Typerspace: An Interactive Approach to Teaching Keyboard Literacy

Exploration of the Digital Divide and its Impact on Keyboarding Ability

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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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Introduction

The concept of a digital divide is not a new one in the studies of technology and society, referring to the disparity in citizens with convenient access to modern technologies, namely computers and the internet. While this divide is the result of a host of different factors including race and wealth, its effects are most visible in early childhood education. According to Daugherty (2014), "children who come from disadvantaged families have lower levels of academic achievement than their more-advantaged peers" (p. 4); the authors go on to explain that this includes digital literacy, and there is considerable concern that disadvantaged students are lagging behind in terms of their development of information and communication technology skills. As a result of limited funding to underprivileged public school districts (Katz, 2020), the students attending these school districts are given fewer opportunities to interact with computers, and therefore have underdeveloped digital literacy skills in later levels of education.

This manifests in difficulty securing long-term employment as adults, given the universal importance of technological communication skills in nearly every form of skilled labor. According to Withers (2015), this is often a significant barrier for technologically illiterate adults seeking employment. They are often hesitant or even hostile in response to employment opportunities which mandate the acquisition of these skills, largely due to the effect of unemployment on their sense of self-worth during a turbulent time in their lives.

Connecting these two facts, it is obvious that there is a problem; underprivileged students are not given a chance to develop digital literacy in their early childhood education, which directly results in an increase in the difficulty of searching for occupation, negatively affecting the productivity of the workforce and society as a whole. To combat this, this study will explore ways in which society can be altered or restructured to allow more opportunities to develop these

skills during early education. This will give me greater insight into how my technical project, a typing practice web application called *Typerspace*, could best be deployed to assist in the development of digital literacy for underprivileged students.

Technical Topic

In a world where technological development necessitates greater computer skills and the COVID-19 pandemic has forced many schools to transition to online learning, keyboard literacy has become an increasingly important skill to develop from a young age. However, many children fail to understand the importance of this skill, and find it boring and tedious to work to develop it. Chwat (2018) reports that despite being considered "digital natives", fourth-grade students were found to submit shorter writing for assignments as compared to students who completed a similar assessment on paper, likely due to limited formal development of keyboarding and digital word processing skills. To improve this issue, an app called *Typerspace* was developed which allows users to practice by typing along to the captions of a selected YouTube video. The idea behind this was that children would generally be more likely to use the app regularly to watch educational or entertainment videos, and that they would be engaged and more likely to retain basic keyboard literacy skills from their practice since they get to choose the subject matter of the video, and therefore the words they type. The app was developed by a group of three college student software engineers, with a large amount of the development being done in a twenty-four-hour span for the HackBU 2021 Hackathon. A typing app was chosen as the task due to the group members' shared memory of a fun typing game that was part of their curriculum in early education, and a desire to translate its benefits to an older audience. It was developed largely in JavaScript, HTML, and Python, and incorporated other software engineering technologies such as Flask, Heroku, and several APIs.

The application largely behaved as desired, capturing the captions of a specified

YouTube video and allowing the user to practice typing while watching their embedded video.

The original goal is still believed to be very feasible, as *Typerspace* has the potential to improve

keyboard literacy skills when released to the public. Because it is not yet released, there is no

data to report on its effectiveness in improving keyboard literacy in children, but this is intended

to be further analyzed following official release, when optimizations such as accuracy statistics

and visual improvements are implemented. Going forward, the *Typerspace* team has every

intention of continuing in its mission to improve keyboard literacy in children by publishing and

promoting the application. The Computer Science curriculum at UVA could be improved to

better prepare students for this kind of work by offering or requiring more classes which focus on

teaching modern and relevant app-building technologies, especially front-end which seems to be

underrepresented in the average student's coursework. Namely, JavaScript and TypeScript are

programming languages which are widely used in the software development industry, but never

formally taught at any point in the CS curriculum at UVA.

STS Topic

The digital divide has an extremely significant impact on development of information and

communication technology skills at a young age, and by consequence, the ability of adults who

came from underprivileged backgrounds to find desirable employment. To address this issue, I

am going to first explore why society and technology have developed this relationship which

works to the detriment of the disenfranchised, and then suggest ways that this issue could be

alleviated. Korupp (2005) finds that, among other factors, household income is a good predictor

of computer and internet access. This is unsurprising, as families with more disposable income

are more likely able and willing to afford personal computers and internet subscriptions. For this

group, technology is a simple fact of life, and is an important part of both education and socialization from a young age. This is not the case for many underprivileged groups. Black children, for example, generally receive more encouragement to pursue sports at a young age from society as a whole (Shakib, 2012), so early introduction to technology is, culturally speaking, a less significant activity. For this reason, attacking the digital divide starting at home seems to provide a challenge; even if some sort of legislation was leveraged to provide underprivileged families with easier access to technology, cultural values would initially decrease the likelihood of actually leveraging the technology to full capability.

Early education programs provide a more reasonable route to integrate computer skills into students' lives from a young age. According to Baker (2014), several states such as Illinois and Philadelphia exhibit high degrees of school funding inequalities, contrasting well-funded suburban areas with poorly funded urban districts with significant minority populations. As expected, the less-funded schools have fewer, if any, computers for student use, and students attending these school districts are at an inherent disadvantage to develop digital literacy skills. Baker goes on to recommend several policies that could help restructure society to better suit the importance of digital literacy in the modern workforce. Specifically, he notes that underprivileged and affluent school districts will more than likely refuse to consolidate to provide a uniform learning experience for students, as this requires agreement from all districts and the decision would negatively impact some students. In this regard, it seems clear that the most effective way to close the digital divide is to provide greater funding directly to the underprivileged schools which need money for student computers. Morgan (2018) reports the states, such as Illinois and Nebraska, which have the greatest inequalities in school district funding (p. 11). This would suggest that data is readily available and easily analyzable, and the

funding disparity is simply the result of a combination of racial bias, socioeconomic bias, and simple lack of concern over funding inequalities.

This isn't a problem that can be significantly improved by the actions of individuals; rather, it would require a structural change to the way that state and local governments evaluate the funding needs of public-school districts. It seems reasonable to assume that some sort of "Diversity and Equity" panel could be effective in examining funding differences which are having an impact on the students, and to recommend money allocation changes that would somewhat rectify these situations. These changes to different levels of government would come at a cost, but it is necessary to accommodate the increased importance of digital literacy and computer skills in our modern economy. In response to the constantly changing nature of technology, society must often change as well to accommodate it.

Next Steps

Technical:

- Allow app to communicate with a database to store user login information and stats

- Add capability to calculate and display user typing stats as they practice

- Finalize hosting and domain name and deploy app

- Advertise app to allow users to practice typing

STS:

- Find and examine a situation in which underprivileged school districts were given greater funding, and how it affected digital literacy in students

- Explore ways to facilitate the development of digital literacy and information and communication technology skills in adults

- Gather more in-depth statistics on the impact of digital literacy on the ability of adults to find employment

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