purpose of these assessment practices can be twofold. That is, they can provide valuable assessment data for educators and function as valuable learning experiences for students.

A typical qualitative assessment method is broadly considered to be one which is “holistic, measuring deep learning and long lasting knowledge, is linked to learning theories, is conducted in context, allows students to express interpretations and is authentic” (Fetherston, 1998, p. 2). The move towards qualitative online assessment by some researchers has been encouraged by an apparent shift away from the “culture of testing” to the “culture of assessment” (Birenbaum & Dochy, 1996). Rather than asking a student to memorise and reproduce concepts and facts in quantitative assessment tasks, those in favour of qualitative assessment tend to view the student as “an active person who shares responsibility, reflects, collaborates and conducts a continuous dialogue with the teacher” (Dochy, Segers & Sluijsmans, 1999, p. 331).

The theories of constructivism and situated learning provide the basis for our discussion of qualitative assessment techniques. Constructivism focuses on the importance of the student in the learning process. It aims to start from a student’s prior experience and recognises the necessity of the

student taking an active part in the ongoing learning process. In an online learning environment, there are many assessment strategies which pass the control to the learner in a constructivist fashion. Because of this, more independence is required by an online learner, and this aids the development of metacognitive skills. Students presented with a variety of resources are likely to have learning patterns which more directly reflect the social process of knowledge construction than traditionally instructivist knowledge delivery. An online learning environment which is based on communication and choice also further promotes a socio-cognitive atmosphere, where meaning is negotiated, challenged and retained in authentic contexts.

Situated learning takes aspects of constructivism one step further, and purports the claim that effective learning occurs when it is located in the specific context in which it is intended to be used (Herrington & Oliver, 1997). While the physical context of the online environment may often not be the environment within which the learning will be used in the future, McLellan (1994) asserts that such a context is sufficient as it is usually either a replica of the appropriate environment, or a contextual anchor which reflects the conventions of the environment. As such, the quality of authenticity is maximised.

The online environment offers new scope for assessment tasks. The ease of using collaborative tasks in an equitable manner, including mentoring, feedback to and from students and teachers, support and encouragement, ability to see samples of other students' work, and the use of peer assessment are all useful affordances. The internet also offers access to a wide range of resources, easily shared with other students. The affordances of the online environment also make it easier to establish an authentic, whole-unit assessment task or scenario – where assessment is both integral to and integrated throughout the whole unit. However, such assessment, particularly when broadly unit-based, must be carefully designed to ensure the marking and support load for teachers is kept within reasonable limits.

Qualitative assessment tasks are most often used in disciplines where definitive, closed answers are inappropriate: for example, social science, humanities, creative arts, and many areas of business. However, often in on-campus or distance situations these disciplines are assessed through standard essay type questions, often relatively ill-defined questions, without marking criteria. We would encourage the use of well-designed qualitative assessment in *all* disciplines, as its contextual basis will prove useful when students later need to apply the information they have learned. Curoe (1999:24) warns of the example of poorly designed tasks in which “students end up finding huge amounts of information

electronically, but then are not directed to evaluate its usefulness or value”.

Aspects of courseware programs like *WebCT* and *Top Class* can be used to facilitate qualitative assessment tasks, particularly those using online collaboration between students. A similar example is the RonSUB online assessment tool (Oliver, Herrington & Omari, 1999), a mechanism by which groups of students submit and discuss their short responses to weekly problems. Tutors have a relatively small role to play in marking the short responses each week. As is often the case in collaborative projects, the more able students are in a position to easily help those with lower abilities, and the need for tutor intervention is decreased. Another appropriate use of qualitative online assessment involves the use of reflective practices to explore varying perspectives on a topic. These strategies are even more advantageous when the content of the course must be synthesised and analysed to enable the student to come to their own position of knowledge. For example, an online postgraduate unit in a Queensland university incorporates the use of a series of reflection tasks into the first section of the unit (Reushle, 2000). Such tasks prepare students to complete a larger project at the close of the unit. Without these initial reflection exercises, the literature required for the development of a large practical project later in the course may not have been as usefully examined.

The most substantial advantage of online assessment over assessment in other contexts is the ability to effectively use complex collaborative activities. Through the use of email, bulletin boards and chat rooms, students can meet synchronously or asynchronously, and keep written records of these interactions. Anecdotal evidence suggests students who are introverted or from a non-English speaking background are much more likely to participate effectively in the online environment than in face-to-face tutorial situations.

