

Information Security Risks Awareness programs at K-12: Is this a right route

Idong-Mkpong- Ruffin
Faulkner University
Imkpong-ruffin@faulkner.edu

S. Sajid Raza
Walmart Stores Inc.
sajid_raza2000@hotmail.com

Syed Raza
Trenholm State Community College
sraza@trenholmstate.edu

Abstract

President Obama stated in his speech during his State of the Union address that “America must face rapidly growing threat from cyber-attacks” (International Business Times, Feb 13, 2013). He also signed an executive order to allow his government to share intelligence on potential cyber threats to private firms because U.S. schools are not preparing kids for digital security literacy in the digital age (Computer Security Updates, 2011). Although, Internet has provided powerful tools for education, it also has created risks and raised some improper and unsafe behavior inside and outside of the classroom (Butler, 2010). A recent poll released by National Cyber Security Alliance (NCSA) showed that only 56 percent of the 1,003 teachers surveyed in December 2009 and January 2010 felt that their districts had the ability to discuss security but only one third say their district required those topics to be taught as part of the curriculum (Cyber Security Digital district Program, Consortium for School Networking, 2010).

This paper is based on an awareness program (Cyber-IQ Summer Camp) that needs to be launched in K-12 to address the need for user awareness about cyber security issues. The topic of cyber security risks must be related early to promote students’ understanding of their roles in cyber security protection. Because 21st Century kids cannot live without technology, they must understand the implications of security (Marcoux, 2014). The awareness program through summer camps will build a strong foundation with a motto “No Child Behind in Basic Cyber Security Knowledge” inasmuch as students today need to learn strategies to help them understand the concepts of cyber security and how to address it.

Almost 80 percent of computer users are becoming victims of fraud affected by some type of security threat due to unawareness about security risks associated with Internet (Adele , Indrajit, Mark, Malgorzata, & Zinta, 2012). A survey conducted by Ponemon Institute showed that the average cost of cybercrime for the U.S. retail stores more than doubled from 2013 to an annual average of US \$8.6 million per company in 2014 (Charles, 2014).

According to the Forbes. January 2016 publication, one million open and unfilled positions will be available by the end of 2016 (Forbes.com, Jan. 2016). Therefore, supply and demand techniques need to be used in order to fill those particular positions along with upcoming vacant positions. The CyberPatriot was established in 2009 as an Air Force Association's National Youth Cyber Education Program designed to motivate students towards careers in cyber security or other science, technology, engineering, and mathematics (STEM) disciplines that are critical to our nation's future. In order to expand this initiative in various states, we need to inform our 21st century digital kids about upcoming cyber security obligations. A model of awareness and encouragement about cyber security program and certification will be announced in K-12 schools systems through "Cyber IQ- SUMMER CAMP" in River Region Alabama Schools Systems.

Keyword: cyber security, security, awareness, Cyber IQ

Introduction

The aim of this paper is to take first steps towards developing an awareness and mindset by understating the reason why cyber security is necessary in today's world. The primary focus of cyber security awareness is to create influences the adoption of secure behaviors. This paper is a first paper from the series of three papers. Two other papers will be presented later by identifying the answers –what works, and what not, and why. This series of papers will follow the following development pattern.

