

EFFECTIVE ASSESSMENT TECHNIQUES FOR ONLINE INSTRUCTION

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The purpose of this article is to discuss effective assessment techniques suitable for online instruction. Online assessment should be viewed as a system for evaluating student academic achievement. Becoming knowledgeable about online assessment is crucial at a time when there is an increased demand for accountability from educational institutions. Perhaps the discussion presented here will assist faculty and administrators in the selection of assessment techniques that properly reflect the pedagogy of online courses.

INTRODUCTION

Distance learning has existed for more than a century. European correspondence courses are the earliest form of distance learning (Ponzurick, France, & Logar, 2000). The number of institutions offering Web-based courses is increasing exponentially. In the United States, 55% of colleges and universities now offer distance learning courses (Terry, 2000). Worldwide the e-learning market was predicted to grow from \$4 billion to \$15 billion between the years of 1998 and 2002 (Cooper, 2001).

As educational institutions are increasingly held accountable for student learning (Braathen & Robles, 2000), assessment represents an important way to respond to such accountability. However, student assessment conducted solely for accountability reasons does not necessarily lead to learning. Educators must establish the purpose of assessment, the criteria being measured, and the intended outcomes before meaningful assessment methods can be achieved (Gaytan, 2002a). The purpose of assessment is to monitor student learning, improve academic programs, and enhance teaching and learning (Zeliff, 2000).

Evans (2002) considered that "assessment requires educators and their respective institutions to develop high standards for learning and to establish methods for systematically gathering, analyzing, and interpreting data to determine how well the standards have been met and to make improvements" (p. 3). In addition, assessment must be linked to the educational institution's

mission, objectives, goals, and values (Hatfield & Gorman, 2000).

The opportunity for online learning drives educators to reconsider their assessment strategies. Online instructors can adapt their traditional assessment techniques to ensure the quality of online instruction. The American Distance Education Consortium (ADEC) developed guiding principles for distance learning, asserting that the principles found in quality traditional instruction are often similar to those found in online learning environments (American Distance Education Consortium [ADEC], 2003). In addition, The American Association of Higher Education's "The Seven Principles of Good Practice in Undergraduate Education" has been revised for the online learning environment but continues to be based upon the characteristics of outstanding traditional teaching and learning (American Association of Higher Education [AAHE], 2004).

Online assessment should be considered as a system, comprised of many components that need to be measured, for the evaluation of student academic achievement. Both traditional and online assessment techniques must be designed to provide students with immediate feedback in an attempt to assist them in the better understanding of the material presented. Similarly, both traditional and online courses must have clearly defined learning

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objectives as their criteria, ongoing assessment methods to measure student learning outcomes, and immediate feedback.

Online assessment, however, requires a more ongoing, systematic approach than that of traditional instruction (Robles & Braathen, 2002). In addition, as the assessment methods must match the level of desired competencies, online assessment requires educators to modify their methods of instruction and it may require the most significant effort for innovation and departure from traditional instruction (Ryan, 2000), because it changes human interaction, communication, learning, and assessment methods (Robles & Braathen, 2002).

Other pedagogical considerations must be given when assessing students online. First, online learning holds the students responsible for initiating the learning process as students are held accountable for completing the work posted online. As a result, a change in the current learning environment takes place from a classroom-based, teacher-centered model to a student-centered, technology-based model (Gaytan, 2002b). These types of learning experiences can be more stimulating and engaging than the traditional delivery mechanism (Robles & Braathen, 2002).

Finally, online instruction requires educators to become proficient in engaging students in both synchronous and asynchronous communication while allowing students to become familiarized with the technology. For instance, the use of chat rooms encourages social interaction among online learning participants (Perrin & Mayhew, 2000). This social interaction must be assessed by thoroughly analyzing the number and depth of student responses (Roblyer & Ekhaml, 2000; Singh & Pan, 2004).

Finding effective techniques to assess student learning in online courses has received increased attention but has not been thoroughly addressed (Robles & Braathen, 2002). Several researchers have found significant challenges when assessing student learning in online courses (Carnevale, 2000, 2001; Vrasidas, 2000; Weigel, 2000). However, other researchers have developed effective assessment techniques for online instruction (Draves, 2000; Perrin & Mayhew, 2000; Redding & Rotzien, 2000; Robles &

Braathen, 2002; Roblyer & Ekhaml, 2000; Singh & Pan, 2004).

