

Technology in the Classroom

It's Not a Matter of 'If,' but 'When' and 'How'

BY ALICE ARMSTRONG

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Technology use in the classroom is rapidly changing how we teach, how children learn, and how school districts spend their resources. But how effective is it? What are the costs? The benefits? The consequences if we don't prioritize or invest in education technology?

This article may help to start the conversation in districts where little is being done, or where technology investment has been postponed or feared.

According to a 2012 study commissioned by Verizon, more than one of three middle school

students report using smartphones (39%) and tablets (31%) to do homework. Those numbers, however, are not matched in the classroom.

A lack of funding, bandwidth, technical support, mobile devices, software, teacher acceptance, and district policies are among the reasons that more students are not using this technology more often at school. All of these reasons are competing with the time and expense needed to support traditional delivery systems, brick and mortar investments, and low-tech pedagogy. But the fact is that students are changing the game and most already own and know how to use these

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new tools.

Despite the impressive numbers of middle school students using laptops, smartphones, and tablets for homework, the study found that very few are using these mobile devices in the classroom, particularly tablets and smartphones. A large gap exists between mobile technology use at home and in school: where 39% of middle school students use smartphones for homework, only 6% report that they can use the smartphone in classroom for school work. Although 31% say they use a tablet for homework, only 18% report using it in the classroom.

Understandably, research on technology use supported by one of the nation's leading broadband and telecommunications companies should be tempered by their obvious interest in the outcome. Nonetheless, it confirms what some educators believe but others are reluctant to acknowledge. The study also gives positive reasons for considering a change in that attitude: "Significantly more students who use mobile devices in the classroom express a stronger interest in STEM subjects than students who do not use these devices in the classroom....Two out of three students (67%) who use laptops

in class say that it helps them learn math and science better, and more than half of students who use tablets in class (55%) say it helps them learn math and science better."

Technology, most would agree, is changing the way many students learn. The argument would come from those—parents, teachers and administrators alike—who may wonder whether it's a change for the good.

According to a 2013 survey of Advanced Placement and National Writing Project teachers conducted by the Pew Research Center, there are notable generational differences in how teachers experience the impact of digital technologies in their professional lives. "Differences in technology use emerge between older and younger teachers."

At times, the Pew study continued, teachers' own use of digital tools can run counter to their concerns about and perceptions of student use. "In an earlier report on these data, we found that teachers expressed some concerns about what they saw as students' overreliance on search engines to find information and complete research projects. Their students increasingly equate research with Goo-

Technology in the Classroom

gling,' and use search engines in lieu of more traditional sources without sufficient ability to judge the quality of information they find online."

Utilizing tablets, smartphones, and whiteboards to encourage students to explore the Internet as a legitimate resource and to collaborate with other students or teachers can engage their students in ways that lectures and textbooks do not. A place still exists for traditional teaching tools and methods, but that place is much smaller than it was 10 or even five years ago.

These tools do not magically solve all of the problems that classroom teachers face. They come with challenges that educators must meet head on, not the least of which is learning to wield them effectively with students. For those in the profession who are not instinctive users of technology, this challenge can be significant. That's why it is imperative that districts provide faculty with effective training and technical support.

Laptops and iPads

For today's "digital natives," paper, pencils, and even textbooks are insufferably old school. Giving students a key-

board or touchpad is much more likely to elicit a positive attitude. According to research conducted by the U.S. Department of Education, teachers nearly "universally" agree that laptops and tablets have been shown to improve class participation. Researchers credit technology as a primary method to empower students to take control of their own learning. Rather than merely listening to teachers disseminate information and dutifully taking notes, students actively search for information and make decisions about the product they are creating.

In essence, technology is transforming students into explorers and teachers into guides.

Before this transformation can occur, students must be taught the skills they will need to navigate the online world including identifying credible sources, discerning the trivial from the consequential, and persevering until they find the information they want and need. These are no simple skills to teach. Teaching students to avoid the inherent sense of instant gratification that online search engines provide is like asking them to take counter-instinctive measures. The seem-

ingly infinite number of sources available online means learning how to wade through pages of search returns to determine the quality of sites and sources. While technology may initially motivate students to embrace assignments, teachers still have to encourage students to think deeply and analytically to do quality research.

