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Cybersecurity Virtual Summer Workshop for Secondary School Teachers : An Experience Report

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Introduction

Throughout the past decade the workforce demands are rising steadily in the field of cybersecurity, outstripping the supply of skilled workers. Cybersecurity education is the backbone of building strong cybersecurity professionals and informed citizens and the need for bringing cybersecurity education for the K-12 students is rapidly increasing. With the long-term goal of broadening participation in field of cybersecurity, the presenters offered a four-day virtual summer workshop for Western New York (WNY) teachers at Buffalo State College in the summer of 2020. More than 25 middle and high school teachers primarily from the WNY area attended the workshop.

There are some benefits associated with virtual delivery of the workshop. Teachers not only from WNY, but from all over New York State attended the workshop, including one international teacher from Turkey. Teachers being able to attend from home gives them more flexibility concerning their schedule associated with travel and the ability to revisit the recorded workshop.

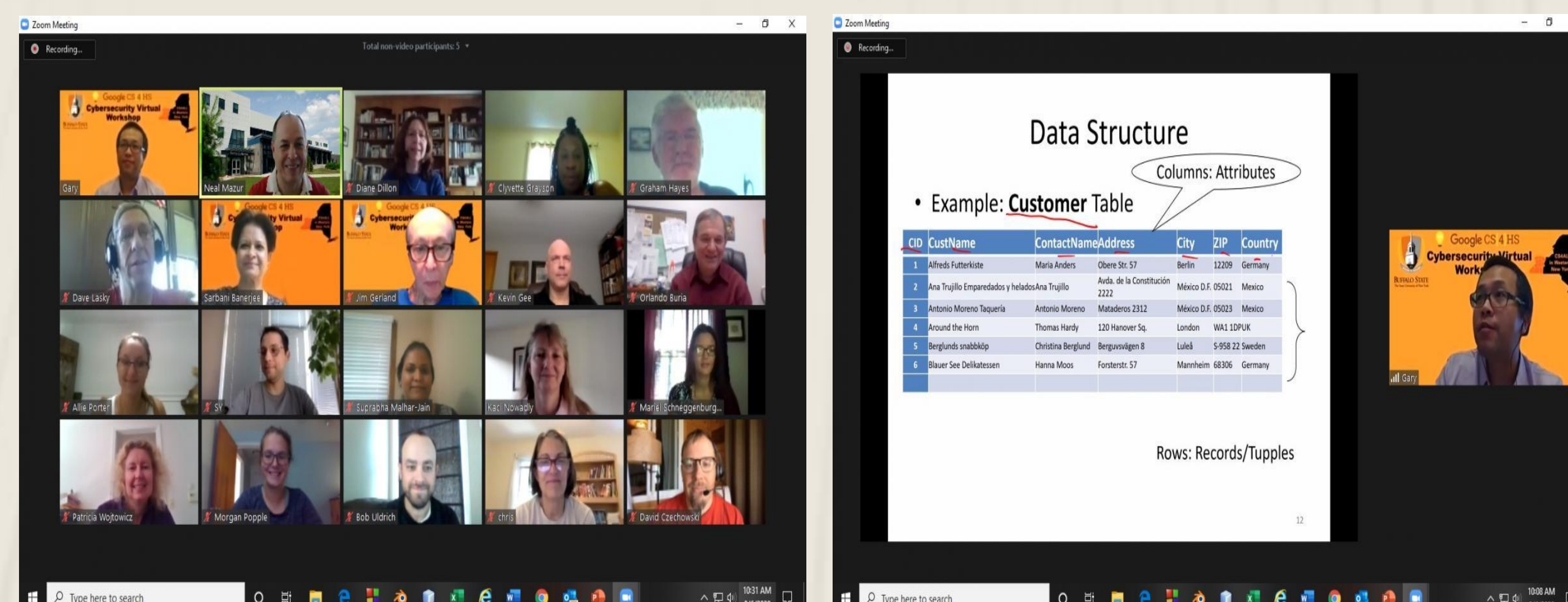
Since the cybersecurity skills shortage is reaching widespread proportions, one way to ensure a larger pipeline in cybersecurity is to train more middle and high school teachers to not only teach cybersecurity in their schools or integrate cybersecurity concepts in their classrooms but also to promote cybersecurity as an attractive career path. To this effect the summer workshop offered a lengthy 'Cybersecurity Careers and Awareness' session with guest speakers from industry sharing their experiences working as cybersecurity professionals.

