Course Materials to Support Computer Security Education

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Abstract

Researchers are finding ways to get students involved in computer science and information security by creating curriculums. They’re trying to teach the fundamentals to students now so they can get into more specific topics as they reach the undergraduate or graduate level.

Bringing the different curriculums together and making them available to students who currently do not have access to the information is the purpose of my research.

Keywords

Schema, Database, Database, Courseware

1. Introduction

Technology is on a rise in today’s society. By 2018, current government projections show that more than 800,000 high-end computing jobs will be created in the economy, making it one of the fastest growing occupational fields [1].

However, the percentage of high schools with rigorous computer science courses fell from 78% to 65% from 2005-2009 [1].

Creating a new curriculum for students in k-12 is being implemented all over the country through organizations such as Oracle, the Computer Science Teachers Association, and It-ology just to name a few.

The committee on National Security Systems (CNSS) and the National Security Agency (NSA) are also involved in making sure younger generations are getting the proper courseware. They have certified the University of South Carolina to build the Center for Information Assurance Engineering (CIAE) (figure 1) [4] webpage.

Figure 1. Center for Information Assurance Website
This webpage offers many useful tools including research, education, and outreach in the area of information assurance and information security.

We are making efforts in making this webpage more appealing and offering more information to the younger generation.

We are currently looking for different and more unique courseware to add for students of all ages.

How can information technology be implemented in elementary and middle school across the nation? How can we make courses more interesting? Are there games we can design to grab their attentions?

Many efforts are being taken to use this technology that many students are growing up with to enhance their learning abilities and to teach computer science at a younger age.

2. Background

Security is a crucial part for every company, but the approaches to security, including evaluation and implantation of safeguards, vary widely. All too often wrong decisions are made: they are caused by insufficient knowledge about the security domain, threats, possible countermeasures and the company infrastructure [2]. Making courseware and other materials available for students at a young age increases their chances at succeeding in the area when they finally get into undergraduate and/or the work force. Students should learn to protect their networks from common intruder methods or attack [3]. Several organizations and universities are creating courseware and programs to engage and teach students about information security.

The schools that have linked up with these organizations and universities are greatly privileged. However, there are many schools in the United States they have not yet reached. The University of South Carolina has realized that although these students cannot receive these courses they currently still have access to the internet. The CIAE webpage is a way students can access some of the same courseware, presentations, and games that teach them about information security.

3. Collecting courseware

Determining what type of courseware to feature on the website was based on some of the standards we found on the Computer Science Teachers Association (CSTA) website [5] and the three critical characteristics of information security: Confidentiality, integrity and availability [6].

Creating ontology to see how the different aspects of information security related to each other was also how we would determine how the courseware that was found would be categorized. Upon completing the ontology the search for a range of lesson plans that would be appropriate for teachers who taught grades K-12 began. The lesson plans had to be interesting and informative. Research has shown students are more motivated and more likely to perform active learning when working on real-world projects that have societal impact [7]. For an example of an active learning lesson plan see Figure 2 [8].

We also began to search for informative games that younger children would be interested in because younger children are using the internet more and more each day. Realizing that education, training, and awareness may be our most prominent security measures, for only by understanding the threats and vulnerabilities
associated with our proliferating use of automated information systems can we begin to attempt to deal effectively with other control measures [6].

After gathering enough courseware and presentations we begin to organize them into the ontology that was created. Creating overviews for each courseware we found was another task we began to work on. There is no way that this task could ever be complete because as the information security curriculum continues to grow the more information that could be added to our research.

Figure 2. Active learning Plan

4. Schema/Redesign/Database

One of the major things that were necessary for the website was that the entire thing needed to be revamped. When you first open the site, its display is very dull and boring, and not appealing in any way. A Schema was drawn for the layout of the entire website, which would include some of the courseware that would be added to the website from the different universities. Some of the things that needed to be added to the website:

HOME PAGE:

- Needs a background
- Logo needs to be bigger
- Needs to be more appealing

EDUCATION:

- Needs to add list of protocols and suggestions of links to the site

PUBLICATIONS PAGE:

- Not organized
- Needs to be spaced out
- Research page needs a new background

The database that was developed that would be used for the revised website was developed in MySQL Command Line Client. The database is called USC_DB; and it would hold data base off of information from the different schools whose information that was gathered from. The database was to include:

- Topics
- Courses
- Lectures
- Institutions

5. Conclusion

Some have taken the initiative to create the tools students need, while others are taking the approach to make sure it’s available to everyone. Giving students the proper tools and opportunity to learn information security related topics before they enter the undergraduate/work field level will benefit the students, universities, companies, and the economy. Although this is only the beginning of helping students with the learning experiences, there are still many things that can
be improved through time. Use the information you know wisely to ensure the future of your company, university, or organization has the proper education.

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References


