

Secure Comics: An Interactive Comic Series for Improving Cyber Security and Privacy

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We designed, illustrated, and developed Secure Comics, an online educational interactive comic series about cyber security and privacy. The three-part comic was evaluated with adults and children, and had positive effects on users understanding of security and privacy information, and improved their secure and privacy-aware behaviour.

Comics; Education; Human-Computer Interaction; Security; Privacy.

1. ABOUT SECURE COMICS

Secure Comics is an educational three-part digital interactive comic series created by us. Figure 1 shows four individual screens. The comic is about two cyber-detectives, Jack and Nina, who solve computer security crimes to protect the public from the cyber-villain "Hack". Jack and Nina act as mentors to teach users about online risks and protection strategies.

Each part of Secure Comics was conceptualized, designed, and implemented by us. A detailed design process is included in our previously published work (Zhang-Kennedy et al. 2016).

Users could experience Secure Comics online², and on iPads. Users select a comic to read from the title screen (Three comics are available. See Figure 1, A), and navigate by pressing a forward/backward button, or use the section buttons. Parts of the comic enable interactive exploration of the content (Two examples are provided in Figure 1). Each comic takes approximately 5 to 8 minutes for adults to read.

This Interactions Gallery exhibit is further discussed in our full paper "Engaging Children About Online Privacy Through Storytelling in an Interactive Comic" in this proceedings.

2. EDUCATIONAL GOALS

Users often have mis-conceptions regarding password strength, malware protection, and mobile privacy that could put them at risk online. The goal of the comic was to familiarize users with these online security and privacy concepts, and to teach

them protection strategies. We assumed little to no knowledge about these topics from our users. Our goal was to make security and privacy information easy to understand, easy to remember, and applicable to end-users' everyday practices. To facilitate these goals, the comic explained the risks and gave advice about the corresponding secure actions. Next, users tested their knowledge in mini quiz games. Our rationale is that if users understood the risk and had means to act, it would increase the likelihood of desirable behaviour. The comic focused on three main topics. Educational messages are followed by recommendations of what users could do to mitigate the risks.

- **Password Guessing Attacks:** Users cope with the challenge of managing passwords by making them short and easy to remember, and reuse the same passwords. These insecure practices put users at risk of online password guessing attacks. The comic educates users about attackers' online guessing strategies to motivate users to create stronger passwords.
- **Malware Protection:** Maintaining the optimal effectiveness of antivirus software requires regular updates by users. The comic teaches users about malware detection methods to help them understand why regular updates are needed to protect against new malware.



Figure 1: Individual panels from Secure Comics. A) home screen. B) page 11 of the password comic. C) page 5 of the privacy comic (with interactive activities map). D) page 3 of the antivirus comic (with interactive character profile). Note: Navigation is cropped

- **Mobile Online Privacy:** Sharing photos online could reveal sensitive location-based information about users. The comic teaches users about the concepts of geo-tagging, online tracking, and GPS tracking on mobile devices, and instruct users how to prevent uninformed sharing of location and personal information.

2.1. Entertainment Goals

Our second goal was to make the comic fun and entertaining to read. Our design approach embeds learning within a fun activity – interacting with a comic book. Comics convey engaging stories, are fun to read, and have large readerships of all ages. Our comic design leverages the media’s power to express ideas through images, text, and narrative storytelling, but also explores interactivity.

Interactive features in Secure Comics are intended to both increase engagement and enhance to lesson content that cause users to think more deeply about cause and effect. For example, users could interact with an activity map on the “A day in the life of Jane” screen in the privacy chapter (Figure 1, C) to discover how the character’s various daily activities could reveal sensitive information.

Evaluations of the comic showed positive learning effects on adults’ (Zhang-Kennedy et al. 2016) and children’s (Zhang-Kennedy et al. 2017) comprehension, retention, and security/privacy behaviour.

The Interactions Gallery is complementary to our full paper “Engaging Children About Online Privacy Through Storytelling in an Interactive Comic.”

3. ABOUT THE AUTHORS

Leah Zhang-Kennedy is the designer, illustrator, and developer of Secure Comics. She has a Ph.D. in Computer Science and a MASc in Human-Computer Interaction (HCI) from Carleton University, Canada.

Robert Biddle is a Professor at Carleton University, Canada. He is appointed both to the School of Computer Science and the Institute of Cognitive Science.

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4. ACKNOWLEDGMENTS

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5. REFERENCES

Secure Comics are available online at:
<http://www.versipass.com/edusec/securecomics>

Secure Comics are available on ipads at:
<https://itunes.apple.com/ca/app/secure-comics/id1130794100?mt=8>

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