Cybersecurity 4-Day Curriculum

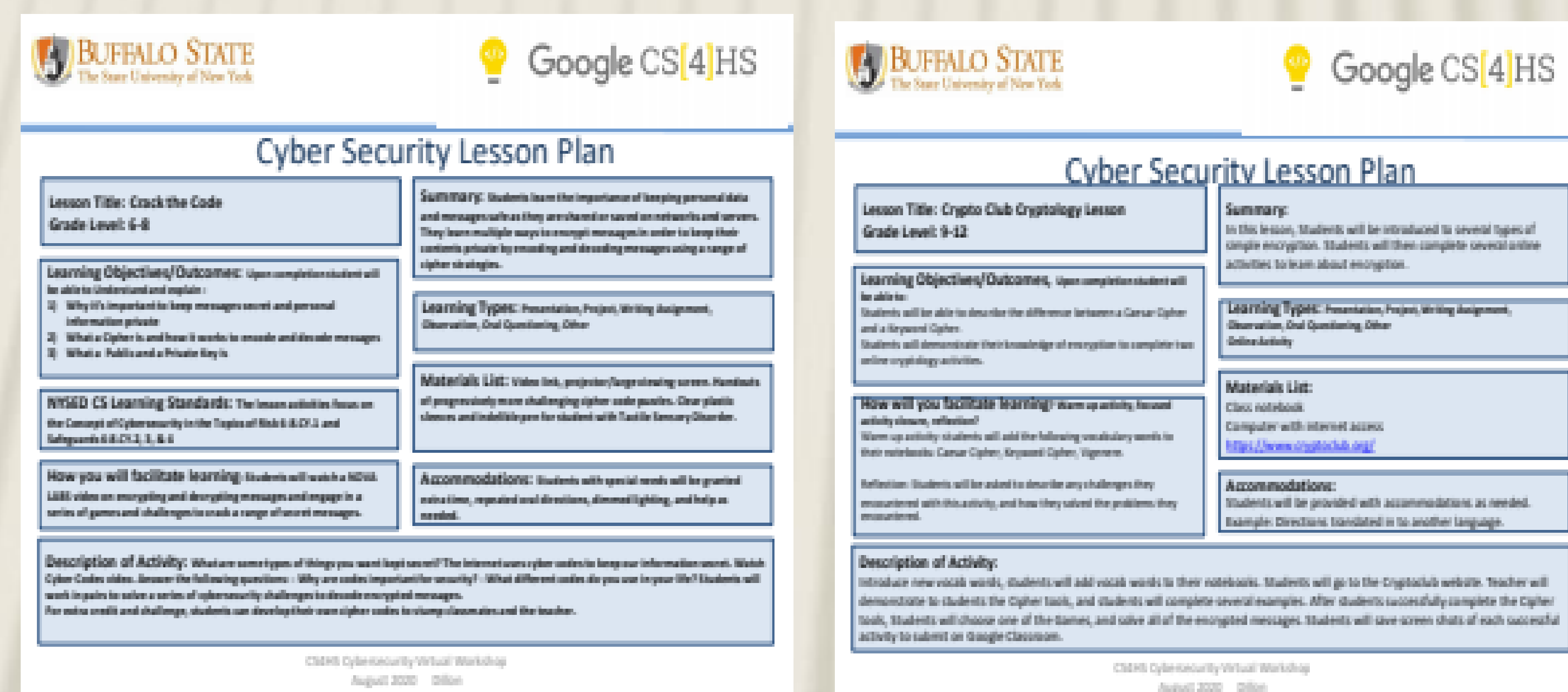
The workshop curriculum included a breadth of cybersecurity topics offered during each 5-hour day. The first three days of the workshop featured morning and afternoon presentations and activities with a break for lunch. Each day culminated with teacher lesson planning activities. Cybersecurity topics covered included:

- Day 1 AM: Cybersecurity First Principles; Cyber Ethics, Ethical Hacking, Cyberbullying, Social Engineering
- Day 1 PM: Network/Web Security, Cyber Professional Experience
- Day 2 AM: Cybersecurity Career Awareness including Certifications and Competitions; Internet of Things
- Day 2 PM: Cryptography: Data Representation, Algorithms and Applications; New York State CS Standards
- Day 3 AM: Data Protection for Web Applications; Case Study on SQL Injection
- Day 3 PM: Raspberry PI with Python Programming as Applied to Cybersecurity Concepts
- Day 4 AM: Teacher Participants' Group Lesson Planning Session
- Day 4 PM: Presentation including Group Pedagogy Discussion

Virtual Workshop Presenters



Cybersecurity Lesson Plans



Lesson Plans

On the last day of the workshop series the teacher participants shared Lesson Plans they created based on the cybersecurity topics presented at the workshop. Participants worked in teams of two preparing lessons during the first three days of the workshop through Zoom breakout rooms. A major drawback associated with virtual conferences is the lack of opportunity to share experiences and network with other participants. The use of these two person teams gave the teachers an opportunity to interact more personally with a colleague. The presentations themselves were a gratifying experience for the participants since they not only developed cybersecurity lesson plans for their students but learned from lesson plans and presentations of the other teachers. Ample time was given following each presentation for discussion, constructive comments, and sharing of experience.

