Programming Together at UVA: A Proposal for a Computer Science Mentorship Program

Relationships with Technology: How it is in the Home and in the Classroom

A Thesis Prospectus

In STS 4500

Presented to

The Faculty of the

School of Engineering and Applied Science

University of Virginia

In Partial Fulfillment of the Requirements for the Degree

Bachelor of Science in Computer Science

By

Bryce Gunter

December 5, 2024

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.

ADVISORS

Karina Rider, Department of Engineering and Society

Rosanne Vrugtman, Department of Computer Science

Briana Morrison, Department of Computer Science

Introduction:

Technology is increasingly being embedded in all aspects of life, from the home to the classroom, and this especially affects children. When I was in grade school, most of my assignments were turned in on paper, and now in college it is the opposite. When I was a kid, I had access to a variety of technologies at home. When it came to technology at school, it was second nature to me. However, I would notice that this was not always the case for my classmates. I did not live in a wealthy area, so for a lot of my classmates their access to most technology was limited to the classroom. This would often cause them to struggle and to need assistance. Since technology has now become analogous to learning in the classroom, these situations have become increasingly more complex.

Now I believe that technology is something that is impossible to avoid in the classroom. Because of this, I want to explore what the effects of these technology connections are. The situation is complex and there are many possible angles of analysis. In the present times, it seems that it is not the access to technology that is the main factor anymore, instead it seems like it is how the parents let their children use technology that matters the most. Limits are no longer based on not having technology, but instead on how much time and freedom parents allow their children to have with the technology in the home.

Because of these experiences and observations, my research question is how does a student's relationship with technology at home impact their relationship with technology in the classroom? From my understanding it seems that having access to technology at home is a benefit, while overuse of this technology is harmful, but of course this is just my hypothesis.

This question is an important one to ask because technology in the classroom does not look like it is going away anytime soon. If we can gain an understanding of how technology at

home connects to how students use technology in the classroom, we can learn how to best leverage technology to help students advance in their education. This is why my STS project explores this connection between technology at home and technology in the classroom. Meanwhile, my technical project is a proposal of a mentorship program between first and fourth year computer science students at the University of Virginia. Similarly to my STS project, this project addresses student success but from a different angle–mentorship. With this connection, perhaps I can find the best way to incorporate technology into the mentoring program to benefit the students involved. Another angle to view a connection between the two projects is that since the mentorship program is for computer science students, it is intrinsically connected to both technology and education, therefore it relates to the STS project through those avenues.

Technical Project:

I am designing and drafting a proposal for a mentoring program at the University of Virginia that involves fourth year computer science students mentoring first year computer science students. The inspiration for this proposal comes from my own experiences as a first year and fourth year student. In my first year, I did not feel very connected to the university and I was very unaware of what would come in the future for me as a computer science student. I would have very much benefited from a guiding figure who had once walked the same path as me. Now as a fourth year, I have this feeling that I could have done more to leave a mark on the students who came after me. That is why I am proposing this mentorship program, to help first year students and fourth year students who have the same feelings as I do and as I did.

The way this program would be set up is that a fourth year student would mentor two first year students, either in the fall or spring semester. The mentor and mentees would be matched on multiple criteria, including personal interests, what they plan to do or have done in computer

science, and what they want to experience in college or have experienced. A training orientation for mentors would occur before classes begin, with a kickoff event occurring soon after where all mentors and mentees would attend and meet each other and create meeting schedules. Over the course of the semester, mentors and mentees will meet bi-weekly for at least an hour, with group sessions occurring every third week, which would include multiple mentor-mentee groups meeting. Also, after every event and meeting, mentors and mentees will be asked to submit feedback to ensure that the program is productive and beneficial for all parties involved.

The goal of this program is to foster a relationship between mentors and mentees that benefits both groups. Mentors would be able to help guide mentees during the most difficult and developmental time at university, and potentially give them someone they can always reach out to when needed. The mentors will be able to gain experience in mentoring that they will be able to carry with them throughout their careers potentially helping them develop skills needed for leadership roles. The program can also help expand the networks of everyone involved. The program as proposed would aim to be beneficial to both parties and be an overall positive experience for anyone involved. This program would be a first-of-its-kind mentoring program for undergraduate engineering at the University of Virginia due to its focus on the social aspects.

STS Project:

How technology impacts students is a widely discussed topic. The problem is nuanced: increased technology use can have mixed impacts on children. The main negative effect is that educational inequities have increased due to there being a gap in the technology that kids have access to. Children from economically disadvantaged backgrounds are often unable to access technology that they need in their classes. Effects can also be seen when technology is present, not just when it is absent. On the one hand, technology can be a distraction for some students. On

the other hand, an increase in technology has led to an increase in the information available to students, which is a benefit as it allows for students to have expanded knowledge. The consensus is that a balance must be found to keep kids healthy and safe. (Ascione, 2023; Maryville University, 2022; Myers, 2023)

Academics are also invested in these technological relationships. Jeong et al. (2024) asks how differences in digital technology access and digital competence affect student achievement. The researchers used a mathematical function to model student achievement and found that students who view themselves as competent in digital use outperform their peers. However, they also found that students who use technology to submit assignments at home tend to have worse performance. These results show that knowing how to use technology in the classroom is beneficial, but using digital devices to do work at home can be detrimental. This is further supported by Skvarc et al. (2021), who examine the connection between technology in the home and academic performance. They found that the number of computers at the home was positively correlated with performance in mathematics, but the number of hours spent on the computers did not correlate.

