#### **Comparing Teacher and Creator Perspectives on the Design of Cybersecurity and Privacy Educational Resources**

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**SOUPS 2024** 



## A Plethora of Resources

119 cybersecurity educational tools created between 2000 to 2019

Zhang-Kennedy et al. 2020



Limited Evaluation & adoption

- Around **30%** of the tools received some evaluation to assess their "effectiveness" (learning, engagement, usability)
- A small number of evaluated tools have received **public adoption and usage**







RQ1: What do teachers consider when choosing cybersecurity and privacy teaching resources?



RQ2: What do resource creators consider when curating, designing, and evaluating cybersecurity and privacy classroom resources?



RQ3: How do creators' design considerations and processes align with the needs of teachers and students to teach and learn about cybersecurity and privacy?

# Methodology

Semi-structured interviews with teachers and resource creators	Lead researcher conducted interviews and led the qualitative analysis Analyzed data using reflexive thematic analysis
Teachers asked about:	What are their experiences teaching cybersecurity and privacy? How do they select resources for teaching? How effective do they find these resources?
Creators asked about:	What is their process for developing new resources? How do they accommodate different population needs (age, educational level)? How could their design processes be improved?

### Participants

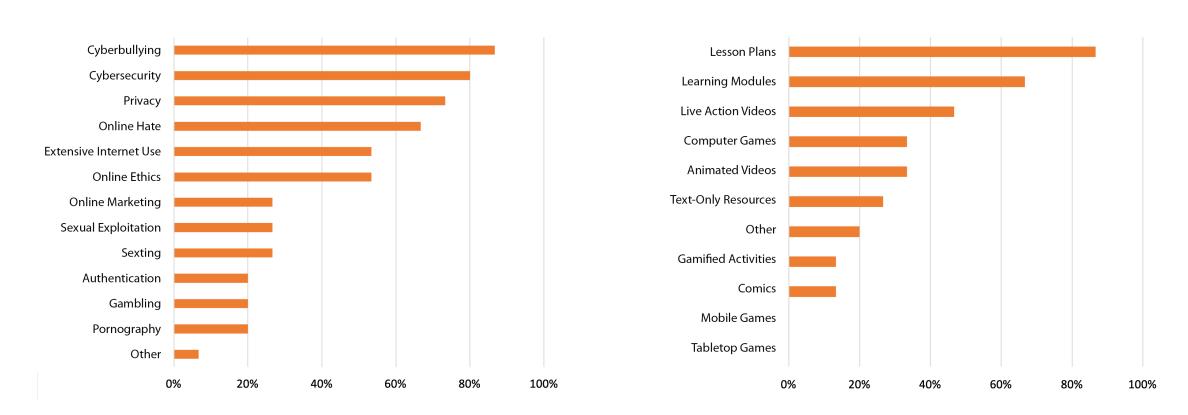
#### Teachers

- 15 Canadian middle-school teachers
- 67% female, 33% male
- Range of teaching experiences (1 – 35 years)
- 93% teaching in public schools
- 87% had background in arts

#### Creators

- 8 resource creators with roles including designer, developer, project manager, and educational director
- 50% female, 50% male
- 88% based in Canada
- 75% were mid-to-late career
- 75% had graduate degrees

### Topics Taught and Resources Used by Teachers



### Different Approaches to Cybersecurity Education

- Teachers approach cybersecurity as part of safety
  - Cybersecurity teaching is ad hoc and in reaction to student context
  - Prefer informal assessments
  - Avoid technical perspectives

- Creators frame cybersecurity as part of a dedicated lesson plan
- Little discussion of the circumstances under which cybersecurity comes up in the classroom

"I don't want to grade a student on their response to something like this, because first of all, a lot of this is sort of opinion and experiencebased. So, I can't really grade them on that because that's not part of the curriculum." – T9

### Same problem; different perspectives

- Teachers are trying to fit available resources to fit their circumstances
  - Emergent events in the classroom
  - Curriculum demands
  - Availability of classroom time/resources

- Creators are starting with a blank slate
  - Trends in cybersecurity topics
  - Funding considerations
- Little direct feedback from teachers or students in the design process

"We'll just use the phishing example because most of the time we get requests around how do students be more aware of malicious attacks or phishing, but then we don't really understand who is this going to. [...] What are the students really experiencing? How are they digesting that information?" – C5

### What is available vs. what gets taught

Many resources do not match teachers' classroom needs and constraints Lessons are designed to be engaging for students, but don't support teachers

Simple, flexible and modular resources are needed

- Support discussion
- Provide adaptable resources for common issues
- "Heavy" resources (e.g., games) are rarely used

### Conclusion

- Creators aren't prioritizing the needs of teachers, and as a result, teachers aren't using many of the materials available
- To support effective early education in cybersecurity and privacy, teachers need modular lessons they can quickly adapt to changing contexts

## Thank you!

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