Survey and Results

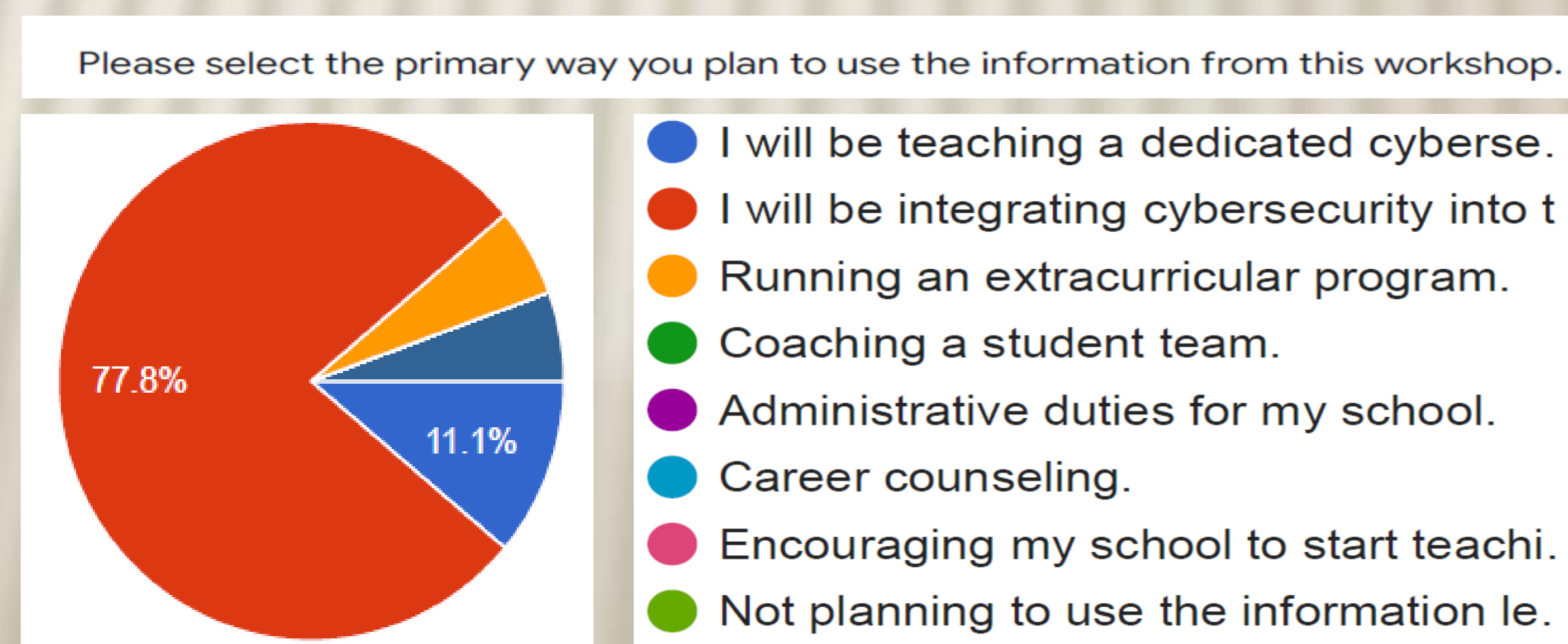
A thirty-question survey instrument was developed and administered to all the participants on the final day of the workshop. This survey questionnaire was designed to determine the teacher's interest in using the material from the workshop in their courses and assess various components of the workshop including the effectiveness of the workshop in preparing the participants to teach/coach cybersecurity in their schools. Significant findings based on participation in workshop:

- 89% of participants plan to create a dedicated cybersecurity course or integrate cybersecurity into present courses.
- 89% of participating teachers strongly agree that they can help build the cybersecurity workforce
- 70% of participating teachers strongly agree that they can communicate complex cybersecurity topics in a way that their students can understand them
- 69% of participating teachers strongly agree that have lessons/activities that are high quality to use to teach/coach cybersecurity to my students

Conclusions

The Buffalo State 4-Day Cybersecurity Virtual Summer Workshop for Secondary School Teachers has been shown to be a successful event to encourage and prepare teachers for presenting cybersecurity concepts at their schools. Based on data collected, the teachers plan to create cybersecurity courses and/or integrate cybersecurity topics into existing courses. Teachers exited the workshop with confidence in presenting complex cybersecurity concepts to their students and left the workshop with high quality lessons and activities.

Survey Data



Acknowledgements

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