Thesis Project Portfolio

Network Process Automation: How Ansible Can Facilitate Efficient Processes
(Technical Report)

The Impact of COVID-19 on the Evolution of Educational Technologies in America
(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

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Sociotechnical Synthesis

(Executive Summary)

Investigating Online Learning Systems in Professional and Educational Spaces

The technical portion of my portfolio and the research portion are not closely related. The former is about my summer internship, where I had to utilize Ansible playbooks to minimize the downtime between consecutive network systems tests; however, the latter is concerned with the mental and emotional effects of online learning on students and teachers across the United States. I decided to research this topic because online learning was the norm in America for all of 2020 and some of 2021, and I had experienced it in college. I wanted to see how other students had fared, especially those in preliminary and primary school, as well as how teachers had been affected. Online learning being implemented nationwide was an example of how unforeseen circumstances – COVID-19, in this case – can force a technology to be used without a regard for the societal impacts that it could have.

The technical portion of my thesis was centered around my internship at the Federal National Mortgage Association (Fannie Mae). “Automation applied to an inefficient operation will magnify the inefficiency.” – Bill Gates. This quote directly applied to the network system that was in place at Fannie Mae when I first started my internship. The overall foundation of the system was inefficient, with little reuse of code and use of functions. There was also no way to

quickly change input parameters on tests without manually changing the code. These issues caused large amounts of downtime – ranging anywhere from 30 minutes to 2 hours – between running multiple tests. My goal was to minimize the downtime. I decided to use an automation platform named Ansible, in conjunction with Cisco Modeling Labs (Cisco CML) and Python. I created playbooks in Ansible that automatically ran tests, opened websites, ran functions, and changed input parameters, based on what was inputted by the user. I was able to successfully achieve my goal: the downtime was decreased from 2 hours to 2 minutes. This allows my coworkers to successfully test network systems without having large amounts of downtime between consecutive tests.

In the STS research portion of my thesis, I looked into the mental and emotional effects of online learning on students and teachers across the United States. Face-to-face learning seems to be more beneficial long-term than online learning. Online learning has a detrimental effect on the students, which is the group that is supposed to be reaping the benefits of the education given to them. Students do worse by an average of 0.22 grade points when taking an online course as a prerequisite to a face-to-face course, and students experience social isolation and lowered self-esteem. Teachers are also negatively impacted by online learning, as they are not able to teach effectively and feel unmotivated to teach online.

At first glance, it seems that the technical portion of my essay is unrelated to the research portion. However, during my internship, I was able to confirm some of the information that I researched in my paper first-hand. For example, it was harder to make connections with my coworkers while I was working virtually. It was also harder to understand the material that I was learning during the online onboarding modules – I found it hard to focus on the screen for large amounts of time. Both of these phenomena were synonymous with the trends that have been

discovered in children during online schooling. This was the first time that I personally confirmed the research that I had done, which was a very exciting thing for me to accomplish. In addition, I was able to learn about the sociotechnical effects of a technology on a certain group of society through the research that I did. Seeing these effects occur to me was eye-opening and reemphasized the fact that the societal implications of a technology should be fully analyzed before being released to the public. I will ensure to keep this realization close to me and my actions as I begin my career in the workforce.

I would like to thank my manager, Daniel Negussie, my mentor, Oleksii Evdokimov, and a good friend/mentor during the internship, Griffin Cosgrove. Without their help and advice, I would not have been able to accomplish my goal of lowering the downtime in between tests. I would also like to thank Professors Kathryn Neeley and Kent Wayland for their help and consideration during the writing process. My portfolio was completed during a tumultuous time in my life, and I would not have been able to complete it without their guidance and kindness.