Why Ed Tech Is Not Transforming How Teachers Teach

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Student-centered, technology-driven instruction remains elusive for most

Public schools now provide at least one computer for every five students. They spend more than $3 billion per year on digital content. And nearly three-fourths of high school students now say they regularly use a smartphone or tablet in the classroom.

But a mountain of evidence indicates that teachers have been painfully slow to transform the ways they teach, despite that massive influx of new technology into their classrooms. The student-centered, hands-on, personalized instruction envisioned by ed-tech proponents remains the exception to the rule.

"The introduction of computers into schools was supposed to improve academic achievement and alter how teachers taught," said Stanford University education professor Larry Cuban. "Neither has occurred."

Indeed, a host of national and regional surveys suggest that teachers are far more likely to use technology to make their own jobs easier and to supplement traditional instructional strategies than to put students in control of their own learning. Case study after case study describe a common pattern inside schools: A handful of "early adopters" embrace innovative uses of new technology, while their colleagues make incremental or no changes to what they already do.

Researchers have identified numerous culprits, including teachers' beliefs about what constitutes effective instruction, their lack of technology expertise, erratic training and support from administrators, and federal, state, and local policies that offer teachers neither the time nor the incentive to explore and experiment.

The net effect, said Leslie A. Wilson, the chief executive officer of the One-to-One Institute, a nonprofit based in Mason, Mich., that has consulted with hundreds of schools and districts across the country and world, is that schools rarely realize the full promise of educational technology.

"There's nothing transformative about every kid having an iPad unless you're able to reach higher-order teaching and learning," Ms. Wilson said. "If schools take all this technology, and use it like a textbook, or just have teachers show PowerPoint [presentations] or use drill-and-kill software, they might as well not even have it."

Modeling Good Digital Teaching

A clear description of what student-centered, technology-driven classroom instruction entails is laid out in standards developed by the Washington-based International Society for Technology in Education.

"You can do student-centered teaching without technology. There have been teachers doing that for a long time," said Wendy Drexler, ISTE's chief innovation officer. "But tech is not going away, and we want to have teachers using it effectively."

In the digital age, the ISTE standards say, teachers should be expected, among other strategies, to "engage

students in exploring real-world issues and solving authentic problems using digital tools and resources." They should also "develop technology-enriched learning environments that enable all students to become active participants in setting their own educational goals, managing their own learning, and assessing their own progress."

That pretty much describes Robyn L. Howton's Advanced Placement English class at the 1,100-student Mount Pleasant High School, a neighborhood comprehensive high school with just-above-average state test scores, located on the outskirts of Wilmington.

On a warm May morning, 26 Mount Pleasant 11th graders were scattered around Ms. Howton's room, sitting in groups of three or four. They were midway through a project-based unit on social-justice movements. Their goal: Produce independent research papers on topics of their choice, then collaboratively develop a multimedia presentation of their findings with classmates researching the same issue.

After a brief welcome and introduction, the teens were on their own. The 15 iPads on a cart in the back of the room were quickly gobbled up.

Nicole Collins, Courtney Norris, and Quincy Vaughn, all 17, went to work at a small table. Using iPads and a cloud-based tool called Google Slides, they collaborated in real time on their group presentation about injustices in the U.S. criminal-justice system.

Ms. Collins said she had chosen the topic because "my own family has problems with the law, so I understand part of it."

Mr. Vaughn expressed a different motivation: "With everything that's going on with Ferguson and Baltimore, it's a little overwhelming," he said, referring to the police killings of black men and the resulting protests in each city. "Sometimes, you need to speak out."

The trio worked enthusiastically for 25 minutes without any interaction with their teacher. Ms. Howton slid to the back of the room. On her laptop, she logged into the Google platform to check students' work. Occasionally, she circulated around the room, asking probing questions or issuing challenges to individual groups.

"I've probably stood in front of that class for three hours the entire school year," said the 24-year teaching veteran, who has received intensive training in technology integration from a local foundation and a consortium of Delaware school districts that promote personalized learning. "I decided my personal goal was to turn my classroom into a model so other teachers who want to start down this pathway have someone to come and [observe]."

But Mount Pleasant Principal Heather Austin said that only about 5 percent of her school's teachers are even in the same ballpark as Ms. Howton when it comes to making effective use of classroom technology. Another 5 percent are extremely resistant to use just about any ed tech.

