The Struggle over Educational Technology in the United States

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by

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Introduction

The best use of educational technology (edTech) in K-12 education in the United States is controversial. School districts, tech companies, K-12 teachers, parents, and students compete to determine how edtech should be used. Edtech raises problems of data privacy and security, and about whether it should supplement or displace traditional teaching methods. It also entails problems of training and support for teachers. Underlying the debate are fundamental differences in educational ideas and values. People who regard learning as the highest purpose of education tend to welcome edtech as a class of tools that can improve students' learning capacity and measure what they have learned. People who maintain that education serves purposes higher than learning, such as personal growth, autonomy, judgment, and communal harmony, tend to accept edtech in supplementary roles, while favoring direct interpersonal modes of education for most classroom activities.

Review of Research

The evolution of EdTech has been a gradual process spanning centuries. The 20th century brought significant advances, including audiovisual aids like filmstrips and overhead projectors, and later computers and the internet, revolutionizing education. However, it was not until the integration of Artificial Intelligence (AI) that a new phase of evolution in EdTech began. AI allows for personalized learning experiences and individualized feedback, revolutionizing traditional education (Bulger, 2018).

According to Bryant and Hillman (2022), nearly 98 percent of U.S. public schools offer some form of technical education. They contend that such programs "have become exploited by big businesses and powerful actors in the marketplace to serve their own needs rather than those of students," and that "digital systems further enable data extraction for student profiling and prediction," serving "worker pipelines and a hyper specialized career pathway for students." They warn that such "career tracking" may confine "children in prescribed futures that ultimately lead to long-term job insecurity."

Some ed tech proponents argue it is misused. According to Levine (2018a), technology as it is used in many classrooms does not foster creativity, imagination, or new ways of thinking. He contends that school systems must invest heavily in faculty training, as students often do not know how to use the technology to its full potential (Levine, 2018b). Bowen, a dean at Southern Methodist University, prefers tech-free classrooms but still favors technology outside of the class meeting. Through podcasts and online games, students can engage with the material before class, freeing up class time for direct interpersonal engagement (NPR, 2009).

Despite the potential advantages of instructional technology, its implementation is fraught with serious difficulties. The digital gap, which refers to differences in access to technology and internet connectivity among various people, is one significant barrier (Warschauer & Matuchniak, 2010). Additional concerns include doubts about the effectiveness of online learning and the quality of educational resources available online (Hill, 2012). Moreover, keeping up with the rapid pace of technological change poses a challenge for schools and educators (Warschauer & Matuchniak, 2010).

Researchers have investigated ed tech's place in education. Reich (2020) contends that ed tech is overrated. He notes that in 1913, Thomas Edison predicted: "Books will soon be obsolete

in the public schools"; 10 years later he predicted that in 20 years, students would be taught through pictures, not textbooks. He says that motion pictures have just started and in 20 years, students will be taught through pictures, not textbooks. Of online education during the coronavirus pandemic, Reich concludes that "the latest and greatest education technologies haven't done much to invigorate emergency remote learning." Learning management systems and videoconferencing do not impress Reich. He argues that videoconferencing does not support "seamless group interaction." "Teaching through Zoom," he asserts, "is like teaching through a keyhole: With some awkward straining, you can sort of see and hear what's happening on the other side, but it's not really conducive to meaningful conversation" (Reich, 2021).

Policymakers are vital in promoting effective EdTech use in schools. The US government has established initiatives like the E-Rate program that provides schools with funding for internet and technology infrastructure (FCC, 2021). They can also develop policies and guidelines for effective implementation and evaluation of EdTech, ensuring it meets the needs of students and teachers. However, schools and teachers may struggle to use EdTech in line with state and federal policies.

Edtech enhances learning and digital literacy. Herold (2018) found that 97% of teachers use it, with 67% using it daily. Edtech also offers new learning opportunities and connects students beyond the classroom. However, extensive use of digital technology, including edtech, may have risks for learning and wellbeing. Researchers have found that pupils who used digital devices more than two hours a day outside of class performed worse academically than those who used them less (OECD, 2015). Excessive screen time has been linked to health effects including obesity and sleep disturbances (AAP, 2016).

Edtech tools often collect and store student data, which can be vulnerable to security breaches and misuse. Fitzgerald and Charles (2017) reviewed 100 contracts between U.S. schools and technology vendors and found that the vast majority fail to meet basic privacy standards. Contracts often let vendors collect data for non-educational purposes, fail to specify how data will be protected, and do not explain how students can control their own data. The researchers warn of risks such as identity theft and targeted advertising, and urge schools to demand better privacy protections from vendors (Fitzgerald & Charles, 2017).

