

Thesis Portfolio

**The Effect of New NIST Password Guidelines on Password Creation For Web Applications
and a Comparison to The Past**
(Technical Report)

How Elementary Age Children Learn To Use Digital Technology
(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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Spring, 2021

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Sociotechnical Synthesis

Inexperienced use of technology can hinder the user and prevent them from using the technology to its full potential. A lack of understanding of certain best practices can result in security issues or create undesired scenarios for unsuspecting users. In other scenarios, taking the time to learn how to use a technology can take valuable time away from productivity and there are not always systems in place to support this learning.

The technical paper portion of the portfolio is a report on the effect of new login password standards released by the National Institute of Standards and Technology (NIST). As the world begins to rely more heavily on digital interactions, cybersecurity continues to grow in importance, thus necessitating secure systems. The experiment is based on a report from 2016 and updated and modified to include current relevant websites and a broader subject of data to reduce bias. The original report determined the optimal password configuration to be one with a minimum of eight characters and containing a number and a special character. However, since the release of the new NIST standards, an increasing number of login systems are switching over to using longer passwords with looser restrictions in order to reduce the risk that a password is breached or an account is hacked. These new restrictions have proven to be more successful at preventing certain types of malicious attacks due to the predictable methods most users would employ to satisfy the previous requirements. These new restrictions also allow for users to create more memorable passwords than before.

The STS research paper focuses on the processes through which elementary-age children learn the knowledge of how to properly interact with and use digital technologies. With the current state of COVID-19 forcing most schools worldwide to go online, possessing the skills to

operate digital technology has gone from being a luxury to almost being a necessity to obtain a basic education. Ensuring that children can properly use these technologies and understanding the process in which they do will enable engineers and general designers to create more effective technology to expedite the learning process and to build digital citizens faster than before.

Through research and analyses of previous studies, it was concluded that children are reliant on certain cues that enable them to discover for themselves what a technology is capable of and how to operate it. In lieu of these cues, a teaching presence, can fill the gap in knowledge to assist the child's learning.

The STS research paper approaches the subject from the ground up by investigating the source of this branch of knowledge. The technical paper utilizes a top-down approach where users must first understand the general concept of a password and how it works before they can be expected to dive into the details to understand the best way to use this technology. By analyzing from multiple angles how learning more about a technology can result in more efficient and productive use, individual methods can be assessed and compared to each other to determine their effectiveness. Should both approaches be determined as effective, then they can both be incorporated into future projects or daily practices to promote productivity and design for broader demographics.