Computer-Based Assessment and Instruction: Technology for Teaching and Learning

Re-published with permission from Family Center on Technology and Disability
Technology Voices - June 2009
Mel Lee and Michael Kasloff share a passion for finding ways to help teachers and students to be successful. It was that passion that drew them to Wireless Generation. This Brooklyn, NY-based company was founded nine years ago by two Rhodes Scholars, Larry Berger and Greg Gunn, who believed that technology could help educators to improve teaching and learning. Mr. Lee and Mr. Kasloff were particularly attracted by the founders’ philosophy of immersion in the workings of schools and current education research in order to develop technology solutions that support teachers in providing effective instruction.

“Larry and Greg started Wireless Generation after having watched schools purchase a lot of education technology products that sat in boxes, gathering dust because they were hard for teachers to use, or didn’t address actual challenges,” says Mr. Kasloff. “They believe that technology does have a place in schools, but that providers have an obligation to develop products and services that reflect a deep and accurate understanding of how teaching and learning actually happen.”

**Computer-Based Assessment**

Schools use a variety of assessments to measure student achievement. These range from formative measures given during the school year to gauge student progress and diagnose learning needs, to summative end of year tests. Wireless Generation has brought a particular focus to the former. For years, teachers have relied upon formative assessments to provide insight into students’ development, particularly in the early elementary years when children are building foundational skills for more advanced learning.
In grades K-6, formative assessment is observational and done one-on-one. Teachers assess at the beginning, middle, and end of year to collect benchmark scores that reveal how students are progressing toward learning key skills. Teachers also do what is known as “progress monitoring assessments” in between the benchmark administrations to gather additional information about each student’s strengths and needs. According to Mr. Lee, the Wireless Generation co-founders watched teachers give these assessments in elementary classrooms, juggling stopwatches, papers, pencils and other materials, then completing the copious paperwork involved in scoring, recording, and analyzing the data. The paper reports generally wound up in filing cabinets, snapshots of student learning no longer considered in making instructional decisions.

“Technology has clearly brought great efficiency to other professional fields,” says Mr. Lee. “Technology-based formative assessments could make the entire process much less burdensome for teachers, and much more valuable.”

Technology has made formative assessment easier, more efficient, and more valuable in the instructional process. Here a teacher uses mCLASS software to record a student’s reading behaviors on a handheld. Results are available immediately, along with analysis and instructional recommendations.

Working closely with university researchers and authors of common early reading and math formative assessments, Wireless Generation developed mCLASS software, which enables teachers to give the assessments more easily, efficiently, and accurately with a handheld device. While students use paper-based materials to do math and reading tasks, teachers record their responses and behaviors directly on the handheld. Because timing is automated, teachers can focus on students rather than administration protocols. Scoring is also automated and occurs immediately, giving teachers real-time information about students’ needs. Teachers “sync” their handheld devices to computers, and student data is uploaded to a secure Web site, where they, as well as principals and administrators, can view a range of different
kinds of reports for analysis and instructional planning. Administrators have access to aggregate reports and can pull out data for virtually any student sub-population, determining how to best meet their particular needs.

Teachers use mCLASS software to give a range of formative assessments including DIBELS (Dynamic Indicators of Basic Early Literacy Skills), developed by researchers at the University of Oregon, and the TPRI, developed by researchers at the University of Texas Center for Academic and Reading Skills, and at the Texas Institute for Measurement, Evaluation and Statistics at the University of Houston. Formative assessments for English language learners are also supported. Universal design principles vary, with the assessment authors providing guidance on whether the measures are appropriate for some or all students (ie, http://www.dibels.org/papers/Appropriateness_0207.pdf).

“Teachers became big fans of the software, especially those who had been using paper and pencil for a long time, because it cuts the assessment time in half,” says Mr. Lee. “We can return that time to the classroom, which is great.”

Lee continues, “Because formative assessment is meant to help teachers understand what instruction they should be providing to which students and when, the software had to do more than just save time. We’ve been fortunate to work closely with many schools and districts, and their feedback pointed the way to where technology could provide the greatest value in linking assessment and instruction.”

What followed were new technology tools and features for teachers to move from data to action. “Teachers would say, ‘I have my data, but now what?’, so the Now What? tools are designed to help answer that question,” says Lee. “We have a Web report that lets teachers review students’ answers during a particular task; the accompanying Item-Level Advisor tool highlights and explains the significant errors and response patterns right on that report. Small Group Advisor is an instructional planning tool that the teacher uses to put her students into small groups according to what the data reveals about their shared needs, so that she can follow up with the right instruction for the right kids.”

Similar support tools were introduced on the handheld device. The “Act” feature recommends instructional activities for individual students based upon their
assessment results. mCLASS:Math guides the teacher through the process of diagnostically interviewing a student to probe his skills and strategies more deeply, and use the findings to make instructional decisions.

“We recognize that every interaction a teacher has with software or other technology is an opportunity for professional development,” notes Mr. Kasloff.

The mCLASS Web reports, for example, “avoid the familiar two-dimensional, flat approach to spitting out numbers and data for teachers. From the beginning, we have paired data with guidance, which helps the teacher to deepen her professional knowledge and skills in working with data.”