The issue of inequality in technology is an important one to expand upon. Often focus is on how schools are helping their students be able to access technology at home and not just in the classroom. According to survey results from the U.S Department of Education's National Center for Education Statistics (Kuykendall 2022), 45% of responding public schools offer internet access to students who need it at home. The more interesting statistic is that 41% said that they did not offer this, which could put some students at a disadvantage. The National Center for Education Statistics (2023) also has a report that in 2021, only 78% of students with parents who did not have a high school diploma had access to the internet at home. This shows

that the issue of access to technology at home is certainly a socioeconomic issue, meaning that students from disadvantaged backgrounds are more likely to be at a disadvantage.

Another thing to factor in this discussion is how parents view this issue. For example, Neumann et al. (2018) asks how parents and teachers view the use of technology such as tablets by young children. In interviews conducted with parents, they found that parents and teachers viewed the tablets positively, seeing their value in the classroom. However, the parents were also worried about how the tablets could be overused at home and saw the best approach as being balanced with limitations and guidance. Similarly, Romero-Tena et al. (2022) used a questionnaire sent out to parents to understand what technology children were using at home and how parents felt about this technology. They found that parents mostly found their children's use of technology to be adequate, viewing it as tools for fun and learning. The responding parents also said that they base the use of technology around time limits that they set for their children. This shows that technology is something that parents want their children to have access to. This encouragement from parents for their children to use technology could be linked to how their child reacts to technology in the classroom.

There has been a lot of research and insights into technology in the classroom and at home, but what is missing is how the relationship with the technology at home directly affects the relationship with technology in the classroom. Most of the research is about what technology is being used, how long it is being used for, and whether there is access or not for all students. Not often is it asked what exactly the technology is being used for. Access to technology is definitely important to research, however I believe that we too often overlook the exact ways the technology is being used. For example, tablets and computers are two technologies that can be used to do vastly different things, and perhaps the things that children do with these technologies

could affect them in the classroom. Could it be that a child who uses a tablet to game will interact with a tablet in class differently than a child watches educational content on their tablet at home? This type of question is one that I hope to be able to answer using the research I plan on doing.

To conduct my research, I plan on utilizing a mixed-methods approach in order to gather a large amount of information and cast a wide net for my search. I will look through the current research articles about technology in the classroom vs home and I will analyze and synthesize my findings to get an understanding of these current findings. I also will look through public subreddits for teachers and parents on the website Reddit and I will view posts and comments to see how they view technology in the home and in the classroom to see what they allow their students and children to do with the technology, and if they have any opinions on the effects and impacts. Next, I will analyze data from interviews conducted with and surveys questioning parents, teachers, or students, that already exist and will use this data to draw conclusions from. The data I will analyze from interviews and surveys will be collected from the last 5 years, while the Reddit posts I examine will be from the last 2 years.

Conclusion:

If it was not clear before, it should be now that technology is something that will never leave the classroom or the home, and that these two environments are connected by this technology. How we use technology in these two environments could have lasting effects on the students who use them. It is our job to understand the relationship between the technology in the home and classroom so that we can act in the best interest of students. By understanding how technology at home impacts technology in the classroom, and vice versa, we can hope to use those understandings in order to do what is best to help children succeed academically.

References:

Ascione, L. (2023, December 11). *What is one negative effect technology has had on education?*. eSchool News. https://www.eschoolnews.com/it-leadership/2023/12/11/what-is-one-negative-effect-technology-has-had-on-education/

Jeong, D. W., Moon, H., Jeong, S. M., & Moon, C. J. (2024). Digital Capital Accumulation in schools, teachers, and students and academic achievement: Cross-country evidence from the Pisa 2018. *International Journal of Educational Development*, *107*. https://doi.org/10.1016/j.ijedudev.2024.103024

Kuykendall, K. (2022, September 27). *New data: Nearly half of schools providing home internet access to students who need it this school year*. THE Journal. https://thejournal.com/articles/2022/09/27/nearly-half-of-schools-providing-home-internet-access-to-students-who-need-it-this-school-year.aspx

Maryville University. (2022, January 18). *Children and technology: positive and negative effects.* Maryville University. https://online.maryville.edu/blog/children-and-technology/

Myers, R. (2023, August 30). *Friend of foe? Pros and cons of technology in the classroom.* Child Development Institute. https://childdevelopmentinfo.com/development/friend-or-foe-pros-and-cons-of-technology-in-the-classroom/

National Center for Education Statistics. (2023, August). *Children's Internet Access at Home.* U.S. Department of Education, Institute of Education Sciences. https://nces.ed.gov/programs/coe/indicator/cch/home-internet-access

Neumann, M. M., Merchant, G., & Burnett, C. (2018). Young children and tablets: the views of parents and teachers. *Early Child Development and Care*, *190*(11), 1750–1761. https://doi.org/10.1080/03004430.2018.1550083

Romero-Tena, R., Barragán-Sánchez, R., Martínez-Pérez, S., & Palacios-Rodríguez, A. (2022). Habits, Norms and Use of Technologies at Home from a Gender Perspective in Early Childhood. *Digital Education Review*, (41), 19–31.

Skvarc, D. R., Talbot, M., Harries, T., Wilson, C. J., Joshua, N., & Byrne, L. K. (2021). Home Information and Communication Technology use and student academic performance: Encouraging results for uncertain times. *Frontiers in Psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.638319