USENIX Security '26 Artifact Appendix: Characterizing Security and Privacy Teaching Standards for Schools in the United States

Katherine Limes
Colorado School of Mines

Nathan Malkin
New Jersey Institute of Technology

Kelsey R. Fulton
Colorado School of Mines

A Artifact Appendix

A.1 Abstract

The artifact contains the dataset, analysis code, and qualitative codebook behind the claims in our paper "Characterizing Security and Privacy Teaching Standards for Schools in the United States". The dataset is a SQLite database containing all standards, with a table for all 37 state standards and eight national organization standards analyzed. The dataset includes our annotations, such as the qualitative labels assigned during analysis. The analysis code is a Jupyter Notebook which runs all database queries and analysis on their outputs used for the study. The codebook includes definitions, category descriptions, and examples for the 109 S&P topics identified in the study.

A.2 Description & Requirements

A.2.1 Security, privacy, and ethical concerns

There is no risk to evaluators from downloading our artifacts or executing our code.

A.2.2 How to access

Follow the link to the OSF archive here: https://osf.io/hwkuc/overview?view_only=c226130f34fb4c28be314426390d6656

A.2.3 Hardware dependencies

None.

A.2.4 Software dependencies

A Linux, macOS, or Windows machine with uv (https://docs.astral.sh/uv/) installed. uv provisions the required Python interpreter (3.13) and all notebook dependencies (Jupyter, nbconvert, ipykernel) from the pinned uv.lock; no other software needs to be installed manually. The analysis logic itself uses only the Python standard library (sqlite3, csv).

A.2.5 Benchmarks

None.

A.3 Set-up

Install uv (https://docs.astral.sh/uv/getting-started/installation/) if needed.

A.3.1 Installation

Download SQL Queries.ipynb and standards_updated1 to the same directory, from the provided link.

A.3.2 Basic Test

Open SQL Queries.ipynb using uv (uv run jupyter notebook "SQL Queries.ipynb"). Run the first two cells, either with the run button or Ctrl+Enter, the second cell should output:

Troubleshooting 39
Networking 38
Networking Security 35
Encryption 34
Safe & Appropriate Behavior 41
Tracking and Digital Footprint 39
Content and Information 25
Cloud Computing 13
Embedded Systems 23
Organizational Security 25
Attacks & Attackers 37
Code Debugging 36
Secure Coding 31
Defenses 41
Laws and Intellectual Property 43
Equity, Accessibility, and Diversity 44
Real World Impacts 37
Other 22

A.4 Evaluation workflow

A.4.1 Major Claims

(C1): *We labeled 12,201 standards from all U.S. states and eight national organizations, finding that 3,920 of them are related to security and privacy.*

(C2): *After qualitative analysis, we identified 109 different security and privacy related topics in the standards, and counted all of the states and national organizations in which they appear. See Table 1 in the paper.*

(C3): *States and national organizations categorized 1,669 of the 3,920 standards that we identified as security and privacy related as security and privacy related. They labeled privacy-related standards significantly less often than security-related standards.*

(C4): *Even popular topics are not universally covered by states and national organizations. Coverage varies significantly by grade level.*

A.4.2 Experiments

(E1): *[5 human-minutes + 5 compute minutes + 5MB disk]:*
How to: *Run all cells in SQL Queries.ipynb*
Preparation: *Install uv, if needed.*
Execution: *Run all cells in SQL Queries.ipynb*
Results: [C1] will be printed by the fifth cell, the output should be *Security Related: 3920*
Total: 12201, which correspond to the number of standards classified as security related and the total number of standards analyzed, respectively. These numbers appear in Section 4 of the paper, as well as the abstract.
Results of [C2] will be written to code_counts.tsv by the second cell. Values in code_counts.tsv should match those entered in Code Definitions + Example Standards.xlsx, and correspond to Table 1 in the paper. Counts for categories, rather than individual codes (i.e., *Encryption* vs *Broad coverage of encryption*) will be printed by the first cell, as described in Section A.3.2 above.
[C3] will be printed by the final cell. The printed output should begin with *Total Number of Standards Categorized as S&P: 1669*, and then a list of topic labels and decimal values between 0 and 1, which represent the percentage of each topic name classified as security in states which classified any topic as security. These correspond to the claims in Section 4.2 in the paper.
[C4] uses cells three, four, and six. Cell three prints a category of topic, followed by the states and organizations which do not have any topics from that category in their standards. Cell four prints the number of S&P standards found at each grade band, reported in Section 4 of the paper, as well as the counts of each topic at a grade band, used for the findings in Section 4.3.2. Cell six prints the name of each state or national organization, followed by how many of the fourteen most common topics that were found in that state or organization's standards, used for the analysis in Section 4.3.1 in the paper.

A.5 Notes on Reusability

All standards and labels are contained in standards_updated1.db, with each state having its own table, and each standard having a row in that table. Each table has eleven columns: name (the state's identifier for the standard), grade_level (grade level or band the standard is intended to be taught at), category (category assigned to the standard by the state), category_detail (any explanation for the category provided by the state), standard (text of the standard), standard_detail (additional detail, clarification, or examples attached to the standard by the state), code (qualitative label added by the research team), security_category (is the category assigned by the state related to security or privacy, Y/N?), security_mention (does the standard mention security or privacy, Y/N?), has_examples (does the standard include examples, Y/N?), and is_required (does the state require CS for graduation, Y/N?). This database can be queried freely for future experiments.

A.6 Version

Based on the LaTeX template for Artifact Evaluation V20231005. Submission, reviewing and badging methodology followed for the evaluation of this artifact can be found at https://secartifacts.github.io/usenixsec2026/.