The other main affordances of the online environment which impact upon current qualitative assessment include the ability to provide open-ended, ill-defined tasks to students who have a wealth of resources at their fingertips; and the capacity to set up authentic tasks with a useful and well-defined purpose and outcome. While these qualities have been used to some degree in offline assessment environments the affordances of the internet make them very accessible and can ensure more effective learning takes place. To summarise, our previous research identified ten key

criteria to guide the design and development of qualitative online assessment tasks (Northcote & Kendle, 2000):

- Assessment tasks should be open ended
- Tasks should have a clear purpose and outcome
- Tasks should be authentic in nature
- There should be an emphasis on process over product
- Collaboration and communication should be incorporated in tasks
- Students should have varying degrees of choice in their assessment tasks
- Tasks should be linked to unit or course objectives
- Feedback mechanisms should be included in the task design
- Tasks should encourage the appropriate, discriminatory use of online resources
- Tasks should enable students to examine and present many viewpoints

Effective qualitative assessment tasks can be developed in the online environment by taking into consideration these criteria.

Combining Quantitative and Qualitative Online Assessment Techniques

Providing assessment tasks over a unit or course which utilise aspects of both quantitative and qualitative design has the additional benefit of encompassing a wider range of learner strategies, and thus increasing the equity of assessment across a broad range of students (Curoe, 1999; Zakrzewski & Bull, 1998). The value of formative assessment throughout the learning process is also of particular importance. Curoe (1999) states that “providing several opportunities for elaborative rehearsal and frequent practice all support the way we know how learners learn” (p. 26) and while rehearsal and practice can be included in summative assessment, it is most useful as formative assessment. For such assessment, quantitative online assessment is a particularly valuable tool.

Clearly, the design of assessment tasks specifically for the online environment is currently an underdeveloped field. Steffens, Underwood, Bartolome and Grave (1998) report the common problem that university lecturers and tutors, despite “working in a new mode of teaching ... are still using very traditional approaches to assessment” (p. 6), although they go on to suggest that a large part of this problem is the unfamiliarity of teachers with the computer-based tools available to them. Staff development programmes are increasingly addressing this issue, and instead our guidelines focus on appropriate design features for the use of both quantitative and qualitative assessment tasks in the online environment.

Potential guidelines for designing assessment tasks using the best of quantitative and qualitative approaches

Our previous interest in purely qualitative online assessment has now been enhanced by the recognition of the high level of enthusiasm for quantitative online assessment methods. We now advocate the use of a combination of these types of tasks when designing assessment, and list below a set of potential guidelines for this design, based on the conclusions we have drawn from the literature reviewed, and what we have observed in our everyday practice.

- **Variety:** include both quantitative and qualitative methods of assessment. This enables a variety of learning styles to be catered for. Ensure, however, that quantitative methods are those which encourage more than surface learning, through collaboration, feedback methods, problem-based learning, etc.
- **Authenticity:** design ill-defined, open-ended tasks where appropriate – especially those which simulate the tasks students will face after graduation. However, some authentic tasks may also be quantitative in nature.
- **Collaboration:** allow for interaction between students and others, including fellow students, students outside the course, tutors, lecturers, members of the local or global community and outside experts. The communications technologies of the online environment make this a much simpler and fairer process than in the past.
- **Feedback:** ensure mechanisms for appropriate feedback are included throughout the online assessment process. Peer feedback and peer tutoring may help satisfy this need.
- **Make use of online resources:** this may include quantitative packages produced by other institutions; as well as ensuring students make full and appropriate use of the multitude of other resources the internet offers.
- **Student responsibility:** can be encouraged by ensuring that students are provided with options of pathways within courses and assessment tasks. Provision for such accountability of the learning process can enable large classes of diverse students to be dealt with by using similar assessment tasks with inbuilt options to account for individual student interests, thus influencing motivational outcomes.

Conclusion

In the last decade research into online assessment tasks has tended to focus primarily on either quantitative or qualitative assessment techniques. This polarisation led us to develop a set of guidelines for designing online assessment tasks which incorporates the best qualities of each of these types of assessment. We are anxious to ensure that technology does not dictate our new educational practices, as warned by Taylor and Maor (2000), but at the same time do not want to discard its important influence.

Research methodologies in many fields have recently come to value and appreciate more qualitative forms of research. Furthermore, many researchers now incorporate both quantitative and qualitative methods in the *same* research project. We recommend that those involved with online assessment take heed of this recent trend towards amalgamation and come to realise the value of using both forms of assessment within the same online context.

Overall, our selection of assessment techniques should be dictated by more important factors than ease of use and the advantages of time saving. Rather, our choice of assessment should reflect the content of the course, the needs of the learner and our epistemological and pedagogical stance as educators. With such considerations in the foreground, the design of online assessment strategies can be undertaken with sound educational theory as its base. Our hope is that assessment design will become more diverse, reflecting a willingness and ability to construct assessment tasks that cater for the differences and complexities found within any modern challenging curriculum.

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