Technology's Impact on Education in Resource Constrained Communities

It has always been apparent that a community's access to technology differs based off of their assets and in which neighborhood they reside in. This inequality stems from deep within American history as it is a result of institutional racism. As technology becomes more integrated into our daily lives, it is important to understand that the learning curve will increase, and the socioeconomic gap will widen. I define the learning curve as the rate in which people learn how to use technology and the socioeconomic gap as people's social and economic position that is impacted by factors such as education, race, and poverty. Dr. Sheena Erete, an Associate Professor at DePaul University gave an insightful presentation regarding an 'Asset Based Approach to Designing Technology' where she stated, "Resource constrained communities are geographically bound areas that face disparities due to issues like concentrated poverty and low household incomes, that lack of adequate educational opportunities and basic health human services due to historic policies that have set this in place" (Erete, 2018). Themes from this course that relate to this topic include inclusive design, accessibility to technological resources, and widening of the socioeconomic gap.

Erete, Dr. Sheena, director. *Taking an Assets-Based Approach to Designing Technology*. July 2018, https://www.youtube.com/watch?v=fCF7M-9Lkpw.

Guiding Questions

- Does lack of technology as a child impact their learning and level of education as an adult?
- How do schools in underprivileged communities currently manage without adequate technological resources?
- How does a school's curriculum differ based off their access to technology?
- Would guidelines across schools in the United States regarding equal access to technology be an effective way in tackling this issue? Have school districts discussed this?

The Role of Technology in Education

"It (technology) can help affirm and advance relationships between educators and students, reinvent our approaches to learning and collaboration, shrink long-standing equity and accessibility gaps, and adapt learning experiences to meet the needs of all learners" (South et al., Pg. 3). This powerful quote comes from the 2017 National Education Technology Plan (NETP) which is a policy document for the U.S education system that aims to support learning and teaching through conducting research. This plan was first implemented in 1996 and ever since has served as a guideline to ensure equity in education through learning, teaching, leadership, assessment, and infrastructure. The NETP is a call to action that illustrates examples of how education depends on effective use of technology in schools with the support of teachers, policymakers, and administrators. In addition, it articulates recommendations in integrating effective technology practices to further improve technology-based learning.

Because technology is constantly being integrated into our daily lives, it is important to note that the way we learn evolves simultaneously. Relying on electronic devices to study and complete homework is a different way of learning than a decade ago when devices were not required at all. “Technology-enabled learning environments allow less experienced learners to access and participate in specialized communities of practice, graduating to more complex activities and deeper participation as they gain the experience needed to become expert members of the community” (South et al., Pg. 9). This research encourages introduction to technology earlier on in children’s’ lives because of the direction our society is heading in. Because technology is becoming more normalized, it is important to support students in technology-enabled learning while providing them with the necessary resources to be successful. Incorporating the use of technology into curriculum’s allows students to gain experience and familiarity with technology at a young age. This has potential to spark their interest in tech related work and they can explore this curiosity throughout their elementary, middle, and high school years.

Technology can also hold an important role in education when it comes to students completing homework at home. It is important to realize that every student is not fortunate enough to have access to people who received an education and who can help them with schoolwork when necessary. This is very prevalent in immigrant households because often times English is not the primary language spoken and the highest level of education received by the parents is typically elementary or middle school. However, students can use electronic devices to communicate with teachers, peers, and use free online education tools such as Khan Academy. Adequate access to technology can fill this void and help guide students through school so they are given a fair chance in becoming academically successful.

South, Joseph, and Katrina Stevens. “Reimagining the Role of Technology in Education: 2017 National Education Technology Plan Update.” *Office of Educational Technology*, 2017.

The Allocation of State Funding to Schools

This research paper discusses the funding gap and how this impacts the way schools teach their students. Greg Orlofsky, the author had already come to the conclusion that those schools with low income and minority students received less money, but he aimed to examine why and how this funding is dispersed.

Orlofsky highlights an important finding from his study; Districts serving the greatest number of poor students and those with the greatest number of minorities get less state and local money. He also discovered that on average, school districts with the greatest number of poor students were given $966 less per student in comparison to low poverty districts. This gap causes a significant impact to the quality of education students are given across the country. Although there are policies in place such as the ‘Every Student Succeeds Act’ that aims to ensure that all public-school students are given the same quality education, despite of their abilities and socioeconomic background, this

study confirms such policies are not enough. Because Orlofsky extensively analyzed the education finance data, he was able to come to such conclusions.