In addition, several researchers reported the following benefits for teachers and administrators when using online testing: handling grades electronically as grades can be entered into the electronic grade book immediately, obtaining students' results faster, creating a student-centered learning environment, incurring less expense than with paper-based exams, and measuring learning more accurately (Bartlett, Reynolds, & Alexander, 2000; Dash, 2000; Newman, 2000; "Oregon to Administer," 2001).

The following sections describe effective assessment techniques appropriate in online instruction with the perspective that online assessment should be viewed as a system for evaluating student academic achievement. An understanding of online assessment is especially important in a climate where there is an increased demand for accountability from educational institutions. The following discussion is intended to assist faculty and administrators in the selection of assessment techniques that properly reflect online pedagogy.

EFFECTIVE ASSESSMENT TECHNIQUES FOR ONLINE INSTRUCTION

A salient prerequisite for developing effective assessment techniques in the online environment, of course, is academic competence in course content, thereby ensuring that those techniques are aligned with course learning outcomes. The use of a variety of techniques to assess student learning in online courses is highly recommended (Christopher, Thomas, & Tallent-Runnels, 2004; Robles & Braathen, 2002; Sanchis, 2001). The following techniques have been found to be effective for online instruction.

USE PROCTORED TESTING

Finding effective techniques to assess student learning and maintaining academic integrity is a challenge in both conventional and online instruction because of issues related to effective assessment, cheating, identity verification, and plagiarism (Byrd & Lott, 2003; Heberling, 2002;

Scanlon, 2003). However, online assessment represents a greater challenge (Fodor, 2003) because no existing technology can ensure academic honesty (Scanlon, 2003).

Regarding academic dishonesty in online courses, instructors are encouraged to hold plenty of threaded discussion sessions to become familiar with the students' writing styles (Singh & Pan, 2004) and to require papers to address issues covered in those threaded discussions. This way, if a student submits work that is unrelated to threaded discussions, online instructors can determine that the student had little participation. Conversely, if work submitted by a student does not sound like that individual, a reverse Internet search is recommended by using some of the student's wording and phrases (Heberling, 2002). Additionally, instructors are encouraged to use new, original assignments, including project-based assessment (Olt, 2002) and the short-answer feature of the testing module found in most software programs, such as WebCT (MacKinnon, 2002).

Identity verification is another important issue to consider when teaching an online course (Byrd & Lott, 2003). Instructors are encouraged to obtain pictures and signatures from all students enrolled in the online course at an initial on-campus meeting. Moreover, online educators are encouraged to hold examinations on campus to proctor, compare signatures, answer student questions (Alexander, Truell, & Bartlett, 2002), thereby ensuring a higher degree of academic honesty (Fodor, 2003).

In the event that campus testing is not feasible, however, software applications are available to develop online tests with a wide variety of functions (Fodor, 2003), allowing instructors to limit the time of the test, use several start times to accommodate time zones, give students access to one question at a time, and prevent students from returning to questions after answers have been submitted (MacKinnon, 2002). In addition, the National College Testing Association (NCTA) has established the Consortium of College Testing Centers (CCTC) to allow distance learning students to take examinations at a reasonable rate in a controlled, proctored environment at local educational institutions, rather than having to travel

to the location where the course originated (National College Testing Association, 2003).

Finally, online tests should be viewed as take-home examinations, because students, upon entering the workforce, will likely not be asked to withhold the use of reference materials or forced to solve problems and communicate in isolation (Major & Taylor, 2003). The use of online, ungraded student self-tests has proven to be an effective assessment tool, because these tests provide the students with immediate, honest feedback regarding their own learning and achievement (Perrin & Mayhew, 2000; Robles & Braathen, 2002) and a sense of security to avoid feeling intimidated by a format they have not experienced (MacKinnon, 2002). This type of self-assessment should be encouraged by online instructors, because students determine the amount and quality of learning as they pre-test, study material, and test again to assess their own progress. Instructors, upon reviewing self-test data, are able to demonstrate that learning is occurring, especially critical at a time when there is an increased demand for accountability.

