

# The Efficacy of Current Assessment Tools and Techniques for Assessment of Complex and Performance-Based Learning Outcomes in Online Learning

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## INTRODUCTION

What does it mean when graduates of education systems are able to identify and solve problems, and make contributions to society throughout their lifetime (Bransford, Brown, & Cocking, 2000)? How can educators assess the development of problem solving or higher-level thinking skills and make sure that students are able to succeed in transferring their knowledge and skills to the complexities of a real-life environment? What role can technology play in augmenting what learners can do? These questions and related issues have fascinated educators and educational researchers for years. However, given the opportunities and challenges that distance education and online learning have opened up to educators, these issues are essential for the design and structure of effective online learning environments, and as such, these are the questions and related issues discussed in this article.

## BACKGROUND, DEFINITIONS, RATIONALE

Criticisms of traditional classroom-based assessment methods are well established in the education literature (e.g., Frederiksen, 1984; Gardner, 1985; Resnick, 1987; Resnick & Resnick, 1992; Smith, 1986; Soep, 2006;). Critiques often mention that too much emphasis centers on measurement and ranking and too little on how assessment can serve as an episode of learning that is consistent with the larger goals and practices of preparing students for real-life situations or what is called “21<sup>st</sup> century skills” (Bennett, Persky, Weissm, & Jenkins (NAEP), 2007). It is argued that conventional assessment methods or testing procedures often privilege discrete bits of knowledge over performances that reveal applied knowledge and skills (Frederik-

sen, 1984; Gardner, 1985; Resnick & Resnick, 1992; Smith, 1986). Furthermore, assessment of a student’s complex abilities or life-like performance requires a complex and formative assessment process and is not supported by conventional forms of assessment, which are focused on summative judgment of simplified and routine problems or questions. In other words, there is a distinction between “assessment *of* learning” (assessment for the purposes of grading and reporting with its own established procedures) and “assessment *for* learning” (assessment whose purpose is to enable students, through effective feedback, to understand more fully their own learning and the goals they are aiming for” (Elwood & Klenowski, 2002, p. 243). While the former emphasizes results of student learning, the latter places the student and learning in the center for the assessment as an instructional practice and aims to contribute to learning processes (Black & William, 1998).

These criticisms are not confined to classroom-based assessment. Assessment in online or web-based learning environments also has been criticized for simply imitating traditional classroom-based assessment and failing to seek new and original ways of assessing complex learning using the full potential of e-learning environment (Cousin, 2005). Scholars interested in effective online or web-based learning (e.g., Alley & Jansak, 2001; Ganesan, Edmonds & Spector, 2002; Goodyear, 2002; Knight & Banks, 2003; Twigg, 2001) are concerned with the design of learning environments that encourage complex and real life achievements. This literature advocates the design of learning environments that favor the emergence of complex outcomes of learning. However, a common assumption when assessment is considered in the context of online learning is that the focus will be on technology-based assessment, which typically means objective, paper-and-pencil tests using web forms, where essentially the student is interacting with the computer. This technology-based assessment

is intensely individualistic (as it is done alone), and emphasizes summative judgment, competition, and prohibits collaboration.

Part of the difficulty in applying assessment that is focused on performance in online learning environments stems from the fact that developing, implementing and managing complex and collaborative learning tasks in online learning do not lend themselves to straightforward, computer graded and replicable assessment methods (Soep, 2006). It is not easy to design and develop complex and problem-based tasks for online learning environments and then virtually implement, track and compare student learning when they work together on real world problem-solving projects. In addition, there are other pedagogical challenges, such as identification and articulation of student learning outcomes that are complex and focused on the student's ability in applying academic knowledge and skills to solve ill-defined, real-world problems.

There is a need, therefore, to identify effective assessment methods appropriate to online learning and understand how online learning changes the selection, monitoring and managing of assessment activities (Australian National Training Authority, 2002). It is also important to investigate what technology tools and techniques are available in current online learning environments, whether or not these tools and techniques are adequate for assessing complex learning outcomes, and how and in what ways these tools and techniques can be exploited to promote assessment as part of learning (Russell, Elton, Swinglehurst & Greenhalgh,

2006) in order to be used to make the feedback loop between instruction and assessment more meaningful (Mandinach, 2005). In sum, establishing online learning environments that are empowered by assessment techniques that make the best use of new and emerging communication technologies is one of the most complicated problems faced by online educators and designers.

## ASSESSMENT OF COMPLEX LEARNING IN ONLINE OR WEB-BASED LEARNING ENVIRONMENTS

Educators agree that “the principles of assessment do not change in an online environment” (Benson, 2003, p. 71). Good assessment means having a clear idea of what one wants to assess and then picking the best way to assess it. Generally speaking, the rule of thumb is: simple learning outcomes, simple assessment; complex learning outcomes, complex assessment. While knowledge and simple skills can be assessed well using multiple-choice, matching, T/F, and short answer test items (traditional paper-and-pencil test) complex skills such as reasoning, problem solving, critical thinking, and application of knowledge probably need assessment techniques that are more sophisticated and are evidence or performance-based. Furthermore, all assessment, especially where human thinking and doing are concerned, rests on judgment of available evidence rather than correct responses to a series of test

*Table 1. Assessment that measures simple learning outcomes*

Learning Outcomes	Assessment Characteristics			
	Focus	Purpose	Role	Tools
<b>Simple Learning Outcomes</b> (knowledge & simple skills)	<b>The focus is on:</b> <ul style="list-style-type: none"> <li>Assessment of discrete knowledge &amp; skills</li> <li>Assessment of individual learner</li> <li>Assessment procedure that is isolated from complexity of real life context</li> <li>Assessment of learners at the end of learning/ instructional activities/tasks</li> <li>Interaction between the assessment tool &amp; the learner</li> <li>Development of an assessment instrument/test</li> </ul>	<b>The purpose is to:</b> <ul style="list-style-type: none"> <li>Measure what learners can do at a particular time</li> <li>Support achievement of lower level cognitive skills as a prerequisite for <b>higher level thinking skills</b></li> <li>Generate evidence of student learning &amp; then making a judgment about that evidence</li> </ul>	<b>The role of assessment is:</b> <ul style="list-style-type: none"> <li>To make a diagnostic or <b>summative judgment</b> of learning</li> <li>Prepare learner for achievement of higher level learning tasks</li> <li>To identify whether individual learner mastered predefined knowledge &amp; skills</li> </ul>	<b>Assessment tools should allow:</b> <ul style="list-style-type: none"> <li>Learners to display their knowledge &amp; skills in predetermined way</li> <li>Development of valid and reliable assessment instrument/test</li> <li>Documentation of learners' response to predefined tests/ assessment items/questions</li> <li>Immediate feedback, grading and other statistical analysis</li> <li>Multiple measures of knowledge &amp; skills</li> </ul>

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