Keeping students on task is another major responsibility in

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a wired or “flipped” classroom. In classrooms with 30 or more students, just keeping everyone on task can be a struggle, let alone giving each student the individual attention he or she needs.

Fortunately, wired classrooms lend themselves naturally to peer collaboration. Tech-savvy students generally enjoy sharing their knowledge with those who are baffled and intimidated; they gain a sense of importance and satisfaction by helping others and earn the appreciation of teachers who are

busy or who may not know the commands themselves.

In many iPad classrooms, teachers are using applications that help them control what the students see on their screens. One such product, Nearpod, allows teachers to create multimedia presentations with interactive features and control the activity with the company’s mobile app. Students receive content on their mobile devices and can submit responses, while the teacher monitors classroom activity, controls the pace of the lesson, and measures student results on an individual and aggregate basis.

Another example of classroom management software comes from LanSchool. Available for most tablets and smartphones, this system is intended to help teachers curb abuse and distractions. Having the ability to black out distracting or offensive screens, limit what students can and cannot do; send messages to students; allow silent, individualized help sessions; and take quick polls, products like these are designed to give back the control that some fear mobile devices surrender.

Of course, technology like this comes with a price tag. One of the questions is, who

Technology in the Classroom

provides the devices? Students or schools? One drawback is that not all students possess their own devices. Teachers may worry that the student who doesn't have a smartphone or tablet will feel ridicule from their connected peers. Teachers can circumvent this problem by putting students in collaborative learning groups.

While some districts have the resources to dole out free tablets to students, others are implementing "rent-to-own" programs, so that the book rental fees students once had to pay for textbooks can become rent-to-own fees for tablets. Nonetheless, the digital divide does create a noticeable line between students and between districts.

The Pew study found that teachers worry about the divide, though they are split about the impact of digital tools on their students. "These teachers see disparities in access to digital tools having at least some impact on their students. More than half (54%) say all or almost all of their students have sufficient access to digital tools at school, but only a fifth of these teachers (18%) say all or almost all of their students have access to the digital tools they need at home."

The study also showed that teachers of the lowest income students were the least likely to say their students have sufficient access to the digital tools they need, both in school and at home. "In terms of community type, teachers in urban areas were the least likely to say their students have sufficient access to digital tools in school, while rural teachers are the least likely to say their students have sufficient access at home."

Smartphones and BYOD

Of all the technological devices available for use in the classroom, the most controversial is the smartphone. The newest cell phones, which combine mobile operating systems, advanced computing capability, portable media players, high-resolution touchscreens, cameras, high-speed web browsers, and thousands of free or inexpensive applications, now comprise nearly 70% of the U.S. mobile phone market. When cell phones came into widespread use among students, most districts countered by banning or severely limiting their use for obvious reasons.

Common discipline issues involved cheating (copying and transmitting tests), texting and "sexting," taking photos of inap-

propriate behavior and in inappropriate places, and even cyberbullying. However, advances in smartphone technology, features, and processing capacity are creating another potential tool that can increase student access to learning technology when district-owned resources may be limited.

For example, one software product called GoMLE turns the student smartphone into a computer. The hosted, web-based application is designed to enable teachers to synchronize lesson creation, management, and delivery with students' devices. The parent firm GoKnow also markets an application to district administrators enabling teacher observations and evaluations to be made on mobile devices.

Proponents of smartphone use in the classroom argue that teachers need to see beyond the social networking function of cell phones to their potential as learning tools. David Rapp, author of "Lift the Cell Phone Ban," says "educators know that with students, cell phone use is inevitable, so why not use the devices for good?" That argument applies to all student-owned devices—not just smartphones.

The Illinois Association of

School Boards (IASB) addressed this shift in thinking in its March 2013 issue of *Policy Reference Educational Subscription Service* (PRESS): "The reality that technology is almost an appendage to most students and educators underscores the major reason fueling demand for a bring-your-own-technology or BYOT policy, or as it is sometimes referred to, bring-your-own-device, or BYOD policy."