"The 90 percent in the middle, they all have overhead projectors, there's a teacher computer, they use some sort of PowerPoint," Ms. Austin said. "They're using [technology] to enhance what they're doing, but they haven't really given students control over it."

Research suggests that's more or less the standard distribution of technology use in most schools nationwide.

The most authoritative national study on teacher technology use was conducted by the National Center for Education Statistics in 2009. A survey of 3,159 teachers found that when teachers did allow students to use technology, it was most often to prepare written text (61 percent of respondents reported that their students did so "sometimes" or "often") conduct Internet research (66 percent), or learn/practice basic skills (69 percent).

Far more rare were teachers who reported that their students sometimes or often used technology to conduct experiments (25 percent), create art or music (25 percent), design and produce a product (13 percent), or contribute to a blog or wiki (9 percent.)

Student-centered use of classroom technology "isn't going to happen overnight," said Ms. Drexler of ISTE. "This is about the diffusion of innovation."

A Pessimistic View

Mr. Cuban of Stanford has a more pessimistic take.

"Most teachers have 'domesticated' innovative technologies by incorporating them into their existing repertoire of teacher-directed practices," he wrote in his 2013 book, *Inside the Black Box of Classroom Practice: Change Without Reform in American Education*.

In his research for that book, Mr. Cuban revisited the technology-rich Silicon Valley high school featured in his seminal 2001 book, *Overused and Oversold: Computers in the Classroom*.

At the turn of the 21st century, he had found that "most teachers [at the school] had adapted an innovation to fit their customary practices."

More than a decade later, some things had changed. More teachers regularly used digital devices for classroom instruction. And many of those teachers had incrementally changed their approach, using technology to plan lessons more efficiently, communicate with their colleagues more frequently, and access information via the Internet more regularly.

Still, Mr. Cuban wrote, "all but a few of the teachers at [the school] used a familiar repertoire of instructional approaches: lecturing, conducting a discussion, and occasional use of technologies such as overhead projectors, videos, and computers."

For the most part, he concluded, "even in computer-based classes, teacher-centered instruction with a mix of student-centered practices was the norm."

Similar findings resulted from a 2010 study of 21 Texas middle schools by private researcher Kelly S. Shapley and her colleagues. The schools had been provided with abundant technology, including laptops for every student and teacher, wireless upgrades for schools, digital curricula and assessments, and professional development, paid for with $20 million in federal funds.

The End Result?

"In general, teachers at many schools seemed to view technology as a more valuable tool for themselves than for their students," Ms. Shapley wrote.

While spotty Internet connections and Wi-Fi networks continue to cause problems in some places, access

to technology is no longer the main barrier to transforming instruction, most researchers point out.

Instead, their focus is now on so-called "second order" obstacles.

In 2010, for example, researchers Peggy A. Ertmer of Purdue University, in West Lafayette, Ind., and Anne T. Ottenbreit-Leftwich of Indiana University, in Bloomington, took a comprehensive look at how teachers' knowledge, confidence, and belief systems interact with school culture to shape the ways in which teachers integrate technology into their classrooms.

One big issue: Many teachers lack an understanding of how educational technology works.

But the greater challenge, the researchers wrote, is in expanding teachers' knowledge of new instructional practices that will allow them to select and use the right technology, in the right way, with the right students, for the right purpose.

A 2014 paper by researchers at Michigan State University, in East Lansing, provides a tangible example: Teachers and students in the small-scale study were found to be making extensive use of the online word-processing tool Google Docs. The application's power to support collaborative writing and in-depth feedback, however, was not being realized. Teachers were not encouraging group-writing assignments and their feedback focused overwhelmingly on issues such as spelling and grammar, rather than content and organization.

Even more important than knowledge of how to use classroom technology, Ms. Ertmer and Ms. Ottenbreit-Leftwich wrote, may be teachers' level of confidence in trying it out in their classrooms. If they do not believe that they can use technology to accomplish their classroom goals, they appear unlikely to seriously attempt it.

On top of that, teachers' "pedagogical beliefs" are increasingly believed to play a central role in their willingness to use ed tech.

In a forthcoming study by researcher Emily Rodgers of The Ohio State University, in Columbus, and her colleagues, 1st graders in low-performing elementary schools showed statistically significant gains in their ability to identify letters after using an iPad app called LetterWorks. Their teachers, however, expressed reluctance about continuing to use the app, in large part because they held a philosophical belief that tactile learning is important for young children.

