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Direct reprint requests to:

Dr. Karen Swan
Department of Education
ED 114A
University at Albany
State University of New York
Albany, NY 12222

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ALTERNATIVE ASSESSMENT APPROACHES FOR ONLINE LEARNING ENVIRONMENTS IN HIGHER EDUCATION

THOMAS C. REEVES, PH.D.
The University of Georgia

ABSTRACT

This article describes the need and prospects for alternative assessment approaches in online learning environments within the context of higher education. Assessment in higher education has traditionally focused on retention of knowledge and its application in limited contexts as measured by paper and pencil tests and academic assignments such as writing term papers. Increased interest among academics in what has been labeled "alternative assessment" reflects both dissatisfaction with national approaches to assessment and the desire to assess the attainment of higher order educational goals that involve deep understanding and active use of knowledge in complex, realistic contexts. Concerns about current assessment approaches are increasing as online learning environments become more prevalent in higher education. The article prescribes three different approaches to integrating alternative assessment approaches into online learning environments: 1) cognitive assessment, 2) performance assessment, and 3) portfolio assessment.

Faculty, administrators, students, parents, and the public at large are increasingly concerned about how assessment is conducted in higher education [1]. In light of these concerns, it is not surprising that the theme of the American Association for Higher Education (AAHE) Assessment Conference held in June 2000 in Charlotte, North Carolina, USA was "Rising Expectations: Can Assessment Deliver?" (http://www.aahe.org). Several issues are contributing to increased attention to assessment practices in higher education, including grade inflation, cheating, and calls for greater accountability with respect to educational outcomes [2].

Another issue of concern to people both in and out of academe is the rapid growth of online learning environments [3, 4]. Non-profit consortiums of traditional academic institutions (such as the Western Governors University) and for-profit enterprises (such as UNext.com) are investing millions of dollars in the development of delivery systems for online learning. While some scholars view online learning as the salvation of higher education around the globe [5, 6], others view it as a major threat to the quality and value of an academic degree [7].

This article is focused on the intersection between assessment and online learning in academe. Specifically, the article describes the need and prospects for alternative assessment approaches in online learning environments within the context of higher education. The major thesis of this article is that online learning environments provide enormous potential for enhancing the quality of academic assessment regardless of whether students are on-campus or at a distance, but that such improvements will require new approaches to assessment such as cognitive assessment, performance assessment, and portfolio assessment.

BACKGROUND

It is important to distinguish assessment from evaluation, an activity with which it is often confused. Although the terms assessment and evaluation are often used interchangeably, they actually have two distinct meanings. Assessment is defined as the activity of measuring student learning and other human characteristics such as aptitude and motivation whereas evaluation is focused on judging the effectiveness and worth of educational programs and products. In short, we assess people and evaluate things. However, the terms are often confused, perhaps because the same data can be used for both assessment and evaluation. For example, a final examination in a course is usually used to assess student learning and provide the basis for the awarding of grades. The same examination results, however, might be used in the evaluation of the effectiveness of a course, especially if other versions of the course are available for comparison.

The confounding of assessment and evaluation in higher education today is evidenced by the following nine principles for good practice in assessing student learning issued by the American Association of Higher Education (AAHE) [8]:

1. The assessment of student learning begins with educational values.
2. Assessment is most effective when it reflects an understanding of learning as multidimensional, integrated, and revealed in performance over time.
3. Assessment works best when the programs it seeks to improve have clear, explicitly stated purposes.
4. Assessment requires attention to outcomes but also and equally to the experiences that lead to those outcomes.
5. Assessment works best when it is ongoing, not episodic.

6. Assessment fosters wider improvement when representatives from across the educational community are involved.
7. Assessment makes a difference when it begins with issues of use and illuminates questions that people really care about.
8. Assessment is most likely to lead to improvement when it is part of a larger set of conditions that promote change.
9. Through assessment, educators meet responsibilities to students and to the public.

Unfortunately, AAHE uses assessment to refer both to measuring student learning and evaluating program effectiveness. This lack of clarity is evident throughout the assessment and evaluation literature, and there is no indication that the term assessment will be reserved for people and evaluation for programs and products in everyday usage. However, this distinction is adhered to throughout this article.

Traditional assessment (commonly called testing) is being challenged in many academic circles by those who favor alternative assessment approaches known variously as 1) cognitive assessment, 2) performance assessment, and 3) portfolio assessment [9, 10]. Faculty dissatisfied with multiple choice tests, short answer quizzes, and essay exams are exploring these and other new assessment methods. The 1998-99 HERI-UCLA national survey of American faculty [11] indicated that nearly 50 percent of faculty report using "competency-based grading" in their courses, although exactly what this means was not clear in the survey report. In the same survey, 40 percent of the faculty in the United States claim to use essay tests, 34 percent use short answer exams, and 30 percent use multiple-choice tests. In addition, 36 percent report using quizzes in grading, 35 percent factor term papers into their grades, and 33 percent include student presentations in assessment. Only 13 percent acknowledge using peer assessments.