The Association's legal counsel suggests, however, that before adopting a BYOD policy and implementing a BYOD program, school officials should consider how the policy and program fit into the district's mission statement for instruction. "This type of policy purpose will be different for each board and its community, mainly because each community has different philosophies and needs," said Melinda Selbee, IASB General Counsel.

Interactive Whiteboards

In addition to allowing more student personal devices, many classrooms are also moving toward built-in technology that is teacher-driven. The most common is the SMART Board®, a system that includes an interactive whiteboard, computer, projector, and whiteboarding

software. According to SMART Technologies of Calgary, Canada, it has more than 2 million installations in K-12 classrooms nationwide, reaching as many as 40 million students. Embraced by many teachers who desire more collaboration opportunities in the classroom, the technology is expensive (as much as \$5,000 per classroom) but growing in acceptance. One recent study suggested there can be multiple benefits to using interactive whiteboards as a part of classroom instruction.

Robert J. Marzano, a researcher based in Englewood, CO, studied teaching and student outcomes in some 200 classes where teachers conducted lessons with and without interactive whiteboards. He found significant benefits when teachers used the boards, particularly among those who had been using the devices for more than two years, were confident in their skill with the boards' features, and used them for at least 75% of class time. The greatest benefits appeared to be in boosting student motivation and participation.

However, Marzano noted that not all teachers are confident in their ability to engage students interactively. Technical training is essential, which is why the

manufacturer offers numerous tutorials and webinars, lesson resources, and online communities comprised of other teachers. There are also critics of the innovation. *Education Week* in February 2010, which reported on the Marzano research, also acknowledged opposition. "There has been criticism that in too many classrooms, they are nothing more than fancy, expensive chalkboards, especially when their interactive features are ignored by teachers who don't know how or refuse to use them." noted Kathleen Kennedy Manzo.

Bandwidth Capacity, Access

The most advanced classroom technology, regardless of the platform or ownership, is worthless without adequate "bandwidth" to support it. Bandwidth is the total range of frequency required to pass a specific signal that has been modulated to carry data without distortion or loss of data. According to the State Educational Technology Directors Association (SETDA), U.S. educational institutions will need networks that deliver broadband performance of 100Mbps for every 1,000 students and staff members in time for the

2014-15 school year. "Addressing teacher and student concerns regarding educational broadband reliability and speed is as critical as ensuring plumbing and electricity in schools," said Douglas Levin, executive director for SETDA.

But access to adequate bandwidth can be an insurmountable problem for some districts, particularly in rural areas.

In areas where adequate bandwidth exists, some districts may still not be able to afford to buy it. In fact, 80% of school districts predict they will have flat or declining IT budgets for the next school year, according to Katrina Schwartz, in an April 11, 2013 posting on the Mind/Shift KQED blog.

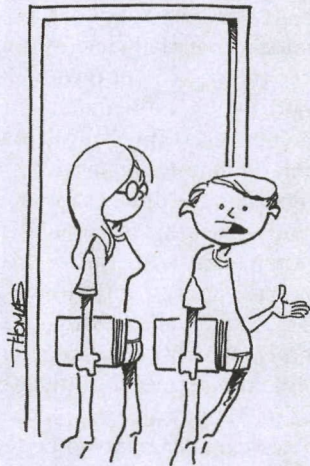
Final Thoughts

There is no shortage of opinions on technology in the classroom. Even the White House has expressed its vision on the subject. In 2010, President Obama's National Education Technology Plan called for "revolutionary transformation rather than evolutionary tinkering."

The model of learning described in this plan suggested that schools must develop and offer "engaging and empowering learning experiences for all learners." Such a model would

ask "that we focus what and how we teach to match what people need to know, how they learn, where and when they will learn, and who needs to learn. In contrast to traditional classroom instruction, this requires that we put students at the center and empower them to take control of their own learning by providing flexibility."

That is a homework assignment that many educators and school boards are now wrestling with. It will take significant time, resources and support to develop a plan that is suited to each student, each school, and each school district. ■



"The great thing about geometry class is the teacher grades on a curve."