

Sociotechnical Synthesis

Submitted to the Department of Engineering and Society

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University of Virginia • Charlottesville, Virginia

In Partial Fulfillment of the Requirements for the Degree
Bachelor of Science, School of Engineering

Rachel Lew
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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

Rachel Lew Date 11/22/2021

 Date 12-03-21
Richard D. Jacques, Ph.D., Department of Engineering and Society

While my STS research and technical work are not directly related, they both explore how technology can damage or benefit an individual, respectively. My STS research analyzes how the differences created in social media has negatively impacted youth mental health. I chose my STS topic because of the prominence of social media in my generation, and my interest in bringing awareness to the risks of social media. In my technical project, I work with my team to design a system that aims to help elementary school students learn how to spell in an interactive way.

In my STS research, I investigate the prevalence of cyberbullying in social media, and other risks social media presents for youth mental health. I research the distinct features of social media that differentiates online behaviors from in-person behaviors in order to understand how social media interactions are as harmful as in-person bullying. By outlining how certain social media features can heighten actions of cyber aggression and increase mental distress in adolescents, I determine the most optimal way to mitigate these effects. My research revealed that the nature of social media itself cannot be altered, even if social media engineers remove harmful features. Thus, educating the users will mainly help mitigate such effects. I learned that while parents and adult figures could bring up social media awareness, the best way to reach all adolescents will be through social media itself.

My technical topic produced an educational device that aims to help elementary school students learn and spell words by prompting the student to spell a given image using physical letter blocks and verifying the input. An object is displayed on an LCD display, the user places individual letter blocks into their respective slots in the device, and the spelling is verified through the arrangement of letters in the slots. An indication of whether the user spells the name of the object correctly is available on the LCD display. My technical topic aims to use

multisensory learning to help students learn to spell in a different way than what is currently taught in the classroom. The knowledge I have gained from prior coursework aided me in completing tasks that were needed to bring the system to fruition.

From both my technical project and STS paper, I learned how technology can change someone's ability to obtain knowledge. Through my STS paper, I learned how the way technology is used can change the initial intentions for the technology. Social media was first created to help individuals reconnect with others, not to cause mental distress on adolescents. Through my technical project, I learned how technology can help individuals gain knowledge. My technical project utilizes hands-on learning and gamification simultaneously to teach individuals how to spell in a way not normally found in the classroom. Both my STS paper and technical project highlight the need for accessibility for resources. In my STS paper, it is important to ensure that all youth can easily access social media education. In my technical project, we had to consider how to create a device that could be affordable for all classroom environments. Overall, I found that considering the potential side effects of technology and reflecting on the accessibility of the technology are essential discussions for any engineer to partake in, and I encourage future students to consider these concerns in their final projects.

Lastly, I would like to thank my STS professors, Professor Caitlin Wylie and Professor Richard Jacques, and my Capstone advisors, Professor Harry Powell and Professor Todd Delong. I'd also like to acknowledge my capstone team, Noah Beamon, Justin Guo, Catlinh Nguyen, and Shymbolat Tnaliyev.

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SpellCheck: An Educational Device to Practice Spelling

With Noah Beamon, Justin Guo, Catlinh. Nguyen, and Shymbolat Tnaliyev

Technical Advisor: Harry C. Powell, Department of Electrical and Computer Engineering

Prevalence of Cyberbullying in Social Media and its Effect on Youth

STS Advisor: Richard Jacques, Department of Engineering and Society

Technical Prospectus

Technical Advisor: Nada Basit, Department of Computer Science

STS Advisor: Caitlin D. Wylie, Department of Engineering and Society