While some faculty are exploring alternative assessments, widespread utilization of traditional aptitude and achievement testing for guiding various academic decisions ranging from admissions to licensure continues. Much more problematic is the fact that whether traditional or alternative, assessment questions concerning issues such as cultural bias, reliability, and validity remain largely unaddressed or unanswered in most institutions of higher education.

ASSESSMENT PURPOSES AND PRACTICES

Assessment has many roles in higher education ranging from narrow, formative purposes (e.g., Did my students understand the major points in the lecture today?) to broad, summative ones (What are the outcomes of a college education?). Whatever the purpose, the development of student assessments should be guided by a common set of questions [12]. The first question is: What is the purpose of the assessment, e.g., formative (to provide information for helping a student learn)

or summative (rendering a judgment of a student's achievement)? The second question is: What is the scope of the assessment, e.g., a quiz administered to a single class shortly after a lecture, or an external assessment of the graduates of a university program such as a bar examination for law students? The third question is: What is being assessed, e.g., knowledge, skills, attitudes, mental models, or higher order thinking capacities? Additional questions must be addressed in any assessment activity related to issues such as reliability, validity, feasibility, and security.

Although most disciplines prescribe specific knowledge and skills students are expected to attain, colleges and universities are increasingly expected to help their students develop positive habits of mind such as commitment, motivation, and ethics as well as higher order outcomes such as problem-solving, intellectual curiosity, and critical analysis. These new outcomes are much harder to assess than discrete knowledge and skills, and most authorities advocate basing assessments upon a wide range of indicators rather than seeking one precise measure. Instead of asking "what test should we use?," faculty are advised to ask themselves "what can we possibly count as evidence that students have attained some desirable outcome such as multicultural sensitivity?" Assessments of higher order outcomes inevitably require a variety of indicators to "triangulate" constructs such as ethical reasoning and intellectual curiosity.

Assessment practices often involve more inference than many faculty and most students prefer. This is especially problematic when the results of summative assessments, e.g., grades, are used to make decisions that have major effects on students' lives, e.g., the continuance of scholarships or other forms of funding. At The University of Georgia, 95 percent of entering freshman in 1999 were awarded tuition waivers called "Hope Scholarships" based upon graduating high school with a B average or better. However, these students must maintain a B average in the university to retain their tuition-free status. The pressure on faculty to award grades based upon unambiguous indicators is considerable, especially in those fields where more subjective assessment strategies are common such as art, dance, and visual design.

Higher education faculty rarely receive adequate training in assessment, but there are several resources available that can provide valuable assistance [13, 14]. An example of such guidance can be found in Angelo and Cross' excellent guide, titled *Classroom Assessment Techniques: A Handbook for College Teachers*. In Chapter One, they present the following seven assumptions about assessment:

1. The quality of student learning is directly, although not exclusively, related to the quality of teaching. Therefore, one of the most promising ways to improve learning is to improve teaching.
2. To improve their effectiveness, teachers need first to make their goals and objectives explicit and then to get specific, comprehensive feedback on the extent to which they are achieving those goals and objectives.

3. To improve their learning, students need to receive appropriate and focused feedback early and often; they also need to learn how to assess their own learning.
4. The type of assessment most likely to improve teaching and learning is that conducted by faculty to answer questions they themselves have formulated in response to issues or problems in their own teaching.
5. Systematic inquiry and intellectual challenge are powerful sources of motivation, growth, and renewal for college teachers, and classroom assessment can provide such challenge.
6. Classroom assessment does not require specialized training, it can be carried out by dedicated teachers from all disciplines.
7. By collaborating with colleagues and actively involving students in classroom assessment efforts, faculty (and students) enhance learning and personal satisfaction [14, pp. 7-11].

Although Angelo and Cross' assumptions were written within the context of classroom instruction, most of the assumptions apply to online learning, with the possible exception of the sixth. Faculty may require special training and technical assistance to develop and implement online assessment programs such as high fidelity simulations or electronic portfolios.

THE NEED TO IMPROVE ASSESSMENT IN ONLINE LEARNING

The September 17, 1999 issue of *The Chronicle of Higher Education* contained twenty-four full-page advertisements among its seventy-two pages in Section A. Twenty-one of these ads were directly related to online learning, primarily for Web-based authoring tools and Internet-based services. This is just one small indicator of the growth of interest and investment in online learning environments in academe. Another is the prediction industry analysts have made that nearly two million post-secondary students will be engaged in online learning in the United States by the year 2002 [3].

