

Measuring Skills for 21st-Century Learning

Designing assessments that measure newly important skills presents challenges, but that should not be an excuse for failing to evaluate what students know and are able to do.

By Elena Silva

An emphasis on what students can do with knowledge, rather than what units of knowledge they have, is the essence of 21st-century skills.

“21st-century skills” is one of the most ubiquitous terms in today’s education debates. Proponents point to a new workforce reality that demands a next generation of college students and workers who are independent thinkers, problem solvers, and decision makers. Public schools, they argue, must focus not just on imparting the basics, but equally so on ensuring that students gain a suite of newly important thinking and reasoning skills. Widely cited by national education groups, teacher unions, higher education organizations, and workforce development groups as an imperative for today’s students, these skills are also gaining steam with policy makers. The governors and chief state school officers of at least 10 states have committed to revising standards for teaching and learning and to create new assessments that reflect the need for 21st-century skills (Gewertz 2008).

But critics levy strong arguments against the push for these skills. They decry so-called 21st-century skills as a meaningless term and a distraction from the more important work of teaching core content. There is nothing new about these skills, they say, and emphasizing them will water down standards and weaken teaching. All the more, they argue, these types of higher-order skills cannot be measured in reliable, cost-effective, or scalable ways.

Assessment is a curious driver in the 21st-century skills debate. But it may well be one of the best opportunities to bridge the skills-content divide that has emerged from the push and push-back of the 21st-century skills movement. Emerging assessment models offer some of the most promising examples of how, at once, education can integrate skills and content.

ANY-CENTURY SKILLS

An emphasis on what students can do with knowledge, rather than what units of knowledge they have, is the essence of 21st-century skills. But it’s no wonder that the term seems vague or confusing. There are hundreds of descriptors of the skill set, including life skills, workforce skills, interpersonal skills, applied skills, and noncognitive skills. Even more definitions exist for the individual skills that fall under the

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broader category of 21st-century skills. In defining “technology literacy,” for instance, various education organizations and businesses list information science skills, digital media fluency, advanced computer, and Internet communications, as well as the newborn term “technacy” — a deep knowledge of technological systems.

The century-specific label is also misleading. Knowing how to think critically, analytically, and creatively are not skills specific or unique to the 21st century (much of the same has been argued by

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philosophers and educators from ancient Socrates to 20th-century John Dewey). Such calls, however, have intensified in the past two decades as the nature of the economy and work has changed. Richard Murnane and Frank Levy, both economists and professors at Harvard and MIT, respectively, have been researching and writing about the evolution of the workforce for more than a decade. Work that requires only routine skills, they’ve found, is now more often done by computers (Murnane and Levy 2004). Today’s workers in nearly all sectors of the economy must be able to find and analyze information, often coming from multiple sources, and use this information to make decisions and create new ideas.

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TEACHING THE SKILLS

Imparting these newly relevant skills is not an option or an add-on. Studies by national



and international research organizations, including the National Research Council, OECD, and the International Society for Technology in Education, have shown that complex thinking and analytical skills are an integral part of learning at every stage of development (Bransford, Brown, and Cocking 1999; OECD 2004; Kozma 2003).

The notion that skills and content are best learned together is also one of the major findings of a recent report on mathematics education, funded and released by the U.S. Department of Education (National Mathematics Advisory Panel 2008). The best learning happens, the report asserts, when students learn the basic rules and procedures of arithmetic at the same time that they learn how to think and solve problems.

The mathematics report also concluded that there is no set age or developmental stage when children are ready to gain complex thinking skills. This is in sharp contrast to the previously held notion that very young children are concrete and simplistic thinkers who can't think abstractly or gain deep understanding of concepts. Thus, while there are building blocks of knowledge — students must master addition and subtraction before they multiply or divide — the idea that students should be taught facts and simple procedures before they get to problem solving or critical thinking is flawed.

Even the nonprofit Core Knowledge Foundation, which pushes for a core content-based curriculum

and has become one of the most vocal critics of the 21st-century skills movement, agrees that learning factual knowledge and the ability to apply, analyze, and create new knowledge go hand-in-hand.

The best educators know that students can't develop and use skills without a core body of knowledge. But they also know that they must emphasize higher-order thinking and problem solving if their students are to ultimately learn how to learn for themselves. Finding and preparing teachers to effectively deliver both content and skills is a very real human capital challenge in a system where the least experienced and least qualified teachers are often placed with the neediest students. But it is this combination of teaching a rich body of knowledge and providing engaging opportunities to apply this knowledge that all students deserve and that public education must work toward.

MODEL ASSESSMENTS

Too much testing has been blamed for narrowing the curriculum. Preparing for and administering mandated tests of basic reading, mathematics, and science take up too much time, teachers say, and force a focus on the basics above all else. But new models of assessment that measure both content and skills are emerging and hold the potential to move us toward an assessment system that is more aligned with what students need to know.

The College Work Readiness Assessment (CWRA) serves as one example. It consists of a single 90-minute task to which students must respond using a library of online documents, from one-page newspaper editorials to 20-page research reports. Facing such problems as a city beset by pollution from a now-defunct factory or a community health clinic struggling to serve a growing immigrant population, students must grapple with real-world dilemmas; make judgments that have economic, social, and environmental implications; and articulate a solution in writing.

The CWRA is intended as a tool for school improvement, not necessarily to measure individual student gains. But those who use it affirm its value as an essential metric for student learning. "Are we teaching our students to think intelligently and critically, to do more than just follow or even lead, but to find new paths to go down? That's what we learn from [the CWRA]," John Austin, the academic dean of St. Andrew's, an independent private school in Delaware that has been using the CWRA for two years, said in an interview with me.

