

Undergraduate Thesis Prospectus

My Experience at ManTech's DFEND Program

Crisis Forcing Change: How the COVID 19 Pandemic
Influenced Technology's Role in Education

by

Michael Kirk

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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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Prospectus

General Research Problem

How can equitable access to educational opportunities be improved?

Inequities in education persist and affect students' access to essential resources. Students with low socioeconomic status (SES) typically attend schools lacking resources, leading them to underperform compared to students of high SES by 20-26% in standardized testing. High SES students are four times more likely to graduate from higher education (Bradley, 2023). Equitable education, providing socioeconomic mobility, is vital to eliminate division and poverty cycles. Technology provides ways to address a social lack of resources: an eBook reader provides a student without a local library with access to an expanse of literature. Technology can also hinder students' education if they lack access: a student without a computer is unable to easily complete digital assignments at home.

CS Capstone Technical Report: My Experience at ManTech's DFEND Program

How has my experience with the ManTech DFEND program contributed to my Computer Science career?

The project will be in the CS department. No advisor has been chosen yet. The project will function like a Capstone. The paper will describe my five years of experience with the ManTech DFEND internship program and its effects on my education and career. The internship gave me a unique advantage and early development in my career. I have 12 project reports and daily writeups from the last three years that I will use to review my time in the program. Analysis of these documents will give insight to where the experience gave me unique

advantages. At the end of the technical project, I will have a paper that examines my experience in the internship and how it affected my career in a way that a student without that internship would not experience.

Crisis Forcing Change: How the COVID 19 Pandemic Influenced Technology's Role in Education

Since the start of the COVID-19 pandemic in March of 2020, how have educational advocacies, school districts, parents, companies, and others sought to diminish inequities in students' access to educational technology and connectivity in the United States?

As of 2018, OECD found the top 10% socio-economic status (SES) students and the bottom 10% had a literacy gap of roughly 3 years of schooling (Sahlberg, 2020). The COVID 19 pandemic caused a shift towards relying on technology for education; however, there still exists inequity. This raises into question how technology has affected inequity since the start of the pandemic and how students' access to technology is being supported.

During the pandemic, students in low SES families struggled to do schoolwork because they lacked internet at home (WINK News, 2020). Low SES students tend to have poor digital literacy, leading to less effective use of electronic resources (Peng & Yu, 2022). One survey in August of 2020 showed that 63% of school faculty say they were using technology more frequently than prior to the pandemic (fig. 1).

Compared to prior to the pandemic, how frequently have you or the teachers you work with been using digital/online reading programs to teach students to read?

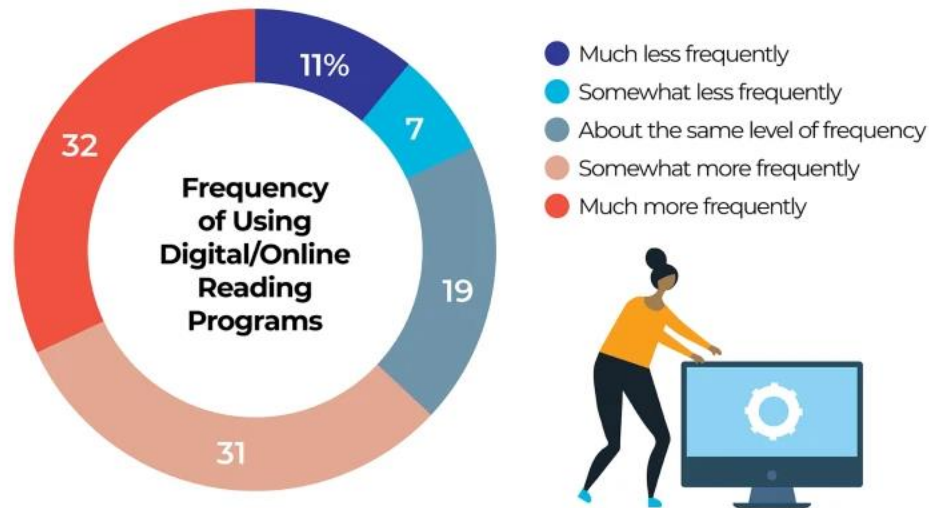


Figure 1. Survey of school faculty and their use of technology for education (Herold, 2023).

