21st Century Assessment: Redesigning to Optimize Learning

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Abstract: This poster presents design implications related to findings from research on the development of Interactive Learning Assessments (ILAs). Standardized assessments using multiple choice questions cannot measure the most critical aspects of learning for the 21st century. ILAs place students in advisory roles, leveraging a place-based metaphor to navigate, learn, then give counsel in situations in which they do not already know how to solve the problem; we assess how students learn to learn.

"I think it was because it's like it's a real thing, like genetic counseling is a real thing in the world and then if you know that what you're learning in class can actually help somebody it just gives you more of a reason to learn it."

Introduction

The above quote highlights the potential for successful integration of learning and assessment in the 21st century context. Rather than emphasizing facts and fragmenting the curriculum, students should see connections to their everyday and professional future selves. Preparing students for diverse and technologically demanding lives requires a substantively different skill set than has been traditionally in school curricula (Partnership for 21st Century Skills, 2002). Towards this goal, we have been designing assessments and related curriculum practices. Our work builds on theories of teaching, learning, transfer and assessment (Bransford, Brown, & Cocking, 2000; Bransford & Schwartz, 1999). While being assessed, students should have the opportunity not only to demonstrate what they already know, but also how prepared they are to learn in the future. Learning should pause while students are assessed. Though strides have been made with respect to teaching practices and the use of formative assessments to improve teaching and learning (Black & Wiliam, 1998), we envision major changes in *what* we assess. Most assessments emphasize factual knowledge rather than problem solving and thinking skills, or attempt to measure these skills in the absence of content, leaving out key elements of what is known about the development of expertise (e.g., Ericsson, 2006). Therefore, if the assessment of 21st century learning is to reveal and drive meaningful learning, it must be authentic and occur at the nexus of skills and content.

Learning Assessment Design Principles

With these issues in mind, we have engaged in design-research, iteratively designing Interactive Learning Assessments (ILAs). As an illustration, the learning assessment we designed for the domain of human genetics has three cases that relate to a common scenario, in which students assume the role of an intern genetic counselor (Svihla, et al., 2009). Each case involves a simulated meeting between the student-as-intern, a virtual mentor and client(s) seeking genetics counseling. Clients have authentic presenting circumstances—for example, in one case the clients, a Mr. and Mrs. Jones, wish to start a family but are concerned about the risk of their children inheriting sickle cell disease. To successfully counsel these virtual clients, students need to understand and be able to apply a set of core genetics concepts and skills and to communicate with their clients in ways that are professional and appropriate to the role of genetics counselor. Sickle cell disease was chosen because it is frequently included in high-school biology curricula and is sufficiently nuanced, providing many layers for exploration: inheritance, evolution, gene-environment interactions, protein structure-function, political policy and bioethics. Each of the cases is organized into three phases: *preparation*, in which *s*tudents familiarize themselves with the case and conduct research prior to counseling their virtual clients; *formative assessment plus feedback* in which students interact with a virtual mentor to review their preparation, and as needed, further prepare for meeting their clients; and *performance and reflection*, in which students counsel their clients and reflect on their learning.

Findings from Design Cycles

Design cycles have been conducted in high school biology classrooms in a rural North Carolina community and in a suburban, high-SES Washington state community. Our research with this learning assessment shows that this

approach provides a rich source of information about students' learning related to content and ability to synthesize across resources, especially as compared to traditional assessments (Gawel, Philips, et al., 2008; Gawel, Phillips, Svihla, Vye, & Bransford, 2008; Svihla, et al., 2009). Teachers appreciated that it changed their perspective of how they interacted with students.

Although pleased with aspects of the design, classroom iterations highlighted redesign opportunities, presented in Table 1. The most significant change involved moving from linear, programmed instruction to a place-based metaphor, which provides virtual locations for types of activities and allows the student to make decisions about when she or he is prepared to counsel clients. The place-based metaphor includes the *Lobby*, where students can learn about general aspects or get a new case, *Mentor's office*, where students can be mentored, an *Intern room*, where students can interact and give and get peer feedback, and a *Consultation room*, where students can answer questions from their virtual clients. Also provided are tools to scaffold students in making effective and responsible use of internet resources, and for professional writing. This place-based metaphor requires that students take greater control of their learning, allowing assessment of metacognitive aspects in addition to contextualized problem solving.

Table 1. Emergent design needs and directions

Needs	Design directions
Students did not do initial research to prepare themselves to meet with their clients.	Provide more explicit scaffolding and expectations; Block access to client if student has not prepared; Show "final product" example to hint at scope of expectations.
Students did not use internet to revise answers.	Provide case report tool to scaffold writing; Include opportunity for peer review; Add bibliographic tool to store notes, rate reliability of sources, tag with key words, and cite sources.
Students didn't understand what an internship is.	Provide explicit introduction to what an internship is.
Students wanted to be told what to do.	Provide guidance that puts students in control, leveraging game-like atmosphere; Allow time for implementation dip.
Linear structure limited ability to assess students' judgments about their preparedness	Shift to place-based metaphor.
Teachers were uncertain about placement in curriculum.	Provide teacher guide showing options (e.g., as formative introduction or summative conclusion to a unit).

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