MAINTAIN CONSTANT COMMUNICATION WITH STUDENTS WHILE PROVIDING SUFFICIENT FEEDBACK

Immediate, ongoing, and detail-oriented feedback assists students in better understanding the material and more effectively applying what they have learned. As a result, assessment methods are aligned with clearly identified learning outcomes, skills required of the learner, and the academic field of study (Wittkopf, 2003). Students need to be able to incorporate the feedback given into the next assignment (Singh & Pan, 2004). Online instructors are encouraged to require a wide variety of clearly explained assignments on a weekly basis (MacKinnon, 2002; Robles & Braathen, 2002). This type of repetitive, continuous assessment allows instructors to become familiar with students' work to ensure student understanding (Schrum, 1998). However, it must be carefully and systematically planned to require students to demonstrate learning has occurred by completing a specific piece of work at various stages in the course and be given meaningful feedback (Kerka & Wonacott, 2000).

In addition, peer assessment is highly recommended as students receive immediate feedback from their classmates (Christopher, Thomas, & Tallent-Runnels, 2004).

Instructors should be reminded that while online learners are able to regulate and monitor their own learning (Bocchi, Eastman, & Swift, 2004; Singh & Pan, 2004) and assess their own progress (Bocchi, Eastman, & Swift, 2004), student performance must, nevertheless, be carefully monitored, because instructors are unable to communicate with their students as quickly, easily, and fully as in traditional instructional settings (Fodor, 2003).

Finally, instructors should survey students during the course to obtain feedback about the quality of their online learning experience. Student opinions can provide valuable feedback regarding how well the assessment methods are aligned with learning outcomes (Singh & Pan, 2004). These anonymous surveys should be available online so that the students' responses are automatically summarized and tallied, providing valuable and continuous feedback. Moreover, online instructors should ask their students to answer questions related to the quality of the feedback received from their instructors (Wittkopf, 2003).

CREATE A LEARNING ENVIRONMENT FILLED WITH DYNAMIC INTERACTION

Interaction has a dramatic impact on student achievement. Bocchi, Eastman, and Swift (2004) found that increased interaction resulted in increased learning as reflected by test performance, grades, and student satisfaction. Online instructors and students must engage in intensive, dynamic interaction in order to stimulate and assess learning (Singh & Pan, 2004). Instructors must be proficient in group dynamics and in engaging students in both synchronous and asynchronous communication (Perrin & Mayhew, 2000; Robles & Braathen, 2002). In order to achieve the high-level learning outcomes required by national and state standards, students are required to collaborate with each other to solve problems (Marshall, 2000; Schrum, 1998), apply solutions, and reflect upon their experiences,

usually following Bloom's (1956) taxonomy of analysis, synthesis, and evaluation (Christopher, Thomas, & Tallent-Runnels, 2004).

Online courses, if conducted effectively, have the potential to yield more interaction than traditional instruction as students feel more comfortable in asking questions and participating in threaded discussions (Draves, 2000; Fodor, 2003; Singh & Pan, 2004). Furthermore, students learn more effectively and efficiently because they have many sources available at their fingertips, not to mention the personal attention they receive, including individual feedback from the instructor (Draves, 2000). Additionally, threaded discussions (e.g., online debate) allow online instructors to better assess student progress than traditional classroom settings in which students are often afraid to participate. Instructors are able to look at grammar and concept development as they are able to analyze the questions posted by the students, the responses, and the depth of understanding (Singh & Pan, 2004).

One factor that plays a crucial role in determining the quality of online courses is the students' perceptions of the degree of interaction (Roblyer & Ekhaml, 2000; Singh & Pan, 2004). This interaction requires assessment using more than the number of student views or postings on a course site. Several postings by students, by themselves, does not measure the quality of learning. Instructors should weigh the frequency and quality of interactions required that best facilitate the achievement of course learning outcomes (Northrup, 2001), i.e., the depth of those postings must be assessed. Rubrics require careful preparation to assess learning and promote critical thinking (Christopher, Thomas, & Tallent-Runnels, 2004; MacKinnon, 2002).

