Lesson 20: Security and Hacking in the Real World (3 days)

Overview

Cyber threats are all around us as criminals exploit the Internet to commit cyber crimes. In this lesson, students will create a visual artifact to inform others about a cybersecurity topic of their choice. They will then examine it with a critical eye to demonstrate a deep understanding of the issue, its functionality, and its impact or potential for impact on people and society.

Lesson Summary

Getting Started
● Watch "The Internet: Cybersecurity and Crime"

Activity
● Research a cybersecurity issue
● Create a visual artifact
● Write about the cybersecurity issue

Wrap-up
● Present visual artifacts

CS Content

Knowledge of the following cybersecurity and cryptography topics (from previous lessons and videos):
● Encryption and Algorithms
● Cracking an Encryption with Heuristics (i.e., frequency analysis)
● Symmetric Encryption (i.e., Caesar)
● Harder to Crack Encryption (i.e., Vigenère)
● Asymmetric Encryption (Alice and Bob)
● Computationally Hard Problems
● Public Key Encryption
● One-way Functions
● Open Standards
● Certificate Authorities

Objectives

Students will be able to:
● Research, understand, and communicate about a current cybersecurity issue.
● Discuss the social, economic, and/or cultural impact of the cybersecurity issue.
● Relate the cybersecurity issue to computing principles topics covered in Unit 2.

Materials and Prep
● Poster paper

Resources

Video
● The Internet: Cybersecurity and Crime YouTube | Download

Student Documents
● Worksheet - Video Guide for "Cybersecurity and Crime"
● Activity Guide - Security and Hacking in the Real World Project (includes rubrics)

Code Studio
● Unit 2 - Security and Hacking in the Real World

Assessments
● Worksheet KEY - Video Guide for "Cybersecurity and Crime" (in Code Studio)
● Activity Guide - Security and Hacking in the Real World Project (includes rubrics)

Teaching Guide

Getting Started

DAY 1

Watch the "The Internet: Cybersecurity and Crime" video and have students complete the associated Worksheet - Video Guide for "Cybersecurity and Crime."

Hand out and review the requirements of the Activity Guide - Security and Hacking in the Real World Project. Show students the end-of-year Explore Performance Task to help them understand the connection between the Performance Task, this project, and the project from the Global Impacts lesson.

Activity

DAY 2

Organize students into groups to work on the visual artifact. See Activity Guide - Security and Hacking in the Real World Project. There are a number of choices for the visual artifact, but it is recommended that students create a public service announcement for the purpose of having an authentic audience.

DAY 3

Students will complete their visual artifacts and the individual written response. See Activity Guide - Security and Hacking in the Real World Project. Present the artifacts to an authentic, real-world audience, such as the morning announcements, the school television channel, the school website, or another appropriate venue.

Teaching Tips

If there is time, allow students to review each other's work and incorporate feedback before they submit their written response.

Wrap-up

If time is available, showcase the visual artifacts.

Extended Learning

Ask students to look at the beneficial and harmful effects of cybersecurity issues like the NSA spying on emails. The more current and relevant the issue, the better.

CS Principles Learning Objectives

- 1.1.1 Apply a creative development process when creating computational artifacts. [P2] (A-B)
- 1.2.1 Create a computational artifact for creative expression. [P2] (A-C, E)
- 1.2.2 Create a computational artifact using computing tools and techniques to solve a problem. [P2] (A)
- 1.2.5 Analyze the correctness, usability, functionality, and suitability of computational artifacts. [P4] (B)
- 6.3.1 Identify existing cybersecurity concerns and potential options to address these issues with the Internet and the systems built on it. [P1] (A-M)
- 7.3.1 Analyze the beneficial and harmful effects of computing. [P4] (A, D, G-H, L)
- 7.4.1 Explain the connections between computing and economic, social, and cultural contexts. [P1] (A-B, E)
- 1.1.1 Apply a creative development process when creating computational artifacts. [P2] (A-B)
- 1.2.1 Create a computational artifact for creative expression. [P2] (A-C, E)
- 1.2.2 Create a computational artifact using computing tools and techniques to solve a problem. [P2] (A)
- 1.2.5 Analyze the correctness, usability, functionality, and suitability of computational artifacts. [P4] (B)

CSTA K-12 Computer Science Standards

Collaboration (CL)
- 2-2. Collaboratively design, develop, publish, and present products (e.g., videos, podcasts, websites) using technology resources that demonstrate and communicate curriculum concepts.

Computing Practice and Programming (CPP)
- 2-6. Demonstrate good practices in personal information security, using passwords, encryption, and secure transactions.
- 3A-9. Explain the principles of security by examining encryption, cryptography, and authentication techniques.

Computers and Communications Devices (CD)
- 3A-9. Describe how the Internet facilitates global communication.

Community, Global, and Ethical Impacts (CI)
- 2-2. Demonstrate knowledge of changes in information technologies over time and the effects those changes have on education, the workplace, and society.
- 2-3. Analyze the positive and negative impacts of computing on human culture.
- 2-5. Describe ethical issues that relate to computers and networks (e.g., security, privacy, ownership, and information sharing).
- 3A-1. Compare appropriate and inappropriate social networking behaviors.
- 3A-8. Discuss the social and economic implications associated with hacking and software piracy.
- 3A-10. Describe security and privacy issues that relate to computer networks.
- 3B-2. Analyze the beneficial and harmful effects of computing innovations.
- 3B-6. Analyze the impact of government regulation on privacy and security.