Project-Based Learning in K12 Cybersecurity Education

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Introduction

- Texas A&M High Performance Research Computing has provided summer camps in cybersecurity since 2017
- Employ an active, hands-on learning strategy for improved engagement
- Frequently use project-based learning (PBL) and the 5E Model as a framework for developing lessons

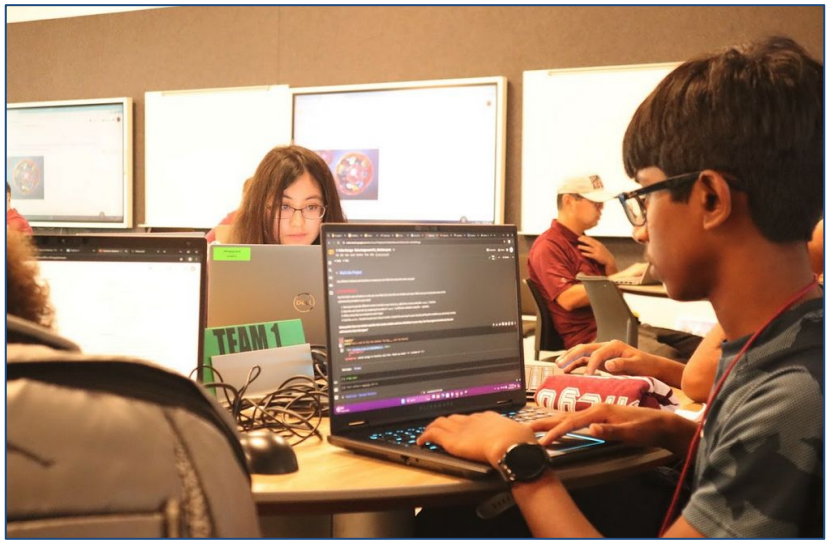
Project-Based Learning and the 5E Model

- Inquiry-based
- Well-defined outcome
- Ill-defined task
- Learn as needed for project
- ↑ student interest in learning
- 5E's
  - Engagement
  - Exploration
  - Explanation
  - Extension
  - Evaluation

GenCyber Concepts Escape Room

5E Model

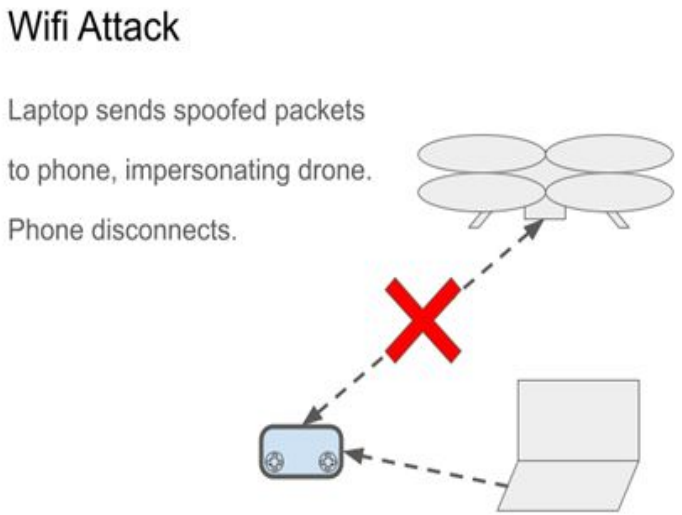
1. Engagement: escape room idea
2. Exploration - guessing the match
3. Explanation - discussion at the end
4. Extension - additional activities
5. Evaluation - last day of camp



Drone Hacking

5E Model

1. Engagement: flying drones
2. Exploration - figuring out why they lost control of the drone
3. Explanation - discussion about insecure Wifi
4. Extension - additional activities
5. Evaluation - last day of camp



Secure System Design Project

5E Model

1. Engagement: Competition for best project
2. Exploration: Brainstorming ideas as a group
3. Explanation & …
4. Extension: GenCyber concepts explained more with each activity
5. Evaluation: Project presentation judged

Discussion and Implications for Teaching

Research-Based Strategies:

- Build on prior knowledge
- Engagement
- Real-life problems
- Inquiry-based teaching/learning
- Students become responsible for learning
- Students become informed citizens