Table 1 shows a rubric that has been developed to assess the quality of interaction in online courses (Roblyer & Ekhaml, 2000). Note that the rubric includes four elements. The first element includes the *Social Goals of Interaction*—establishing rapport and collaboration between instructor and students and among the students, supporting both social and instructional course goals (Bocchi, Eastman, & Swift, 2004; Singh & Pan, 2004). The second element—*Instructional Goals of Interaction*—involves engaging students in productive dialogue that leads

to learning and to the development of students possessing reflective and critical thinking skills. The third element—*Types and Uses of Technologies*—refers to the various technologies that can be used to foster quality interaction in the course, such as desktop videoconferencing (Wittkopf, 2003) and Web-based resources (Singh & Pan, 2004; Wittkopf, 2003). This highlights the need for instructors to take advantage of these technologies by refining their techniques, course design, and methods used to deliver instruction (Roblyer & Ekhaml, 2000; Singh & Pan, 2004). Lastly, the fourth element—*Impact of Interactivity Changes in Learner Behavior*—requires the observation of student behaviors, such as the willingness to use the various technology resources, collaboration with the instructor and other students, taking responsibility for their own learning, and participation in course activities (Singh & Pan, 2004).

MODIFY TRADITIONAL ASSESSMENT TOOLS FOR THE ONLINE EXPERIENCE

Traditional assessment techniques can be modified to meet the assessment requirements of online instruction (ADEC, 2003; Ali, 2003; Major & Taylor, 2003). The following assessment tools (used in traditional classrooms) can successfully be adapted for online delivery: essay exams; thought-provoking discussion questions; and projects that require students to demonstrate proficiency in content knowledge, solving problems, working well with each other, and communicating effectively. For example, writing assignments must involve thought-provoking activities, rather than simple memorization (Henning, 2003).

USE ALTERNATIVE ASSESSMENT

Alternative assessments (including authentic, performance, and portfolio assessments), when used effectively, provide evaluation information related to student performance (Christopher, Thomas, & Tallent-Runnels, 2004; Gaytan, 2002a; Rasmussen & Northrup, 1999).

For instance, performance-based assessment works well for behavioral or skill-based objectives, because it involves asking students to do

something, providing the educator with the opportunity to witness the skill in action (Gaytan, 2002a; Xu, 2004). Lynch and Purnawarman (2004) found performance assessment to produce students with the following characteristics: highly motivated and committed; equipped with a range of portable skills; capable of self-criticism and evaluation; active and reactive participant in the learning process; capable of discernment, rather than simply passive; fairly and reliably assessed; and capable of storing knowledge in long-term, rather than short-term, memory (e.g., students cramming for a few hours before exams).

Another example of alternative assessment is the use of electronic portfolios (E-portfolios) for students to showcase their work while documenting what they have learned. Students become more engaged in the design of their own developed competencies and place higher value on their work (Heath, 2002; Lynch & Purnawarman, 2004). Because E-portfolios are a compilation of homework assignments and projects, logs, instructor's feedback, and other important documentation, online instructors can monitor student progress, measuring learning through well-established course objectives (Lynch & Purnawarman; 2004, Xu, 2004).

An additional example of alternative assessment is the use of computer labs (Varvel, 2002) and Web-based simulations (Schmidt, 2003) to enhance the students' learning experiences, allowing instructors to assess student progress. In short, several alternative assessment techniques are available. In order to assist instructors in determining which alternative assessment technique is most suitable for a given situation, a set of indicators is displayed in Table 2.

The first technique, authentic assessment, should be used when student performance is assessed under the same conditions using the same materials as a real-world performance (Xu, 2004). The second technique, performance assessment, should be used when students develop a product or activity in context and not isolated from the learning process (Lynch & Purnawarman; 2004, Xu, 2004). Finally, the third technique, portfolio assessment, should be used when student work is stored to demonstrate development, process, and final product (Lynch & Purnawarman, 2004).

Table 1. Rubric to Assess the Quality of Interaction in Online Courses (Roblyer & Ekhaml, 2000)

Rubric Directions: For each of the four (4) elements found in the rubric, select the description that best matches your course. Add up the points to determine the quality of interaction.

