Improving the Pipeline: A First Look at the Data

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ABSTRACT

Improving the Pipeline [1] is an NSF funded grant to extend the cybersecurity pipeline into the high school environment. High school students explore cybersecurity concepts while earning credit for an introductory cybersecurity course. This poster discusses a first look at the data collected during the first year of the program as preparation for the second year of the program begins for a new cohort of high school students.

CCS CONCEPTS

• Social and professional topics → Computing education programs; K-12 education; • Security and privacy;

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1 DATA COLLECTED

A primary goal of this grant-funded program is to prepare high school students to pursue the education required to succeed in cybersecurity fields. The program allows high school students to begin cybersecurity studies prior to entering college. The program was broken into 14 content modules, each focusing on a specific area of security ranging from Introduction to Security to Contingency Planning. The first cohort completed the program during the 2017-2018 academic year. The program started with 19 students, of which 16 successfully completed, drawn from two local school districts. Although there was no incoming expectation, all students completed a math placement exam prior to the program. Several students also completed a reading comprehension placement as mandated for participation in the college's dual enrollment program. Participants completed pre and post assessments for the entire program as well as for each content module. Every assessment included both direct and indirect assessment questions.

In addition, seven exams took place during the year along with two capture the flag style events, both of which provided direct assessment data. Exams were typically given after the completion of every two modules and the capture the flag events took place

at the midterm and final points of the program. A final exam was also given. Exams consisted of multiple choice, true/false, and essay questions.

2 RESULTS

This section provides a discussion of the data and any initial insights gained. Additional data will be collected as the program continues with a new cohort of students. The sample size was not sufficient to facilitate statistical analysis of the data, so the focus is currently on the presentation of initial insights drawn from the raw data.

Initial review of the math placement data showed that an overall high school freshman level of math was largely a sufficient prerequisite for the program. Individual math placement scores did not have a strong correlation to overall student success. The results of the reading comprehension testing indicated that mastery of reading was closely linked to student success during this program. The students who fell below the expected reading comprehension level of entering freshman were not as successful as their peers.

Raw pre assessment direct evidence for each module indicated areas students appeared to possess the lowest and highest comprehension upon entering the program. For example, the modules with the lowest scores, Hashing and Risk, indicated a low comprehension. The modules with the highest scores, Social Engineering and Introduction to Security, demonstrated higher incoming knowledge.

Post assessment data provided a way to see improvement in student comprehension after each module and hinted at potential areas to improve upon when offering the module to the next cohort of students. Additional data will be gathered.

3 NEXT STEPS

The 2017-2018 offering of this program yielded a sample size that did not permit proper statistical analysis. The presentation of the raw data is currently all that is feasible; however, the raw data may be of interest to others considering a similar program. The goal of the following year of the program is to continue collecting data to aid in proper analysis.

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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>

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