As online learning environments for higher education expand, assessment is increasingly being recognized as a critical issue. Some enterprises are taking radical steps to address assessment challenges. Consider the Western Governors University (W.G.U.), a virtual university that as of September 1999 had spent thirteen million dollars to put 130 courses online (http://www.wgu.edu/wgu/index.html). W.G.U. separates course delivery (which may originate from any of the dozens of member campuses located within the nineteen participating states and territories) from assessment (which is administered by an "assessment council" located in Denver, Colorado). Separating assessment functions from instructional functions, as done at W.G.U., is a disturbing trend for those who believe that assessment should be faculty-driven and embedded in instructional practice [15]. But it is also a sign of the concern

many academic entrepreneurs (as well as the corporate interests behind them) have for improving assessment in higher education.

Whether separate or integrated, any approach to improving assessment in online learning must seek to reach optimal levels of "alignment." Alignment is evident when the articulation among learning objectives, content, instructional design (especially the tasks in which students will be engaged), instructor expertise, technological affordances, and assessment strategies is as clear as possible. Many of the problems that arise when technology is introduced into university courses stem from a lack of alignment.

For example, consider the integration of resources into an undergraduate course in Ecology. A faculty member may build a course Web site to provide students with an easily undatable syllabus, provide access to extended online resources such as electronic journals and real time ecological databases, and foster online discussions via chat or listserv functions. Faculty members who have developed such Web sites may be surprised and disappointed by the failure of their students to use the intended resources or engage in online discussions [16]. However, students may perceive a lack of alignment in that neither the use of the Web resources nor the participation in online discussions have any relationship with assessment and grading in the course, and thus they choose to target their efforts on those learning activities more clearly aligned with getting the best possible grade in the course (such as reading a textbook or studying lecture notes).

Students regularly seek to ferret out those aspects of any course that are most closely aligned with getting a good grade, and thus faculty members are often asked annoying questions such as "Do we have to know that" or "Is this going to be on the test?" An advantage of online learning components such as course Web sites is that they can make the answers to these types of questions public through an explicit explanation of the alignment of assessment procedures with the goals, methods, and resources within a learning environment [16].

The need to enhance assessment within online learning environments is also being driven by the increased demand on the part of business and industry that their employees possess higher order outcomes such as problem-solving skills and a capacity for lifelong learning as well as discrete knowledge and skills [17]. According to a recent article in *Business Week* [3], UNext.com, a for-profit online learning enterprise that features Nobel Prize winning faculty and prestigious collaborating institutions such as Columbia University, Stanford University, the University of Chicago, and the London School of Economics and Political Science, is spending more than a million dollars to develop each course the company will offer. However, their target audience is not traditional undergraduates, but knowledge workers from large corporate clients such as IBM. These clients expect guarantees that in return for investing in this type of online learning, their workers will be better performers in the twenty-first century. Obviously, enhanced assessment is essential to those guarantees.

THREE NEW DIRECTIONS FOR ONLINE ASSESSMENT

There are three major directions for integrating alternative assessment approaches into online learning environments: 1) cognitive assessment, 2) performance assessment, and 3) portfolio assessment. "Cognitive assessment" is focused on measuring students' higher order thinking abilities, attitudes, and communication skills [18]. Inevitably, there is considerable inference involved in measures that are used to assess higher order thinking skills and attitudes. One popular cognitive assessment approach is concept mapping, a strategy that enables students to externalize the relationships they have made among concepts and processes within a domain and to reveal the structure of their knowledge [19]. Concept mapping software, e.g., Inspiration (http://www.inspiration.com), has been available for years, and recently Internet companies such as Concept Systems, Inc. (http://www.conceptsystems.com) have developed Web-based concept mapping tools.

Cognitive assessment measures such as concept mapping may lack the "face validity" of more traditional measures of academic achievement in the eyes of many faculty, but research supporting their utility is strong [20]. Nonetheless, although face validity is not as important as construct validity in a purely psychometric sense, the former is essential if alternative assessment procedures are to be accepted by faculty and students. Faculty who explore the use of concept mapping as both an instructional tool and a method of cognitive assessment report useful results [20].

Although it is not directly observable, deep conceptual knowledge can be inferred from students' performance on a range of cognitive assessments. Other cognitive assessment measures such as problem-solving simulations can be integrated into Web-based learning environments. However, cognitive assessments must be used judiciously because students can learn to mimic conceptual knowledge by repeating answers to previously presented questions rather than generate unique responses to novel problems. Faculty may unwittingly participate in this charade by over-emphasizing the need to get the "right answer" rather than striving to detect the thought processes students use to arrive at answers. Cognitive assessment walks the fine line between traditional testing procedures that assess low level knowledge and skills and highly inferential measurement scales that have insufficient relationships with the content of any given domain.

