Pilot & Prove:
Just a Click Away

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Boulder Valley School District piloted student-response systems and proved the tools could enhance learning.

By Michael Matassa

TURNING FROM THE BLACKBOARD, middle-school math and science teacher Megan Fisk asks her students whether anyone sees a mistake in the solution she's just written. Very soon, the room lights up with many blue flashes, as students take a stab at the answer.

Unlike most classrooms, where only a handful of youngsters might respond, Fisk's students use small, blue infrared handheld devices called response pads or "clickers." With the anonymity of a clicker, her students can submit their answers without their peers knowing if the response was right or wrong.

Similar to a TV remote control, the response pad wirelessly connects to a system that projects the teacher's questions onto a screen in front of the classroom.

"[Having the response pad] gives me self-confidence, which can make me concentrate more so I don't have to worry about embarrassing myself by getting the answer wrong," says Aaron Jones, an eighth-grade student in Fisk's class.

TESTING THE WATERS

To test whether the clickers could transform the way teachers and students approached learning, Colorado's Boulder Valley School District (BVSD) launched a one-year pilot in August 2004. The project's sponsors hoped the technology would boost student responsiveness and learning, and simultaneously improve teaching — because instructors can better gauge whether students understand the day's lesson. Nine teachers and nearly 300 seventh- and eighth-grade students participated in the pilot project.

Prior to the clicker test, Craig Yager, a fifth-grade teacher who took part in the pilot, calculated how many students typically participated in classroom discussions. He discovered that two-thirds of his students were seldom or never heard from. After bringing the clickers into the classroom, participation reached 100 percent.

"The shy students and the kids who would never risk answering questions in front of their classmates [now had] a voice with which to speak," Yager explains. The teachers could engage students because the clickers resemble remote controls.

To implement and test the clicker concept, the pilot design team created a districtwide plan with three key concepts: high accountability standards, abundant resources for teachers and intensive professional development.

TRAINING THE TEACHERS

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Teacher workshops began at the start of the 2004-05 school year. The design team recognized that if teachers didn't know how to use the clickers and couldn't easily implement them, they would not be used.

Some administrators and teachers raised concerns that, if teachers were limited by the clickers' multiple-choice questioning format, they might head in the wrong direction.

"In the hands of an intelligent teacher who is knowledgeable about differentiation of instruction, clickers can enhance learning through higher-level thinking skills," says Sandy Ripplinger, BVSD director of school leadership. "My fear, as an administrator, is that an unsophisticated teacher may use this tool to take us back to the dark ages of education, narrowing the learning of students to simplistic, prescribed answers, the 'drilland- kill' approach."

Anticipating these concerns, the pilot design team made professional development its top priority. The design team partnered with eInstruction Corp., a response pad manufacturer, to develop a two-day teacher training program.

The goal of the first day was to get teachers up to speed so they could begin the year using the clickers, notebook PC, projector and infrared receiver that make up the classroom response system. Training was provided by eInstruction's CPS software so that teachers could effectively format questions, implement clicker lessons and manage student data.

The second day of the workshop was devoted to taking questioning techniques beyond the restrictive multiple-choice questioning format and into powerful methods for learning. "Clicker questions can suddenly launch an unexpected class conversation, especially when students are prompted to explain why they chose an incorrect response," says Jack Ganse, an eighth-grade earth science teacher at BVSD.

THE BUDDY SYSTEM

Despite teachers' time constraints, collaboration was a key priority because time spent in collaborative learning activities can produce more-effective clicker users. The design team created a buddy system that matches experienced teachers with teachers new to clickers. Collaboration is facilitated through "buddy forums." Bridging time and space gaps, buddy teachers can collaborate asynchronously in their team forums and wikis — server programs that let users collaborate in forming the content of a Web site.

The two all-day workshops gave teachers time to create content for clickers, but the burden of their daily schedules limited their ability to maintain the momentum back in the classroom. "I [didn't] always have the time to download images and diagrams that help explain concepts," says Brian Slobe, a middle-school science teacher. Mainly, teachers said they had little time to prepare questions that integrated images, audio clips and video to create higher-order questions.

Although eInstruction offers prewritten questions, teachers often had to rewrite the questions to fit the specific content of their lesson.

The design team created a Web community to give teachers clicker resources. Dubbed the Online Learning Center, this collection of forums, wikis and announcement boards was designed to help teachers save time. The OLC offers forums for discussing goals, target student groups and content-specific topics, as well as sections for tips, software/hardware information and current research.

PROVING THEIR WORTH

To gauge effectiveness, regular clicker use among a target group of low-achieving students was correlated with gains on the Colorado math accountability tests. At Eldorado K-8 School, Fisk tested

whether integrating response pad technology into the classroom would improve student scores on the 2005 eighth-grade state math accountability test. The data showed the target group's mean gain was 27.6, while the mean gain districtwide was 21.3. The results were not statistically significant because of the target group's small size.

"Although our gains are not through the roof, the clickers increased the equity of our math curriculum, allowing lower-achieving students to be integrated into the regular track course and make gains," Fisk explains.

In another measure, Fisk compared trimester math report card grades over the course of two years for the same target group of students. The idea was to show evidence of a decrease in failure rates. As seventh-grade students not using clickers, her target students received a D or F grade in math approximately 33 percent of the time over the course of the three trimesters. However, as eighth-grade students regularly using clickers, these same students received a D or F only 9 percent of the time. Even more notable, there was only one F out of 66 grades (2 percent) among the target students, compared with 14 Fs out of 66 grades (22 percent) the previous year.

Fisk thinks she knows why failing grades decreased among the target group. "Students who have not succeeded in the past have more confidence in solving problems and in their mathematical abilities," she explains. "The outcome is that they participate more and enjoy math more. Clickers provide a safe environment where all students are put on a level playing field and have the confidence to share their strategies for solving problems."

Results like these were enough proof for Boulder-based Impact on Education, an independent, nonprofit group that originally funded the clicker pilot, to award the design team a three-year extension and approximately $113,000 to implement clickers in middle-level math and science classrooms. With the extension, the district hopes that the clickers will produce similar results in 10 other middle schools, with 30 additional teachers and about 3,000 more students.

A BRIGHT FUTURE

With solid results and a new focus on math and science, the clicker project fits neatly into the long-term vision of Impact on Education. But the group must work with local companies to secure funding. "We can only fund projects if we can convince the community to provide the money to support them," says CEO Francie Anhut.

To ensure continued funding, BVSD is bolstering its implementation plan with improvements to the professional development plan, further development of the Online Learning Center and tighter accountability metrics. A level-three workshop was added to the 2005-2006 schedule to train teachers in advanced uses of clickers by sharing proven strategies.

In addition, plans are under way to create a question bank database in the OLC that teachers can search and pull from when looking for questions. Finally, accountability measures are being improved by including other results-oriented metrics, such as homework-completion percentages and impact on motivation and attitude.

The future of the clickers in Boulder looks favorable if teachers can continue to show a strong correlation between clickers and learning increases in math and science. "We want to see more kids get interested in science and math and do better in those subjects as a result," says Anhut. "If clickers will help improve student learning, we're excited."

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