	Low Interactive Qualities 1-7 Points	Moderate Interactive Qualities 8-14 Points	High Interactive Qualities 15-20 Points	
	Element #1 Social Rapport-Building Activities Created by the Instructor	Element #2 Instructional Designs for Learning Created by the Instructor	Element #3 Levels of Interactivity of Technology Resources	Element #4 Impact of Interactive Qualities as Reflected in Learner Response
Few Interactive Qualities (1 Point Each)	Instructor does not encourage students to get to know each other. No activities require social interaction. Brief introductions at the beginning of the course only.	Instructional activities do not require two-way interaction between instructor and students; one-way delivery of information (e.g., instructor lectures, text delivery).	Technology resources that allow one-way (instructor to student) delivery of text information such as Fax or Web.	By the end of the course, all students in the class are interacting with instructor and other students <i>only</i> when required.
Minimum Interactive Qualities (2 Points Each)	In addition to brief introductions, the instructor provides for one other exchange of personal information among students (e.g., written bio of personal background experiences).	Instructional activities require students to communicate with the instructor on an individual basis only (e.g., asking/responding to instructor questions).	Technology resources that allow two-way, asynchronous exchanges of text information such as e-mail, listserv, or bulletin board.	By the end of the course, 20-25% of students in the class are initiating interaction with the instructor and other students on a voluntary basis.
Moderate Interactive Qualities (3 Points Each)	In addition to providing for exchanges of personal information among students, instructor provides at least one other in-class activity designed to increase social rapport among students.	In addition to requiring students to communicate with the instructor, instructional activities require students to work in pairs or small groups and share results within their pairs/groups.	In addition to technologies used for two-way, asynchronous exchanges of text information, synchronous (real-time) exchanges are required, such as chat rooms.	By the end of the course, 25-50% of students in the class are initiating interaction with the instructor and other students on a voluntary basis.
Above Average Interactive Qualities (4 Points Each)	In addition to providing for exchanges of personal information among students, instructor provides several other in-class activities designed to increase social rapport among students.	In addition to requiring students to communicate with the instructor, instructional activities require students to work in pairs or small groups and share results within their pairs/groups and the rest of the class.	In addition to technologies used for two-way, asynchronous and synchronous exchanges of text information, additional technologies are used that allow one-way visual and two-way voice communication between instructor and students.	By the end of the course, 50-75% of students in the class are initiating interaction with the instructor and other students on a voluntary basis.
High level of Interactive Qualities (5 Points Each)	In addition to providing for exchanges of personal information among students, instructor provides a variety of in-class and outside-class activities designed to increase social rapport among students.	In addition to the requiring students to communicate with the instructor, instructional activities require students to work in pairs or small groups and outside experts and share results within their pairs/groups and the rest of the class.	In addition to the use of technologies that allow two-way exchanges of text information, visual technologies such as two-way video or videoconferencing technologies allow synchronous voice and visual communications between instructor and students and among students.	By the end of the course, over 75% of students in the class are initiating interaction with the instructor and other students on a voluntary basis.
Total for Each:	_____ pts.	_____ pts.	_____ pts.	_____ pts.
Total Overall:	_____ pts.			

Table 2. Determining Best Suitable Alternative Assessment Techniques: Indicators Used (Rasmussen & Northrup, 1999)

Assessment Technique	Indicators
Authentic	<ul style="list-style-type: none"> • Is learner performance to be evaluated under the same conditions using the same materials as a real-world performance (Xu, 2004)? • Are students equal partners in the learning and assessment process? • Do students perceive the value of assessment? • Are students motivated to become participants?
Performance	<ul style="list-style-type: none"> • Will students create a product or activity in context/not isolated from the learning process (Lynch & Purnawarman, 2004; Xu, 2004)? • Will parents and teachers receive information on how students understand and apply information (Xu, 2004)? • Is the performance occurring in a complex environment? • Is the performance part of a high-order, problem-solving environment? • Does it stimulate a wide range of active responses? • Does it involve challenging tasks, requiring multiple responses? • Does it require significant student time and effort?
Portfolio	<ul style="list-style-type: none"> • Is the student's work to be stored to showcase development, process and final product? • Will the teacher examine whether or not the student can actually perform the task? • Is it important to review the work as a collection of products (rather than just viewing the final product)? • Will the work be jointly evaluated by teachers and students?

CONCLUSION

Online assessment must balance the requirements of technology, delivery, pedagogy, learning styles, and learning outcomes. That is, a wide array of online components, assessment criteria, and tools are needed to effectively and thoroughly assess student learning while meeting the challenges of accountability, reform, and students' learning needs. Therefore, it is highly recommended that educators continue to research this mode of instruction to develop new, efficient, and effective assessment techniques in the effort to hold institutions accountable for student outcomes in the online environment.

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