

Undergraduate Thesis Prospectus

Custom Software for Schools

(technical research project in Computer Science)

The Struggle over Educational Technology  
in the United States

(sociotechnical research project)

by

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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## **General Research Problem**

*How may AI capacities be optimally applied in sociotechnical systems?*

As of 2019, approximately 80 percent of large companies were using some form of artificial intelligence (AI) in their business, an increase of 70 percent in five years (Ghosh et al., 2019). In schools, automated systems, including AI-guided systems, offer numerous advantages. Such systems can augment instruction in novel ways, offering students immediate feedback, and adapting to individual students' needs. Educational technology (ed tech) can offer instructors new means of communicating with students, and relieve them of tedious administrative tasks. It can also support new methods of collaboration among students. Yet ed tech can have undesirable effects. For example, it can become a school's excuse to increase classroom enrollments without hiring additional instructors. Such systems can interfere with direct interpersonal communication in classrooms. Ed tech's expense can be a burden on schools. When students are expected to have certain devices or ample home connectivity, it can also exacerbate the inequities associated with the digital divide. Most educators selectively welcome ed tech, but even its proponents disagree about its optimum implementation. For example, to many educators, direct interpersonal communication is essential to education and technology that interferes with such communication is undesirable. Others, however, perceive tech-mediated communication as valuable in itself, and under some conditions as more effective than direct interpersonal communication.

## **Custom Software for Schools**

*How may AI better serve students' educational needs?*

I don't yet have a project assignment and haven't yet requested a project type. The project will be an independent project. My technical advisor is Nada Basit, a CS professor from the Engineering Department. I am planning on working on this project solo. Project goals remain unknown as I didn't really have a chance to start. I am planning on meeting with my Technical advisor next week to discuss how we will proceed. Even though I don't have a specific project determined yet, I am planning on working on a project that uses tech ed to serve students' educational needs. Unfortunately, I will have to omit the other parts for this section as I don't have enough information about my project.

## **The Struggle over Educational Technology in the United States**

*In the U.S. public schools, how are tech companies, school systems, K-12 teachers, parents and students competing to influence the proper place of educational technology in the classroom?*

In 2014, Michael K. Cohen of Oxford University, summarizing recent work on artificially intelligent agents, tweeted: "Under the conditions we have identified, an existential catastrophe is not just possible, but likely" (Cohen, 2022; Cohen, Hutter, & Osborne, 2022). Although the hazards of educational technology (ed tech) are categorically different, it has attracted substantial controversy.

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.).

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.”

Jillian Kazlow, a freshman intending to major in journalism (2017), states that all of the assignments for her “tech-free” classes are posted online. She also says “The previously executed methods for note taking and writing are completely obsolete. No one even has to step foot in a library anymore. Some teachers must let go and accept the fact that things change and in some instances they change quite rapidly and for the better. We should not abandon the good ol’ pencil, but we should embrace the keyboard” (Kazlow, 2017). 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 (Restauro, 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).

While Anderson welcomes ed tech as a means of preparing students for the workplace, others question the extent to which schooling serves employers’ interests. 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 proponents of ed tech argue that it is misused. According to Elliott Levine (2018a), a former school administrator who works in ed tech for Hewlett-Packard, “technology as it’s used today in many classrooms doesn’t motivate or foster creativity, imagination and new ways

of thinking beyond some unique anecdotal examples”; to do better, he argues that school systems must “invest heavily in training for their faculty.” He argues that “in many schools, students don’t know how to apply the technology they have been given to its full potential” (Levine, 2018b). Jose Bowen disagrees. A dean at Southern Methodist University, he favors tech-free classrooms. Admitting “it sounds like it’s an anti-technology position,” Bowen actually favors technology, but outside of the class meeting. Through “podcasts and online games,” he observes, students can have “first contact with the material before they come to class,” freeing class time for direct interpersonal engagement (qtd. in NPR, 2009).

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).

According to Sokolik (2003), students expect technology-mediated education merely because digital technology is the “medium of the day.” She argues, however, that ed tech is best used as a supplementary tool for diverse educational purposes, rather than as a primary means of content delivery. Students, she finds, “are motivated by better access to instructors, low-stress

environments for participating in discussions, a variety of activities ..., classroom routines that make it easy for them to stay organized, and a curriculum that teaches them ideas and skills of value,” and for such purposes, ed tech can be useful. But too often, she contends, ed tech systems “merely deliver content.” In a study of ed tech in teaching ESL writing, Stefano (2013) found that “when instructors’ general views about technology are positive, technology can be a helpful learning tool.” Most study subjects welcomed ed tech in university ESL writing classes. Stefano concludes that “when instructors’ professional and personal goals” align with “advantages for their ESL composition students,” universities should “support instructors as they select and adopt types of technology in the teaching of ESL composition.” According to Groff and Mouza (2008), students pursuing technology-based projects in classrooms face “vast and diverse” obstacles. They urge teachers to use classroom technology to develop students’ “21st century skills and demands.”

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