Improving the Cybersecurity and Information Assurance Pipeline: Impact of High School After-School Program

Sandra Gorka

Pennsylvania College of Technology
Williamsport, Pennsylvania
sgorka@pct.edu

Jacob R. Miller

Pennsylvania College of Technology
Williamsport, Pennsylvania
jmiller3@pct.edu

Alicia McNett

Pennsylvania College of Technology
Williamsport, Pennsylvania
amcnett@pct.edu

Bradley M. Webb

Pennsylvania College of Technology
Williamsport, Pennsylvania
bwebb@pct.edu

ABSTRACT

Over a two year period, Pennsylvania College of Technology faculty participated in an NSF funded grant to extend the cybersecurity pipeline [1] into the high schools by delivering cybersecurity concepts in an after school program where students earn college credit. This poster explores the profile of incoming students and the impact of the program.

CCS CONCEPTS

• **Social and professional topics** → **Computing education**; • **Security and privacy**;

ACM Reference Format:

Sandra Gorka, Alicia McNett, Jacob R. Miller, and Bradley M. Webb. 2019. Improving the Cybersecurity and Information Assurance Pipeline: Impact of High School After-School Program. In *The 20th Annual Conference on Information Technology Education (SIGITE '19)*, October 3–5, 2019, Tacoma, WA, USA. ACM, New York, NY, USA, 1 page. <https://doi.org/10.1145/3349266.3351376>

1 OVERVIEW

One goal of the grant is to research the impact on student educational and career choices. The program ran for the first time in the 2017-2018 academic year and was repeated the following year with a new cohort. A total of 42 students from four local schools enrolled in the year-long program.

2 RESULTS

A pre-course survey showed that 14 (34%) students were already interested in a career in cybersecurity, 24 (59%) indicated they may be interested, and 3 (7%) indicated they were not interested. The post-program survey (n=26) asked students to rate the impact of the program from 1 - 5 (5 - significant impact on career choice; 1 - no impact). The survey showed 54% of participants indicated moderate

to significant impact ('4' - 27%; '5' - 27%) on career choice. Furthermore, 11 (42%) were interested in pursuing a career in cybersecurity, 9 (35%) might be interested, and 6 (23%) were not interested. Eighteen Students indicated an intended college major in computing, ten of those in cybersecurity.

Fourteen content modules were delivered, each focused on one area of security. Students entered the program with a variety of backgrounds. Pre- and post-assessments by module were used to assess student knowledge and receive feedback for revisions. Pre-assessment scores indicated that students were initially strong on Social Engineering, Programming Concepts, and Wireless Security and comparatively weak in Contingency Planning, Hashing, Risk, and Networking Concepts.

Post-assessment of student comprehension showed strongest growth in hashing (29%), basics of security (25%), encryption (24%), contingency planning (22%), and security by design (21%). Post-assessment scores indicated students struggled most to understand Policy, Contingency Planning, and Risk. Course post-assessment indicated students most enjoyed the Social Engineering module (30.8%) and least enjoyed Programming Concepts (23.1%).

3 NEXT STEPS

The program is being offered to a final cohort during the 2019-2020 academic year. The efforts of this grant have resulted in the development of a new course available to all non-Information Technology students enrolled at the college. The last cohort will enroll in an evening course over the period of one semester, meeting twice a week with each session lasting 75 minutes.

ACKNOWLEDGMENTS

This material is based on work supported by the National Science Foundation under Grant No. 1623525. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

REFERENCES

- [1] Sandra Gorka, Alicia McNett, Jacob R. Miller, and Bradley M. Webb. 2017. Improving the Pipeline: After-School Program for Preparing Information Assurance and Cyber Defense Professionals. In *Proceedings of the 18th Annual Conference on Information Technology Education (SIGITE '17)*. ACM, New York, NY, USA, 167–167. <https://doi.org/10.1145/3125659.3125665>

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the owner/author(s).
SIGITE '19, October 3–5, 2019, Tacoma, WA, USA
© 2019 Copyright held by the owner/author(s).
ACM ISBN 978-1-4503-6921-3/19/10.
<https://doi.org/10.1145/3349266.3351376>