Since States are in charge of funding public schools, Orlofsky says that they are the ones that must diminish this funding gap. He states, “The most common approaches are for states to reduce reliance on local property taxes by assuming a greater share of overall school funding and to heavily target poorer districts when distributing those state tax revenues” (Orlofsky, Pg. 9). Although there is recognition that high poverty schools receive less funding, we have not seen an improvement in the opportunity, achievement, and equity gaps in education. Although this research article was published in 2002, we see similar trends in today’s society. There are still schools in resource constrained communities that need more financial help but are not receiving it.

Orlofsky, Greg. “The Funding Gap: Low-Income and Minority Students Receive Fewer Dollars.” *Education Resources Information Center*, Aug. 2002.

The Digital Divide

This report was written by Raeal Moore, Dan Vitale, and Nycole Stawinoga, all employees for the American College Testing (ACT) company. This paper encompasses a study that was done by the ACT specifically the Center for Equity in Learning. The authors define the digital divide as, “The gap between people who have sufficient knowledge of and access to technology and those who do not—persists’” (Moore et al., Pg. 0). This divide is significant because it is the reason why students who are in “technology-deficient circumstances” continue to be victims of the achievement gap. Since technology-based learning is slowly transitioning in becoming the norm, recognizing racial disparities, geographical location, and income as factors in access to technology is important in order to create actionable recommendations. In this study, they gave a survey to a sample of high school students and were asked questions about their access to technology and internet in regard to educational purposes at school and at home.

Although 14% of students reported to only have access to one electronic device at home, the authors dig deeper into this user group to understand the educational challenges they face. The research results find that from that 14%, a majority of those students were from underserved communities whose parents made less than $36,000 a year, and only 8% of those students were white while the rest made up various minority groups. It is important to indicate that more than half of those students who reported to only having one device at home, either had a smartphone or a laptop. It is easy to imagine the numerous barriers that can come with completing schoolwork on a cellphone.

Some of the authors’ recommendations include expanding device and internet access among those who lack them. Because more than half of students who said there one electronic device at home was a smart phone, the authors made an interesting point that colleges and universities need to make their applications more accessible by

allowing those forms to be compatible with filling them out on a smartphone. Without conforming to people's needs based off what they have, we are only contributing to this digital divide. The authors state that, "Inequitable access to electronic devices and effective internet connections contributes to opportunity, achievement, and equity gaps in education" (Moore et al., Pg. 8). This relates to Papert's article in which he predicted the normalization of computers and technology will surely enhance class distinctions. Although Papert's optimistic side acknowledges that access to technology can dramatically change people's situations, he does not go into depth regarding how to tackle this issue. But with more research being done since the publication of Papert's piece, we can understand what other authors have recommended.

Moore, Rael, et al. "The Digital Divide and Educational Equity." *Education Resources Information Center*, Aug. 2018.

A Design Approach

The research paper written by Diogo Casanova and Paul Mitchell outlines numerous approaches in designing technology enhanced learning spaces in schools. They did a study at an English University where they conducted design workshops for students and teachers, so they were able to vocalize their needs. Their goal of this paper is to describe design methods for new learning spaces that promote the use of technology. Casanova and Mitchell also articulate how their new recommendations support various ways of learning, as they recognize not all students benefit from mainstream teaching practices and environments.

This research took place between 2014-2016 where they had twenty-five students and thirty-two teachers from a handful of teaching disciplines. Both user groups included men and women from various ages in order to ensure different experiences would be shared. Based off the data received, Casanova and Mitchell found that interaction and engagement were common needs in the classroom amongst their users. Their first design concept is called "The Cube" where it seats about 400 students that would be spread across all four walls of the room while the professor sits in the middle. In addition to this, a tablet provided by the University would be connected to each seat that allows the professor to monitor their screens. The goal of this concept is to increase student and professor interactivity and engagement with one another while practicing thoughtful technology incorporation. Another concept referred to as "The Poppy Flower" is designed for twenty-four students in total but the classroom is split into tables of seven, one chair being in the middle for the professor with six students sitting in chairs in the shape of a circle. This promotes heavy collaboration and allows students to ask the professor questions in smaller groups to enhance their comfortability.