The second major direction for integrating alternative assessment approaches into online learning environments is performance assessment defined as methods that require learners "to demonstrate their capabilities directly, by creating some product or engaging in some activity" [21]. Performance assessment is focused on learners' abilities to apply knowledge, skills, and judgment in ill-defined realistic contexts whereas traditional testing largely measures inert knowledge that can be cued by a few artificial stimuli [10]. The key attributes of performance assessment

are: 1) it is focused on complex learning, 2) engages higher-order thinking and problem-solving skills, 3) stimulates a wide range of active responses, 4) involves challenging tasks that require multiple steps, and 5) requires significant commitments of student time and effort [22].

In traditional higher education contexts, assessments are usually distinct activities clearly separated from instructional events. For example, after students in a Biology course have attended twenty lectures and completed six labs, they are likely to have a mid-term examination consisting of many multiple-choice questions. A major advantage of online learning environments is that assessment activities can be embedded unobtrusively into the interactive structure of the program via interactive multimedia simulations. A Web-based simulation of evolutionary processes can engage students in a series of increasingly complex problems, complete with detailed guidance and feedback. The computer can track improvements in student performance within the various problems, and thus provide the instructor with performance assessment data at the same time that the program is using the same data as the basis for additional instruction.

The third major direction for integrating alternative assessment approaches into online learning environments is portfolio assessment, defined as any method by which a student's work is stored over time so that it can be reviewed in relationship to both process and product [23]. Portfolios have been widely accepted as assessment methods for decades in fields such as art, architecture, and engineering. Electronic portfolios are relatively new developments, but many Web resources are available today to support the development and maintenance of digital portfolios (http://www.folioone.com/).

Whereas performance assessments usually focus on solutions alone, portfolios enable faculty to judge the interim steps and draft products that were involved in the completion of a task or course of study. Students can be encouraged to annotate their portfolios via electronic journals or reflections. One example of the use of portfolios can be found in the Instructional Technology Masters program at The University of Georgia where students publicly present a comprehensive portfolio of their design work as the culminating assessment in the program (http://it.coe.uga.edu/pdf/portguide.pdf).

DISCUSSION

Most higher education courses continue to be dominated by teacher talk, texts, and tests, and many faculty remain comfortable with the notion that they can transmit knowledge to relatively passive students and assess their achievement with traditional measures [2]. Further, it is difficult to convince faculty that most knowledge is heavily contextualized and that its generalizability is severely limited. Indeed, faculty tend to over-emphasize the measurement of decontextualized knowledge, assuming that the less contextualized their tests are, the more likely they are to assess generalizable knowledge and skills. This

assumption is very weak in light of the generally poor transfer of higher order knowledge and skills found from one part of the curriculum to another, or from the curriculum to real world performance contexts [24]. Testing decontextualized knowledge with abstract tests may lead to greater variance in grades, but faculty should not fool themselves into thinking that they have measured what is really important.

Assessing higher order outcomes, performances, and portfolios within interactive learning environments is a major challenge that must be addressed carefully. Traditional assessment measures are unlikely to reveal the complexities of the outcomes of student-centered online learning environments that are radically different from the dominant teacher-centered instructional paradigm. If the increased attention to higher order thinking outcomes, alternative instructional designs, and the use of technology in higher education is more than just a fad, there must be greater efforts to develop alternative assessment methods. This article is intended to point faculty in new directions, but there is inadequate space to provide detailed guidelines and examples. Much work remains in this area, and it should be the focus of serious research and development initiatives.

The future of online learning environments is still evolving and I hesitate to predict what it will be. Some have been very pessimistic [7] whereas others have been extremely optimistic in their prognostications [5]. Some predictions even forecast the end of higher education as we know it today. For example, James Duderstadt [25], former President of the University of Michigan, acknowledges a possible future in which corporate university interests construct a:

> . . . brave new world of market-driven higher education . . . consisting of fifty thousand faculty "content providers," two hundred thousand faculty "learning facilitators," and one thousand faculty "celebrities," who would be the stars of commodity learning-ware products [25, p. 12].

Will cyber-education replace traditional campuses as some have predicted [5]? Major problems in traditional higher education have been highlighted in scholarly publications as well as the popular press, including: 1) academic institutions have unclear or contradictory missions, 2) poor quality teaching is ubiquitous, 3) faculty research agendas do not serve the interests of the public, 4) academic freedom and tenure are outmoded concepts, and 5) the costs of higher education are spiraling out of control [2]. Confronting the twin challenges of overcoming these problems and improving overall academic quality, many authorities are looking to technology as a meta-solution to both real and imagined ills [5, 6]. While some scholars acknowledge that technology can introduce new problems as well as ameliorate existing ones [4], many people in and out of academe are looking to increase access, improve quality, and lower costs via online learning environments [26]. Arguing against these enormous change forces is probably futile, and thus it is critical that faculty play a leading role in these developments. What may seem