Coping with the Bell Curve

In a class in which the bulk of the students are in the bell curve of grade-appropriate math, a much smaller percentage may need remediation because they are at least a year behind their grade in math, and a similar-sized group may be above grade level. Are these computer-based programs effective for all three groups?

Replies Mel Lee: “The mCLASS reports color-code students by strengths and needs. Teachers can use tools such as the Small Group Advisor to plan instruction for each group: grade-level and above, at some risk, and at highest risk.”

Many schools use technology-based assessment in their Response to Intervention (RTI) programs. “Teachers can do this kind of technology-based assessment more frequently. The progress of at-risk students can be monitored as often as every 1-2 weeks. These checks are incredibly important so that classroom time is maximized - if a particular intervention isn’t working for a struggling student, teachers know to change it.” Lee has spearheaded the development of a special version of mCLASS for RTI that allows general education teachers and special education staff to capture and share not just data, but also the specific interventions given, and for how long, the multi-dimensional tracking that is characteristic of formal RTI implementations.
Computer-Based Instruction with a Teacher at the Center

A student seated in front of a computer clicking and listening to an unseen instructor via headphones is a familiar image. When Wireless Generation developed its Burst:Reading technology-powered intervention for grades k-3, it decided that the teacher had to remain at the center of the action. “Having the teacher deliver the instruction, and engage and inspire students is particularly important when you are intervening in the early grades,” says Mr. Kasloff. “We recognized that technology could help every teacher to be adept at differentiating instruction for their students, with all of their varied needs, but as in our approach to assessment, technology is a support, not a replacement.”

Burst:Reading is distinct from other paper-based and computer-based programs because it is embedded with new, patent-pending technology that matches curriculum to students’ needs based upon past and current assessment data. “This was a logical extension of our work in the formative assessment area,” says Mr. Kasloff.

New technology has been developed to support teachers in giving the right instruction to their students every day, based upon learning needs. For example, Burst:Reading analyzes students’ formative assessment data, groups students with shared needs, and sends the teacher a 10-day sequence of lessons for her to deliver to each group. The teacher adjusts groups and lessons as she sees fit.

The technology applies an algorithm that analyzes the data, groups students in the class who share needs, and creates a customized 10-day sequence of lessons at the right pace and intensity for each group. The teacher downloads the lessons, teaches for 10 days, and re-assesses her at-risk students. The whole process then repeats with the new assessment data informing the analysis, grouping, and selection of lessons.
“It takes many hours outside of class time for a teacher to analyze data for each student, create groups for follow-up instruction, and then cull through instructional materials to find the right lessons for each day. Even the most accomplished, dedicated teachers can find it challenging,” says Mr. Kasloff. “This is another great example of how technology, when applied appropriately to classroom activities and with respect for the unique, human characteristics of teaching and learning, can help to make instruction more effective.”

**Flexible Instructional Content**

“One of the great benefits of computer-based instructional materials is that they are easily updated or modified to meet students’ needs. Traditional printed textbooks are updated only every 5-7 years,” says Mr. Kasloff. “Computer-based programs are far more flexible and conducive to tailoring instruction to the needs of the individual learner than having a teacher take an entire class of 25 kids through a textbook in lockstep, regardless of where each child may be in his development.”

Universal design principles are kept in mind. The content of the Burst:Reading lessons is always multi-modal. For example, a sub-skill in literacy is the ability of students to distinguish sound and language. The skill can be taught using a physical manipulative employing rhymes and poems, movement of the body, in some cases even using a hand-puppet that simulates generation of language. The lesson includes these different modalities with the goal of meeting students where they are. Additional modalities can be added if necessary.

Cultural relevance is also considered, and content can be instantly tweaked. “In terms of cultural relevance, our goal is to help teach students various ways to comprehend text,” Mr. Kasloff remarks. “This has become an increasingly sophisticated effort using a carefully crafted set of stories. To get to the approximately 10 stories needed for a specific instruction strand, we will produce approximately 40 stories around different themes and topics, and field test them broadly until we find the stories that have the most cultural relevance for students.”
Computer-Based Programs in the Home

Mr. Lee explains that Wireless Generation’s assessment offerings, with one exception, are not designed for in-home use. But to involve parents in their child’s education, many school districts using mCLASS assessment software also subscribe to a feature called Home Connect. After each benchmark assessment, the teacher sends a letter home to each child’s parent or guardian, explaining the assessment results in clear, easy-to-understand language and suggesting learning activities to do at home. Many teachers also use the Home Connect letters as part of parent-teacher conferences. The letters can be written in multiple languages.

For parents or guardians who want instructional content for use at home, Mr. Kasloff recommends FreeReading.net, a free open source reading intervention program also launched by Wireless Generation with an advisory board of leading reading researchers. Burst:Reading draws upon content from FreeReading.net to generate lessons.

“FreeReading.net is a great resource to use at home,” says Mr. Kasloff. “It’s a research-based program that is constantly being improved and enhanced through the contributions of many thousands of teachers and researchers around the world. There is also a complete, sequenced curriculum on the site called Intervention A, also available for free.”

The Last Word

“Traditionally, K-12 education has been slower to embrace technology than other industries and areas of society. Nevertheless, we have found that if the technology is designed well for the tasks at hand, educators at all levels of technology engagement, from infrequent users to experts find it easy to use and beneficial,” says Mr. Lee.