Sokolik (2003) suggests that while students expect technology in education, ed tech should be a supplementary tool rather than a primary means of content delivery. Students are motivated by better access to instructors, low-stress environments for participating in discussions, a variety of activities, and classroom routines that make it easy for them to stay organized, and for such purposes, ed tech can be useful. Stefano's (2013) study found that technology can be a helpful learning tool when instructors' views are positive. Stefano found that ed tech is a helpful learning tool when instructors' views on technology are positive, and universities should support instructors' technology selection. Groff and Mouza urge teachers to use classroom technology to develop students' "21st century skills and demands," as students face diverse obstacles when pursuing technology-based projects in classrooms.

A major challenge in the integration of EdTech in the classroom is the lack of training and support for teachers. A survey by the National Education Association found that only 30% of teachers reported receiving adequate training and support to effectively integrate technology into their teaching (National Education Association, 2016). The high cost and time commitment of teacher training are major barriers to improving education through edtech. Many schools invest in tools without providing adequate training for teachers. Bart Epstein, CEO of the US based

EdTech Evidence Exchange said “Too many schools think the cost of training and professional development and support are optional,” also supporting by adding that “schools might spend $125,000 for a license, but decline the $25,000 training package offered along with it.” (Kologrivaya, 2022).

To improve the future of edTech, several steps are needed. It's expected that more innovative tools, such as virtual and augmented reality, will become prevalent in classrooms, offering immersive and interactive learning experiences (Johnson et al., 2015). Furthermore, AI is expected to become more important in edTech, with tools helping with grading and personalized recommendations (West, 2019). However, challenges, such as data privacy and security, must be addressed (Boser, 2018). 83 percent of CoSN member districts surveyed in June said that they will be expanding cybersecurity initiatives this school year. What’s more, 62 percent will be spending more on cybersecurity this fiscal year, up from about a third who reported budget increases in 2020” (Klein, 2022). The future of edTech is promising, but requires careful planning.

The Evolution of Educational Technology: A Brief History

According to Schembri (2018), in the U.S., “the conversation around ‘ed tech’ is as old as the U.S. education system itself.” Today, however, “the companies building the devices and software now possess unprecedented resources for pushing their products into the classroom.” The International Society for Technology in Education (ISTE) is a nonprofit that advises educators and that sets ed tech standards. ISTE urges responsible parties “to inspire and facilitate among all stakeholders a shared vision of purposeful change that maximizes use of digital age resources to meet and exceed learning goals” (qtd. in Schembri, 2018). Schembri (2018) adds

that ISTE advises teachers “to master digital tools and stay abreast of new approaches ... to properly integrate technology into their classrooms,” and that “students must be active in articulating their learning goals and how they want to use technology to achieve and demonstrate them.”

International Artificial Intelligence in Education (IAIED) promotes ed tech. It claims that it is “bridging the gap between academia, business, and non-profit in preparing future-proof generations towards ubiquitous AI.” It holds yearly conferences to shape education based on the improvements of AI (IAIED, n.d.). The Association of Computing Machinery’s Special Interest Group on Artificial Intelligence (ACM SIGAI) promotes AI by “funding, developing, and promoting AI education,” and through “publications and public outreach activities both within the AI community and beyond” (ACM, n.d.). AI4ALL’s Open Learning program “Empowers high school educators of all subjects to bring AI education to their classrooms through a free, adaptable AI curriculum and educator resources.” (Open Learning, n.d.).

Potential Benefits and Challenges of EdTech

During the COVID-19 pandemic, teachers' technical skills improved significantly with the use of EdTech, as reported by almost 90% of teachers in a March 2021 survey by Education Week Research Center, with nearly half of them stating that they improved significantly (Klein, 2022). EdTech also benefits diverse students, including those with disabilities and ESL students, through personalized learning, which allows students to have a learner profile tailored to their specific needs, strengths, and weaknesses, resulting in more efficient and effective goal completion (Herold, 2016).

In Restauri's interview with Amanda Gillespie, a 33 year old STEM educator (2013), Gillespie says "When it comes to jobs, our country is in a crisis, and it is only going to get worse if we continue to ignore the facts. Eighty percent of the fastest growing careers in the country require STEM skills, but the U.S. is not graduating enough students who are able to meet this need. As a result, as many as 3 million STEM jobs have gone unfilled." She believes that through technology, educators can better engage students and help improve their performance in STEM, which will equip them with the digital-age skills for college and the workforce (Restauri, 2013). Disagreeing with experts who caution that children's "comfort in digital spaces" may impede their development of "in-person socialization skills, such as facial expression control, polite conversation and active listening," Dave Anderson, a clinical psychologist, argues that "email voice, text voice, the ability to interact effectively over Zoom or chat are integral to the modern workplace. You need both" (qtd. in Spencer, 2022).

