A Tool for 21st Century Learning and Assessment

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Abstract: Twenty-first century assessment must reveal and drive meaningful learning. Typical assessments focus on what students have learned but not necessarily how prepared they are to learn in the future. Through design experiments, we have created and researched Preparation for Future Learning assessments in which students use real-world resources to learn to solve problems. Our goal is to provide valid measures of students’ existing strengths as well as skills and knowledge that they need to learn.

Purpose and Rationale

In this interactive event, participants will experience the affordances that a 21st century Preparation For Learning assessment (PFL) provides over a traditional sequestered assessment. We will demonstrate our current tool in which learners take on the role of a virtual genetic counselor as they solve a complex challenge, acting as members of a community of experts. Parts of the assessment involve individual, collaborative, and whole-class or cross-class activity.

This quest to design instructional assessments arose from a partnership with education and policy leaders in North Carolina and Washington State. We are striving to align our work with new sets of 21st Century Skills (Partnership for 21st Century Skills, 2003), in part because educational leaders in North Carolina worried that their current assessment systems are inadequate for the task of assessing 21st Century Skills. The problems facing North Carolina are shared by other countries as well (Partners In Learning, 2006). As emphasis has shifted to easily measurable learning, such as multiple choice assessments, teaching has aligned with this method of assessment.

In order to transform current accountability systems, we are designing a multimedia, PFL assessment that provides opportunities for students to learn while being assessed. In a PFL assessment, students demonstrate their capacity to solve problems by having the opportunity to learn while performing the task in knowledge rich environments (Bransford & Schwartz, 1999). We are designing an assessment that can be used in a formative (Black & Wiliam, 1998) and summative manner. Our goal is to assess skills in the context of challenging content (Figure 1).

Figure 1. 21st Century assessment lies at the nexus of 21st Century Skills

The development of an assessment tool that is scalable and capable of making student thinking and learning more visible presents a possible solution to a critical global need. While there are examples of assessments making use of computers, and even use of latent semantic analysis for evaluating essays, neither leverages the potential presented by modern technology.

Partnering with content experts and teachers, we designed assessments in the context of genetics. Our PFL assessments are scenario-based and place the students in the role of genetic counselors who answer questions posed by virtual clients. We contrast these with traditional assessments that comprise multiple choice (MC) questions constructed by a test question analysis consultant to a large testing corporation and by a classroom teacher, then reviewed by a content expert.
Objectives

Our findings from two iterations of design experiments demonstrate some of the affordances presented by PFL assessment: students may make use of feedback and resources, learning and changing their minds during the assessment. This model of assessment not only provides deeper and more relevant information about students as well as for them, it also aligns better with real world demands. One of the objectives of our proposed interactive event is to contribute to the global conversation about assessment as a driver of instruction, and to consider how this model might help us to move beyond old inventory models (as when stores used to close to count their remaining stock; technology now allows this to occur dynamically. This has yet to occur in schools: instead, we pause learning in order to measure student knowledge.). Another objective is to garner international perspectives on the current design and how we might improve. Our concerns include finding points of leverage for automating feedback, designing for collaboration, better reflecting 21st century skills, and considering ways to incorporate working smart tools.

Internet searching is included as a way to both foster student learning during the assessment, and to create an authentic 21st century task. An affordance of the searching is that students are given feedback by the search engine when they have poorly specified a search term. Students have demonstrated that they can make effective use of this type of feedback, but this is clearly not sufficient to our ultimate aims. Additionally, we need to consider ways to help students learn to be better critical readers with their searches, particularly in light of findings demonstrating that searchers are biased in their selection of an internet resources, based on their prior conceptions (Lau & Coiera, 2007). We recognize the shortcomings of a largely text-based assessment of scientific learning and intend for future renditions to foster model-based thinking (Schauble, 1996; Schauble, Glaser, Raghavan, & Reiner, 1991). We would like to explore how to powerfully incorporate simulations as part of the assessment.

As we continue to design to support collaboration, we consider how students may act as colleagues in a community of learners (Lave & Wenger, 1991). In addition to including questions that ask students to compare answers, to evaluate their answer in light of other (both student and expert) answers and to develop consensus about specific questions as a team or class, we have incorporated or repurposed freely available tools, such as social bookmarking and wikis. Social bookmarking tools allow students to “tag” resources they see as relevant to their research, building up class-wide (school-wide, or state-wide, etc.) resource lists that evolve as they continue to be used within that community. Additionally, in our current redesign, we are including ways for students to offer their expertise to others, as well as ways for students to request help from a colleague when needed.

The development of a PFL assessment that is both scalable and capable of making student thinking and learning more visible presents a possible solution to a critical global need. While there are examples of assessments making use of computers, and even use of latent semantic analysis for evaluating essays, neither leverages the potential presented by modern technology.

We are iterating towards a scalable “working smart” assessment system that will show how students, both individually and collaboratively, learn and improve. The PFL assessment employs scenarios in which students participate in cycles of 1) self-, peer-, technology- and teacher-directed learning, 2) formative assessment, 3) further learning and revision, and 4) benchmark assessment of knowledge and skills. We seek to continuously improve and to find partners who can contribute to this substantial undertaking.

Figure 2. A screenshot of the clients in the 1st Genetic Counseling Scenario
Format
Participants will work in pairs, either sharing one computer or collaborating with two computers. Given sufficient time allocation, participants will first complete a brief traditional assessment in biological sciences as a point of contrast to our design. They will be asked to reflect on their experiences with this assessment, then begin the PFL assessment scenario. Two versions of the PFL assessment have been tested, one in North Carolina and one in Washington State (See http://staff.washington.edu/djgawel/ncavideo/ for links to the tool. Please contact us for a password). We are actively redesigning these as we prepare to go to scale next year; thus the version participants will interact with will be similar to this, but will include new features, such as more opportunities for feedback, better quality video and voice-over, and functional “teacher perspective” views, in which one can see what information about student work teachers will receive.

Participants will begin the PFL assessment by viewing a machinima of a virtual couple considering having a child, but concerned the child might inherit sickle cell disease (See Figure 2). Sickle cell disease was chosen because it is a widely used topic 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. Additionally this context has been studied elsewhere (Bell, et al., 1993). Participants are asked to take on the role of genetic counselor, which makes the problem more student-centered and eventually, student-driven. Learning theory posits that this is a way to keep students engaged with the learning experience, and will result in more successful learning (Bransford, Brown, & Cocking, 2000).

Participants will be directed to consider how this assessment currently measures 21st Century skills, as well as how it could better do this as they engage with it. Participants will be asked to comment upon the assessment, and if willing, be asked to help us critically evaluate how to improve learning and assessment of 21st Century Skills.

References

Acknowledgments
We would like to thank the many people of North Carolina who have supported this project. Sam Houston, President and CEO of the North Carolina Science, Mathematics and Technology Center was particularly instrumental in supporting this project and funding this project through the Burroughs-Wellcome Fund. Preparation of this paper was strongly influenced by our colleagues at the Learning in Informal and Formal Environments, and supported in part through NSF grant # 0354453. The ideas expressed in this article are not necessarily those of the NSF. We would especially like to thank the students, teachers, faculty and staff involved in the design experiments. They were extremely generous, thoughtful and committed. Finally, we would like to thank the anonymous reviewers who helped us improve this proposal.