The CWRA grew out of the Collegiate Learning Assessment (CLA), the higher education equivalent

developed by the Council for Aid to Education and the RAND Corporation. Nearly 200 higher education institutions now use the CLA, while the CWRA is in use by only a handful of private schools and a single Long Island, N.Y., public school.

New technologies are making it easier to measure individual student mastery of 21st-century skills. River City, for example, is a “virtual world” that simultaneously teaches and assesses middle school science students. Like other simulated learning programs in education and a range of other industries, River City presents students with a problem and asks them to develop a hypothesis and procedure, test it — virtually — and then describe their findings and make recommendations in a report.

From a technical standpoint, these “multi-user virtual environment” tools are among the most advanced performance assessments that now exist. They can keep detailed records of the moment-by-moment movements and decisions of each participant and provide a log for each student in each session. Teachers can track the progress of individual students.

Programs like River City are good for tracking student gains at the classroom or school level, but the true test for accountability will be if assessments like this can work on a larger scale. Several promising examples move toward this goal, taking the necessary step of linking these types of assessments to existing state or national standards.

Researchers at the Center for Research on Evaluation, Standards, and Student Testing (CRESST) at the University of California-Los Angeles have developed an assessment that measures complex thinking and judgment skills within the existing framework of state math assessments. The system, called PowerSource, is funded by a U.S. Department of Education Institute of Education Sciences grant and is now being piloted in nearly 70 schools. Designed for middle school prealgebra, it consists of multiple interim assessments that are formatted as narrative themes or graphic novels. When I interviewed her, Eva Baker, who directs the center, explained: “It’s still an experiment. But it has real promise for improving instruction and for demonstrating mastery of a broad set of skills.”

The International Baccalaureate (IB) Diploma Programme, a rigorous two-year high school course of study taught in more than 2,000 public and private schools in 130 countries under the auspices of the nonprofit International Baccalaureate Organization, serves as evidence that the assessment of core content and advanced skills, aligned with a program of stan-

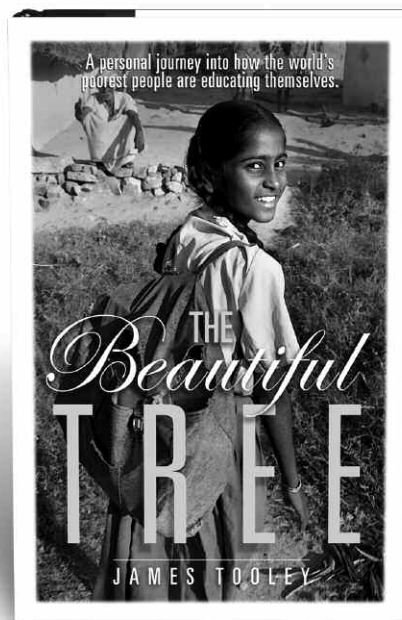
dards and curriculum, can happen at a large, even international, scale. The 40-year-old program is built on the principle that students can and should master both basic subject matter and higher-order skills. The program has developed common curricula, standards, and assessments that are used throughout its school network and has developed strategies for ensuring the standardization of both teaching and teacher-graded testing (International Baccalaureate Organization 2004).

The program assesses student performance using a range of techniques, both internal (classroom-based, teacher-led) and external. All courses, for example, have three or four separate assessment components, none worth less than 20% or more than 50% of the overall assessment. Each component includes a range of performance tasks in various formats appropriate

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to the subject matter, which could include multiple-choice questions, short-response questions, structured and open-ended problem-solving questions, data analysis questions, case studies, and essay questions.

THE WAY FORWARD

Measuring more on a large scale is no easy task, but it can be done. Addressing concerns of cost and reliability are key. So, too, is ensuring that assessments provide more and better information about student learning to teachers and schools without adding another layer of testing.

Cost is a major concern, particularly as most districts face serious cuts in revenue. Multiple-choice, machine-scored assessments are generally less than \$1 per test (GAO 2003). Assessments like the CWRA, on the other hand, run more than \$40 per test, though still a relatively small portion of the roughly \$8,000 spent on education per student.

Training and monitoring human scorers to grade tests is also costly, as well as time-consuming. The IB Diploma Programme, for instance, has nearly 5,000 test examiners worldwide. The program ensures a high level of consistency among its examiners, most of whom are experienced Diploma Programme teachers, by providing detailed instructions on scoring for each assignment, requiring each examiner to submit samples of his or her scoring, and employing a cadre of senior examiners who determine scoring standards and monitor examiner work. A machine-scored test is undeniably faster.

But advancements in assessment technology can do a lot to address the burdens of time and cost. Simulation-based assessments, such as River City, are able to assess students' understanding of complex problems using multiple-choice formats that are automatically scored, making them not only cheaper and more efficient, but also more reliable. And computer-adaptive tests, which adjust the difficulty of questions based on students' performance on previous questions, can be scored immediately and also make faking far more difficult, because the test changes with the individual test-taker. Delaware, one of several states experimenting with computer-adaptive tests, recently completed a pilot of 30,000 students in four districts and found that the adaptive tests were actually better at identifying student growth than existing grade-level tests.

Research on measurement and testing is advancing new ways to overcome concerns about reliability, for instance, whether certain skills can be coached or

“faked” on a test. The Center for New Constructs at ETS sponsored an entire conference in 2006 to understand and address how, for example, a student might answer in ways that suggest she is a critical thinker when in fact she has merely learned what types of answers make her seem that way. Participants discussed the utility of new types of questions, including more subtle questions or more complex “forced choice” questions, which can detect and correct faking.

Assessment won't solve the many problems of public education. But it does return us to the fundamental question of what learning outcomes matter most for students. In the end, there is no real choice between content and skills. For those dedicated to improving day-to-day learning and longer-term student outcomes, designing standards, curricula, and assessments that reflect this reality is paramount. **K**

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