Computer Security Strategies
An Instructional Design Approach

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What is it?

Module  Web-Based  Hybrid
What is it?

Hybrid  Text  Game
Poll Question

A) Console  B) Computer  C) Mobile
Today’s Presentation

- Research
- Project Development
- Implementation
- Results/Discussion
An instructional need

- Cyber-attacks more frequent, visible
- General user unaware of dangers
  or
- Apathetic about risks
Research

User Accounts

- Usernames
- Email
- Password

- Personal Information
- Financial Information
Can you guess?

77

A) hundred
B) thousand
C) million
D) billion
Software updates

- Neglected practice
- More common vector of attack than brute-force
- Exploits vulnerabilities:
  - Java
  - Flash
  - Quicktime
  - Microsoft.Net Framework
Online Security

Online security

- Clicking on malicious hyperlinks
Danger: AVG Search-Shield has detected active threats on this page and has blocked access for your protection.

The page you are trying to access has been identified as a known exploit, phishing, or social engineering website and therefore has been blocked for your safety. Without protection, such as that in the AVG Security Toolbar and AVG LinkScanner®, your computer is at risk of being compromised, corrupted or having your identity stolen. Please follow one of the suggestions below to continue.

IP Address: 8.14.147.111

For additional information click here.

Suggestions:
- Click the "Back" button on your browser to return to the previous page and choose another link (recommended).
- If you would like to ignore the warning and continue to the page, click here (not recommended). Note: AVG LinkScanner® will continue to block dangerous content associated with this page.
Harmless?

Rick Astley
“Never Gonna Give You Up”
1987 #1 hit single

Rick-rolling
Project Origins

August 2011

Passwords
Project Rationale

Computer Security

Frustrating

Computer Game

More Fun
Proposed Audience

Adults
College Students
Faculty

Kids
6th graders
7th, 8th graders
Target Audience

College Students

Faculty

Kids

6th graders

7th, 8th graders
The purpose of the project was to create an instructional design module that would make the task of teaching basic computer security concepts more engaging and relevant to children.
ARCS Model

- Attention
  - Scary topic: computer security

- Relevance
  - Students login to gmail, countless other sites
  - Students like video games (assumed)

- Confidence
  - Students will learn the strategies they need

- Satisfaction
  - Students will have fun
Module Development

- Weebly, free
- Drag and drop
- Familiarity

Create a Free Class Website
and let your students build sites too
Game Development

- $99, single license
- Port to WEB, HTML5
- Drag and drop
- 2D game making
- 1 ½ months learning
Implementation

- Pilot study session #1
  - February 7th, 2012
  - 8 students

- Pilot study session #2
  - February 9th, 2012
  - 8 students

- Small group evaluation
  - February 16th, 2012
  - 30+
Linear Progress

- Front-page
- Demographics Survey
- Pre-test
- Text Section 1
- Embedded Test, Section 1 (Game)
- Text Section 2
- Embedded Test, Section 2 (Game)
- Post-Test
- Attitudinal Survey
- Congratulations page
Computer Game Progress

- Load Screen
- Maze Level
- Quiz Room
- (repeat cycle)
Welcome to my lesson! My name is Adam. Today, you will be learning about different strategies for making you, your identity, and your computer, more safe from harm. You will be expected to read everything on each page, and even play 2 small computer games!

How to participate in the lesson:
1. Read everything on the page as best you can
2. Focus on learning! Try to remember what you have read
3. Click the word 'Next' on the bottom right of the page when you are ready to move forward.
4. If you want to go back and re-read the previous page, click the word 'Previous' on the bottom left of the page.

Lesson Overview

First, you will complete two surveys:
1. About You!
2. Test Your Knowledge! Part 1

Then, in Case 1, you will learn:
1. About an attack that can guess your password
2. The definition of password strength
3. What attack can steal your password
4. How to easily memorize passwords
5. What makes a strong password
6. The importance and function of software updates

Then, in Case 2, you will learn:
1. What 'SSL' stands for
2. What 'HTTPS' stands for
3. What 'SSL' and 'HTTPS' does
4. How to find webpage security information
5. What 'SEO' in "SEO Poisoning" stands for
6. How to reveal a hyperlink's full URL address

To end Case 2, you will play:
GAME 2: Online Security
6 short levels of fun and learning!
Practice what you've learned!

Then, you will end the lesson with two final surveys:

Focus on Learning!!
Have Fun!!
Game (Embedded Test)

Make a strong password by using an array of symbols, characters, numbers, uppercase and lowercase letters.
A brute force attack tries to steal your password by:

- Buying it
- Guessing it
- Making it
- Attacking it

Score: 100
# Results (n=22)

<table>
<thead>
<tr>
<th>Section 1</th>
<th>Pre-Test</th>
<th>Post-Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Brute Force Attack</td>
<td>41%</td>
<td>86%</td>
</tr>
<tr>
<td>2. Password Strength</td>
<td>64%</td>
<td>77%</td>
</tr>
<tr>
<td>3. Keyloggers</td>
<td>18%</td>
<td>77%</td>
</tr>
<tr>
<td>4. PW memorization</td>
<td>45%</td>
<td>86%</td>
</tr>
<tr>
<td>5. PW makeup</td>
<td>73%</td>
<td>100%</td>
</tr>
<tr>
<td>6. Software updates</td>
<td>23%</td>
<td>32%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Section 2</th>
<th>Pre-Test</th>
<th>Post-Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. SSL: Secure Socket Layer</td>
<td>45%</td>
<td>64%</td>
</tr>
<tr>
<td>8. HTTPS: Hypertext Transfer Protocol Secure</td>
<td>50%</td>
<td>27%</td>
</tr>
<tr>
<td>9. Purpose of SSL &amp; HTTPS</td>
<td>5%</td>
<td>23%</td>
</tr>
<tr>
<td>10. Location of security information in browser(s)</td>
<td>5%</td>
<td>0%</td>
</tr>
<tr>
<td>11. SEO: Search Engine Optimization</td>
<td>77%</td>
<td>86%</td>
</tr>
<tr>
<td>12. Revealing Hyperlink Address</td>
<td>14%</td>
<td>73%</td>
</tr>
</tbody>
</table>

**Color Code**
- Yellow = Above 70% correct
- Orange = Multiple correct answers
- Green = Acronym question
Students really enjoyed the module
Average to above average improvement from pre-test to post-test for many of the 12 questions
Pilot study sessions were instrumental in improving module success
Implemented Suggestions

- Invincibility
- Less reading (text and game)
- Easier levels
  - Could take up to 4 hits before dying
  - Less enemies
  - Enemies moved slower
- Automatic level skip feature
Overall
- I liked that it was very educational and not very boring, like most educational games.
- I liked it when I was doing all the solving and the part we had to go through the room

Mechanics
- The part of the video game that I liked was when you collect the lock and you become invincible, you can kill the bad stuffs and get more points.
- How the bad things catch you quickly.
- Dying from the black stuff and the pink circles
Conclusion

- Entirety of experience is very valuable
- Reflection: Do a better audience analysis
- Be more flexible
- Possibility for longitudinal study, or an improved study in the future
- Commercial application?
Thank you! Questions?

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