Educational Technology in U.S. Classrooms: Divergent Agendas

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What is technology's place in the classroom? How does new technology help teachers and students, and by how much? Teachers, school administrators, educational policymakers, and tech companies vie to influence which technology to adopt in U.S. public schools and how best to use it. Organizations lobby the federal government in order to push their agendas and fund candidates who will back them. For example, from 1990 to February 2019, the National Education Association, the largest teacher and educator union, donated almost $143.5 million to federal candidates and committees to lobby for its members' interests (OpenSecrets, 2020). Do technology companies have too much say in which technologies are chosen? Pearson Education, a technology company that controls a large share of the computer-based testing industry, lobbies for policymakers that support legislation like the No Child Left Behind law that mandates standardized testing for schools (OpenSecrets, 2019). When integrating technology in classrooms, who benefits the most? Do the benefits to students and teachers outweigh the monetary and administrative costs of integrating the tech? The U.S. Department of Education is also a key player in how technology in classrooms is implemented. By their laws, standardized testing became mandatory across the country and a computer-based assessment industry was born and continues to flourish. (DoE, 2001) Teachers, technology companies, and organizations focused on educational technology in classrooms pressure school administrators and policymakers to promote their positions on technology.

Review of Research

Researchers disagree about technology's effects. Beatty, Clark, Reed, and Xu (2017) found that in high school classrooms, hand-held personal education technology made no significant difference in student achievement, in students' perceptions of their own devices' values, or in their attitude about the class subject. They concluded that schools cannot rely solely on new technologies to keep student engagement high. Technology that provides data must be combined with teachers' expertise in order to maximize student achievement. This shows that although technology companies will always push for more and newer educational technology in the classroom, it may not always be in the best interest of the students.

Glass and Kang (2018) found that while dividing students' attention between a device and lecture did not reduce lecture comprehension, it did reduce long-term retention of lecture material. Exam performance was significantly worse in the study sample for whom devices were permitted. While technology can be a useful tool for helping students learn, it can also become a distraction for both students and their teachers. Certain technologies provide more avenues for abuse and distraction than others. Personal devices such as laptops or tablets have a higher capacity for distraction as class sizes increase and teachers can give less one to one attention to students. Technologies that gather and analyze data in the classroom have less potential for abuse by students, as they are not directly interfacing with the tech, but they require teachers or administrators who are proficient in order to maximize benefits.

Berry and Wintle (2009) found that students found a technology-rich science project more challenging and time consuming, but also more engaging than the conventional project. Students assigned to the technology-rich project showed greater retention of information and academic engagement than the other students. Retention of information and academic

engagement are not the only factors to take into account when evaluating the impact of new educational technologies, however. Because of the United States' focus on standardized tests as the measure of success across school districts and states, schools have shifted more of their resources to improve test scores over other metrics.

Most students would welcome guidance in effective technology use (Marcus, Tugend, and Mongeau, 2019). Technology is useless if people don't know how or why to use it. When misused, educational technology can worsen the experience for both teachers and students. Because of this, teachers must leverage their expertise to get the most use out of classroom technology. Training for teachers and administrators on new technologies is as important as choosing which new technology to implement.

Irving (2006) shows that both "assessment *of learning* and assessment *for learning*" play important roles in maximizing student achievement in the United States. Educational technology for the purpose of *assessment of learning* include "computer-based statewide testing programs, reliable and valid measures of student learning, and comprehensive data management systems that facilitate the flow of information between stakeholders." These types of technologies focus on gathering information and meta-data in order to improve upon classroom efficiency and operation. In contrast, educational technology for the purpose of *assessment for learning* includes "assessment programs sensitive to the needs of students in both the regular and special education populations." These are technologies that students and teachers directly use to assist learning, such as connected classroom technologies or online resources that students may access. Classrooms must use both effectively to make the most out of the technology's powerful tools.

Teachers

Some teachers collaborate to promote technology in the classroom. Heather Wolpert-Gawron (2009), a middle school teacher, publicizes Ed Tech Action Network's website that allows users to send letters about educational technology to local and state representatives. By directing people to ETAN's website, she raises awareness that each teacher can have a voice in how the country views educational technology. Wolpert-Gawron states that teachers who "believe that technology integration must be included in the future of education, … can no longer be 'just a teacher.' You are now a member of a special-interest group." Groups of teachers like this one organize to promote the integration of educational technology in classrooms.

Other teachers are more skeptical. Terry Heick (2015) is a teacher who argues that frequent technological innovations leave teachers with insufficient time to adjust. He also believes that "mobile technology is inherently manipulative" and only ends up distracting the user. Perkins (2019), contends that rapid and costly change strains schools' limited resources, and that technology too often distracts students. Problems like this plague school districts with administrators that believe educational technology is a "catch-all" for problems in the classroom.

The National Education Association (NEA) is the largest labor union and professional interest group in the United States, representing education professionals like public school teachers, university professors, and other education-related personnel (NEA, 2020). At the state level, the NEA lobbies legislators for school resources, campaigns for higher professional standards for the teaching profession, and files legal actions to protect academic freedom and the rights of school employees. At the national level, the NEA lobbies Congress and federal agencies on behalf of its members and public schools. From 1990 through Feb. 2019, it contributed nearly $143.5 million to federal candidates and committees in order to advocate for its members.

(OpenSecrets, 2019) Labor unions are one of the most popular and effective ways for people to enact large-scale change.

Students Make Themselves Heard

Students disagree about technology in the classroom. Some view it as distraction, while others find it helpful. Johnathan Wulffleff (cited in Garland, 2014), an eighth grader, uses recordings to learn at his own pace, "If you have issues, you can watch the video again. With a class, you only get it once." Classroom recordings have an additional benefit of being able to be shared with other students or even other schools. Other students, such as Cheyenne Knight (cited in Garland, 2014), prefer live classes, as in online classes students can "take tests with your notes right in front of you. You don't have to memorize anything." She worries that access to materials during exams will tempt students to cheat, and that even if materials are allowed, it leads to a worsened learning experience.