Classroom Realities

Those barriers to good technology use are made worse by school-based factors and problematic policies.

Researchers have found, for example, that even innovative teachers can be heavily affected by pressure to conform to more traditional instructional styles, with a teacher as the focal point for the classroom. Newer teachers inclined to use technology in their classrooms can also be deterred by experienced teachers who feel differently.

And the current test-based accountability system isn't exactly supporting the transition to student-centered, technology-driven instruction, said Ms. Drexler of ISTE."We're telling teachers that the key thing that is important is that students in your classroom achieve, and we're defining achievement by how they do on [standardized] tests," she said. "That's not going to change behavior."

Perhaps the most obvious—and overlooked—barrier to effective ed-tech use is that totally changing the way you do your job takes a ton of time and work.

That's the challenge facing Scott Bacon, a 13-year-veteran educator who now teaches 9th grade economics at Mount Pleasant High.

As his students returned from lunch on that recent May day, they settled into paired desks, all facing the front of the room.

Mr. Bacon launched into a combination PowerPoint presentation-lecture about various types of unemployment.

Periodically, he stopped to ask a question of the whole class. A few students' hands shot up. After hearing from one or two of the students, Mr. Bacon continued, clicking a button to bring up his own answers to his questions on the PowerPoint.

When the lecture turned to "technological unemployment," Mr. Bacon joked to the class: "Eventually, everyone is going to be replaced by a robot, right? I'm being replaced by computers as we speak. You can just watch Khan Academy now, right?"

Later, he described his own experience trying to implement the technology-integration training he has received through the same multidistrict consortium on personalized learning in which Ms. Howton takes part.

While he's very motivated to make his instruction more student-centered, Mr. Bacon said, "What I'm finding is I'm having a hard time doing it that right way, a wholesale change."His attempts to move in that direction have been frustrating and draining.

He described, for example, an earlier lesson in which he conducted an experiment involving a National Public Radio segment on recent federal unemployment statistics. The whole class listened together. Mr. Bacon asked half his students to write a summary and reaction using a pencil and notecards and half to do so using the online discussion forum on the school's new learning management system.

Describing his own experience during the experiment, Mr. Bacon said, "I'm up there juggling different remotes, a mouse up here versus a mouse [attached to a computer in the back of the class.] It felt crazy. Doing that was a lot more work than if I had just given them all notecards."

Ingredients for Success

So how can schools and districts better support teachers in transforming the way they teach?

Most often, that discussion begins with professional development. There are a lot of ideas and theories on what can make such training more effective, but rigorous, independent research remains frustratingly rare.

One strategy that most researchers and experts seem to agree on: so-called "job-embedded" professional development that takes place consistently during the workday and is tied to specific classroom challenges that teachers actually face, rather than in the isolated sessions often preferred by district central offices and written into districts' contracts with their teachers.

"When learning experiences are focused solely on the technology itself, with no specific connection to

grade or content learning goals, teachers are unlikely to incorporate technology into their practices," concluded Ms. Ertmer and Ms. Ottenbreit-Leftwich, the researchers who wrote the 2010 paper on the factors influencing teachers' use of educational technology.

Another oft-cited strategy is putting to work those "early adopters" inside a school who are making innovative, student-centered use of technology in their classrooms. "The smarter districts use those teachers to teach other teachers how to integrate tech into their lessons," Mr. Cuban said. "The dumb ones use vendors to provide professional development and force teachers to attend those sessions."

That smarter strategy is what Ms. Austin, the Mount Pleasant principal, is attempting.

But even as she described her approach to scaling up student-centered, technology-driven instruction during an interview in her office, a whiteboard loomed over her shoulder. On it was a circle, representing a Mount Pleasant student. Surrounding that circle were 19 other shapes, each representing a major initiative or issue the school is currently trying to balance, from new online exams linked to the Common Core State Standards to Delaware's intensive new teacher-evaluation program.

"I'm going to keep [technology integration] as my priority," Ms. Austin said.

But the reality is that goal will be as much a challenge for the school leader as it is for her teachers.

Such dilemmas are part of why it's most realistic to expect that, for the foreseeable future, teachers' use of technology in the classroom will typically follow a bell curve, with those using student-centered approaches in line with the ISTE standards mostly remaining outliers.

"When all the stars are aligned, you can think about fundamentally changing how you've always done business," said Ms. Wilson of the One-to-One Institute. "But remember, changing how we do education is like trying to move Mount Everest."