"Furthermore, the findings provide valuable insight into practices that will lead to more sustainable and future-proof learning space design" (Casanova et al. Pg. 10). The authors suggest that current teaching environments and practices are not long lasting. This is because of the continuous integration of technology in society and because traditional teaching environments are not designed to satisfy the needs of all students.

Casanova and Mitchell's process of listening to user needs and designing new approaches to support various ways students learn relates to inclusive design. As designers, our goal should not be to design for the majority but instead reach new heights and help users with different capabilities reach their potential. When it comes to education, one size does not fit all meaning that one standard curriculum, learning environment, and online course does not allow students with different needs to succeed. This in itself is also contributing to the achievement gap.
When thoughtfully designed, technology has the ability to empower individuals to no end and this can be the impact when adequately incorporated into schools.

Casanova, Diogo, and Paul Mitchell. "The Cube and the Poppy Flower: Participatory Approaches for Designing Technology-Enhanced Learning Spaces." *Journal Learning Spaces*, 2017.

Online Education During COVID-19
This interview was conducted by The Harvard Gazette where they interviewed Paul Reville who was the former Secretary of Education in Massachusetts. They wanted to gain more insight into the impact of Covid-19 on school districts and how this experience can cause a positive shift in the American education system. In this interview, they discuss that this crisis has shined light on so many flaws within the education system especially for disadvantaged students.

Since schools were forced to close abruptly, they were not prepared in this transition into online learning. Because of this, we all get to witness how schools work to improve children's access to technology and resources. Reville states it is important to ask, "How do we make our school, education, and child-development systems more individually responsive to the needs of our students? Why not construct a system that meets children where they are and gives them what they need inside and outside of school in order to be successful?" (Reville, 2020). Reville brings up an important point that it is critical to take Covid-19 as a learning and growing opportunity for the U.S education system. Throughout the interview he continues to strongly suggest that the system needs to begin to cater to the needs of individuals rather than setting expectations for them to follow. When asked how much of an impact closing schools for months would have on students' education, Reville stated that not everyone will experience the same setback. He also states that those who are the least economically challenged will experience little to no turmoil however those who are the most disadvantaged will be the most susceptible to the effects of Covid-19. Due to the constant trends we have witnessed in the inequality in education, it makes sense that this pattern is only getting worse during this crisis.

This interview was a significant addition to my overall research because it allowed me to evaluate the U.S education system in present day through the eyes of a former Secretary of Education. Reville, having worked with maintaining policies and funding schools, still recognizes gaps in the system and even makes recommendations based

off that. He states that providing technology and adequate internet access to all is just one step in the right direction of closing the achievement gap.

Moneo, Liz. “Time to Fix American Education with Race-for-Space Resolve.” *The Harvard Gazette*, 10 Apr. 2020.

Understanding Education through the Perspective of the U.S Education System

Although the U.S education system has a long way to go before the achievement gap can fully diminish, their continuous efforts in providing resources to students of all needs are undeniable. This document clearly states, “The challenge of ensuring educational equity is formidable. Our country's international competitors are improving faster than we are educationally, and many are having greater success in closing achievement gaps—which remain stubbornly wide in the United States” (Education, 2017).There is a section on their official website named ‘Equity of Opportunity’ where they disclose information regarding policies that are in place that aim to continue to expand equity in schools.

Although the website includes a handful of initiatives, a few that stand out include the Individuals with Disabilities Education Act (IDEA), the Every Student Succeeds Act (ESSA), and Native Youth Community Projects. These policies are significant because they focus on inclusiveness and ensure that students regardless of their capabilities, socioeconomic background, and history with educational opportunities have a fair chance to succeed as their more privileged counterparts. More specifically the IDEA provides states and federal grants to support research, technology, and parent training. The ESSA ensures students are given resources they need such as technology to achieve and learn at the level they should be. The Native Youth Community Projects evaluates patterns in educational barriers Native youth face and aims to support them in overcoming them. Each policy is individualized and takes into account the needs of the students, similar to what we do as designers especially during the user centered design process when ideating for users and their specific needs.

Throughout this research paper, I have examined many critiques of the U.S education system and flaws that are present within it. However, it is critical to show the continuous efforts they have made in attempting to provide an equal education to students regardless of their disadvantages. It is also important to recognize that despite the policies and laws that have been put in place to tackle these issues, the achievement gap is still present and still causing the socioeconomic gap to widen especially in resource constrained communities.

“Equity of Opportunity.” *U.S. Department of Education*, www.ed.gov/equity.

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