Technology by itself doesn't inherently improve learning for students. Benjamin Crist, an undergraduate student at Vanderbilt University, describes the learning process as "an exchange. That exchange requires both parties to actively participate in order to get the most out of the exchange for everyone. Technology only increases the ability to accomplish this task and eases the transition into the digital world of the future." (Vanderbilt Center for Teaching, 2000) Without teachers that know how to make the most of the technology they're working with, technology can even be detrimental to learning. Victor Sung contends that "the most effective learning occurs when the material is presented in as clear a way as possible … Since all students do not learn in the same way, the availability of new technologies allows for the presentation of material in a variety of ways that can be effective for all." (Vanderbilt Center for Teaching,

2000) One of the most effective ways technology has improved the education system is the way information can be shared. If a professor opts to, they can record their lecture and have it available for re-watching by students to better absorb material.

Technology Companies

One of the most successful ways for educational technology companies to get their tech into schools is by lobbying the United States government. According to OpenSecrets.org, a research group tracking money in United States politics, the top three "Schools/Education" lobbyists were the Association of American Medical Colleges, the Apollo Education Group, and the University of Washington, with each spending over $1 million in 2019. Money spent on influencing the politics around education can be worth much more than the same amount spent on directly improving schools (OpenSecrets, 2019).

Pearson Education, one of the largest education focused companies in the world, funds research on the efficacy of its products, and publishes "Product Efficacy Reports," which it uses to advertise to school districts and universities (Pearson Inc., 2019). These are good resources for measuring the impact of educational technology in real classrooms, despite the studies about Pearson Education products being funded by Pearson Education itself. In addition, Pearson had a hand in creating the Common Core State Standards, a set of educational standards that have been adopted by forty-one states (Achieve Organization, 2013). The company lobbied to get these standards in place, then designed and sold tests to the states.

The Department of Education

The United States Department of Education establishes policies that govern how education in the United States works (DoE, 2017). Because education in the United States is primarily the responsibility of state and local school districts, the Federal funding to elementary and secondary education accounts only about 8 percent of total funding. Through things like the Ed Tech Developer's Guide, they provide guidelines on how companies should focus on improving schools with new technology. (Office of Educational Technology, 2015).

The No Child Left Behind program, signed into law in 2002 by the Bush administration, mandated that states must annually test students in reading and math from the 3rd grade throughout high school. It also defined standards of proficiency for both students and schools. Schools are kept on track towards their goals by tracking "adequate yearly progress," with increasingly severe penalties for missing their progress goals (Elementary and Secondary Education Act, 2001). These standards spawned an industry dedicated to creating standardized assessments and helping struggling schools make their AYP goals. This law also caused school districts to focus more on the standardized test results, as they directly impact school funding.

In 2009, the Obama administration signed the Race to the Top program into law, inviting states to compete for $4.35 billion in extra funding based on the strength of their student test scores. In 2010, an overhaul of the No Child Left Behind program was proposed, promising further incentives to states if they develop improved assessments tied more closely to state standards. This also emphasized indicators like attendance and graduation rates in addition to test scores (DoE, 2010). Because of the heavy reliance on standardized testing scores, schools were forced to put more effort into raising test scores than educational quality. Pearson Education worked with the Department of Education to create the Common Core State Standards, and it

was able to intertwine its other learning programs deeply with the standardized tests. Pearson advertises online tutoring services (Pearson Inc., 2020) for students who are struggling with tests that Pearson designs. The company also hires out consultants to coach teachers if their students are getting unsatisfactory test scores (Pearson Inc., 2020). As a result of the interconnectedness of Pearson's programs, some educational technology advocates push for full integration of Pearson systems because it comes in a convenient "all-in-one" package.

Organizations

Conferences and conventions are major ways that organizations advocate for educational technology. Organizations like the Association for Educational Communications and Technology (AECT) and the International Society of the Learning Sciences (ISLS) have a hand in how technology is integrated into schools. One way to influence the spread of ideas about educational technology is to host conventions. AECT "provides an international forum for the exchange and dissemination of ideas for our members and for target audiences" in the form of two conventions: the AECT International Convention and the AECT Summer Research Symposium (AECT, 2020).

Conventions provide invaluable opportunities for researchers and educators to network and exchange ideas about educational technology. The International Society for Technology in Education (ISTE) hosts the annual ISTE Conference & Expo, attracting "over 16,000 attendees and industry representatives, including teachers, technology coordinators, administrators, library media specialists, teach educators and policymakers" (ISTE, 2020). In order to maximize the amount of people that are exposed to their products and ideas, organizations often sponsor the trips of policymakers and administrators they want to influence.

The International Society of the Learning Sciences (ISLS) hosts two conferences on alternating years, their International Conference of the Learning Sciences and their International Conference on Computer-Supported Collaborative Learning (ISLS, 2020). The Institute of Electrical and Electronics Engineers (IEEE) Technical Committee on Learning Technology (TCLT) hosts the annual Technology for Education and International Conference on Advanced Learning Technologies conferences (TCLT, 2020). Each of these conferences and conventions attract policymakers, administrators, and technology activists to mingle and influence each other, increasing the chance and rate of further technology integration in school systems. By inviting policymakers and administrators, the hosts of these events are able to shape how new technology is presented and to whom.

Conclusion

Educational technology can worsen the classroom experience for both students and teachers, or it can improve it. Berry and Wintle (2009) demonstrated that technology alone is not sufficient.

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