When viewing technology as a tool to address inequity, all facets must be considered.

Based on presented literature, participants addressing inequity will likely find it is counterproductive to rely on technology without supporting students' access to it.

Some existing research parallels this problem: one study shows internet access can mitigate impacts of income difference in healthcare quality, paralleling how technology can be used to address educational inequity (Yu & Meng, 2022). Research has been conducted on trends of technology in education from the years 2011 to 2021, providing meaningful insights into education before and after the pandemic. Technology in education was found to be strongly linked to availability to consumers (Dubé & Wen, 2021). Researchers have explored what technology provides the most engagement from students, such as digital games, giving potential

insight into what efforts may be most effective in increasing education quality (Schindler et al., 2017).

Participants include students, parents, teachers, nonprofit organizations, for-profit companies, schools, and school boards. Participants addressing inequity may fit any demographic group. The students, parents, and teachers most impacted by the inequity will commonly be of a lower SES demographic group.

Students that value quality education are primary participants. Their role in their education is large: enthusiastic students study more and tend to be better problem solvers (Moghadasi & Keikavoosi-Arani, 2023). Student participants that are low SES are most impacted by inequity: these students tend to have fewer devices and limited access to school-related resources at home (ACT Center for Equity in Learning, 2022). Younger students without experience using technology may be unable to participate in school activities due to limited exposure to technology (Wongprasert).

Parents of children that value equity and accessibility are vital. When given proper support, parents can promote their child's education (Osorio-Saez et al., 2021). Students with parents involved in their schooling have better attendance, behavior, grades, and social skills (The Annie E. Casey Foundation, 2022). Parents have split views on technology in education: some support it, others do not see it as a long-term solution. "I call it a lifeboat we needed in that situation [the COVID 19 pandemic], but a lifeboat isn't long-term housing" said Emily Cherkin, mother of two and former teacher (Cunningham, 2022).

Nonprofit organizations advocating for education can utilize technology to aid in addressing inequity: children in Camden New Jersey are provided with Kindles by the Camden

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Dream Center to accelerate their literacy (Camden Dream Center, 2023). Organizations like EveryoneOn strive to increase access to digital devices and in-home internet. Their ConnectHomeUSA program focuses on providing digital literacy and educational resources to those in public housing (EveryoneOn). Silicon Harlem's nonprofit C-Better Foundation addresses inequity by providing technology focused education aiming to increase digital literacy and access to students in Harlem. Their stated goal is "Creating a connected world, where equal access and exposure to innovative technology is available for all people." (C-Better).

For-profit companies often have products directed towards low SES students. Kajeet provided products to address lack of in-home Wi-Fi for students during the pandemic (Kajeet). Companies also donate resources for philanthropy. In 2020, Amazon donated nearly 9,000 laptops to Seattle Public Schools, with the Amazon Web Services CEO stating, "Making sure our kids have the ability to keep learning is one of the most important things we can collectively do during the COVID-19 crisis." (US About Amazon, 2020).

Teachers addressing inequity can advocate for higher access to resources. In 2012, over 26,000 teachers, clinicians, and paraprofessionals in the Chicago Teachers Union Strike successfully advocated for better teaching conditions and school resources (Rahmen, 2022). Teachers can ensure that technology is used in relation to the access level of their students, helping ensure a lack of access does not harm their education (Lieberman, 2021).

Individual Schools seeking equitable education can support teachers with meaningful technology training. They can also help ensure access to the devices they have available. A community college in California gave laptops to randomly selected students who applied for financial aid. Following their academic records, they found the group that received laptops

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performed better than those that did not. A school in Colorado successfully implemented a one-to-one laptops for their students (Cappola, 2020).

The National School Board Association (NSBA) has four dedicated “Equity Councils” that work to address equal access to quality education (NSBA, 2023). Greater than the NSBA, the state government education departments (participant group) decide how schools are funded and other aspects in education. School districts that are utilizing technology are a participant group and have a direct effect on the student participant group. In 2020, 73 of the largest 100 school districts in the nation were instructing entirely online. It was found in 2020 that 36% of low-income students could not complete their schoolwork because technology was inaccessible. (American University, 2020).

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