The Challenge of Implementing Technologies in Teaching

Caroline V. Katemba's study involved 30 randomly selected English teachers from different schools. She asked the questions about "*English teachers' perceptions and challenges encountered in implementing the technologies*" and found that 93% agreed that technology improved their knowledge and skills, 70% agreed it was highly necessary in teaching English, and 84% agreed it could be used as an advanced instructional tool. About 63% of the teachers had used ICT in their teaching, and 77% believed it could be used as curriculum material. Another part of the survey reveals that roughly 70% disagree that technologies are more powerful teaching tools than discussion and teaching without ICT, and roughly 67% disagree that technology has noteworthy values for human societies. Approximately 84% of the teachers agree

that technologies/ICT offer educational values for students in learning English, indicating a positive attitude towards technology use in teaching (Katemba, 2020).

Results from the same research indicate that teachers face challenges while implementing technology in the classroom. Approximately 67% of teachers have access to technology, while about 53% find it helpful in avoiding problems with handwriting and organizing ideas. Additionally, 83% report no difficulty in using ICT, and 87% are aware of ICT materials related to English language learning. However, 73% have limited time to integrate ICT into their teaching, and accessibility remains an issue due to a lack of teacher confidence, qualification, resistance to change, negative attitude, and ineffective training (Katemba, 2020).

Lack of Training and Support for Teachers

Teacher training can be an overwhelming space to get into, though, there are three major areas that we could say would be promising.

The first should be the improvement of sharing resources. “A space where teachers can share their methods and experiences drastically boosts educational outcomes,” says Anuradha Handa. One example we can say that is implementing this would be a school in Colombia that allows teachers to upload their own materials for other teachers to download for free. (Kologrivaya, 2022)

The second would be training delivery methods by using the emerging technology. Mr. Shaterian is most excited about virtual reality, as existing teacher training models are human-based and therefore hard to scale. Eight years ago, School Fab Labs created a successful model “to train teachers and observe them in action with the kids,” he says, adding that the future

could look very different with emerging technology. “VR headsets would change everything, I’m a true believer in that sector.” (Kologrivaya, 2022)

The third area would be freeing up the teachers time. Since teachers need time in order to train for a tool, they also need a tool that will help them save time when it comes to teaching. For example, lesson-planning could take hours. But a tool that would help them with this problem could have them saving hours and complete it in minutes (Kologrivaya, 2022).

Teachers often receive insufficient training and support for edtech. According to the National Education Association, in 2016 only 30 percent of teachers reported receiving adequate edtech training and support (NEA, 2016). With insufficient training and support, even good edtech can fail students and teachers.

The Future of Education Technology

EdTech firms are relying on instructors for the support they need, and they target teachers by supporting direct analytics. “TeacherFX, a Brighteye Ventures portfolio company, hopes to improve teachers’ performance and the student experience by offering real time classroom analytics to help teachers curate their best teaching style. This helps teachers self-reflect and adapt to their students’ preferences, but only when educators know how to use the analytics.” (Kologrivaya, 2022). Nader Shaterian, the founder of the digital creation space School Fab Labs states that “Teachers are underpaid and overwhelmed,” Therefore, they are unlikely to be impactful in the long run unless it is simplified for teachers, and it becomes an easier tool without training needed.

Conclusion

The debate over the proper place of EdTech in K-12 education in the U.S. public school system is ongoing and complex. Those who prioritize learning tend to view edTech as a tool to enhance student learning and assess their progress. Others who prioritize personal growth, autonomy, judgment, and communal harmony tend to support the use of edTech in a supplementary role while emphasizing direct interpersonal education for most classroom activities. Understanding the competing interests and perspectives of key stakeholders is crucial for navigating this ongoing debate and determining the most effective role for EdTech in the classroom.

To address these concerns and promote the potential benefits of EdTech, it is important for schools and school systems to provide teachers with adequate training and support to effectively integrate technology into their teaching. Additionally, there should be policies in place to protect student data privacy and security, as well as guidelines for appropriate screen time and device use in the classroom. Ultimately, finding the proper place for EdTech in K-12 education in the U.S. public school system requires a careful balancing of the potential benefits and challenges, as well as a recognition of the diverse perspectives and interests of the key stakeholders involved.

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