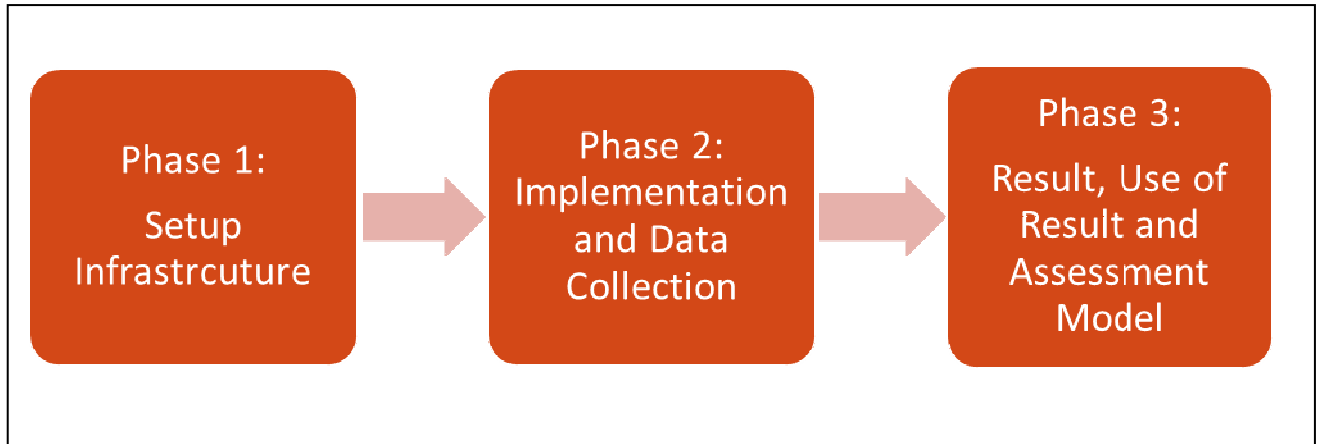


Figure 2: Three Papers Series Process

According to Benjamin Scriber, director, CE & A Professionalization & Workforce Development Program, in 2015, more than 209,000 cyber security jobs went unfilled (Stanford University analysis of numbers from the Bureau of Labor Statistics)(Setalvad, 2015). There are more cyber security jobs open than there are qualified candidates to fill them, and last few years media has reported increase in information security incidents therefore, President Obama has made information security a national priority (White, Hewitt, & Kruck, 2013).

Awareness and encouragement about cyber security is a pivotal element in the current environment and society. Giannakas, Kambourakis, Papasalouros, & Gritzalis (2016) introduced cyber security awareness to K-6 students through a novel mobile app named “CyberAware” in order to educate K-6 students about cyber security threats. Another aspect of awareness named CyberPatriot program, created by the Air force Association (AFA), is designed to motivate and inspire the K-12 students by delivering basic cyber security education and promote STEM (CyberPatriot, 2009), but there is no program directly related to summer initiative programs to promote cyber security education for K-12 students.

According to the U.S. Secretary of Defense Ash Carter (Nelson, 2015), "The dominant power of the 21st century will depend on human capital. The failure to produce that capital will undermine American security." Different cyber security jobs require more understanding of security or technology; therefore, different avenues need to be developed in order to prepare these digital kids.

Kevin (2012) stated that our district leaders need to take responsibilities for teaching students how to navigate wisely the Internet and develop an understanding about the cyber world and upcoming threats. Therefore, there is a significant number of student' participation required in cybersecurity activity programs to provide awareness about cybersecurity risks and issues for K-12 students.

President Obama stated ""We know hackers steal people's identities and infiltrate private email. We know foreign countries and companies swipe our corporate secrets. Now our enemies are also seeking the ability to sabotage our power grid, our financial institutions, and our air traffic control systems. We cannot look back years from now and wonder why we did nothing in the face of real threats to our security and our economy" (International Business Times, Feb 13, 2013).

For competitive advantage, most business and educational organizations have installed the latest security application; but due to lack of trained staff and users, there is still a vulnerability in their system. Hence, to update infrastructure means nothing if users do not have detailed appropriate awareness and practice about cyber safety (White, Hewitt, & Kruck, 2013).

The proposed study initiative is to provide awareness and encouragement to the K-12 students to join Cyber IQ Summer Camp and obtain the certification of completion and join local and state level competitions about Cyber IQ-Completion among public and private schools. This process will persuade them to join cybersecurity filed to support President Obama initiative "... information security a national priority" (Cybersecurity, Feb 12, 2013).

Awareness Model

Kortjan, & Von Solms (2014), stated that in order to reduce the computer security risk, training and awareness programs played a vital role to train individual. In other words, Cyber Portfolio, is another attempt to show the innovative menu for those who are seeking innovative methods to integrate technology in their curriculum lessons (Robles, 2012) but it requires a to change the existing curriculum through school districts Board of Education.

ISF, 2014, and NIST, 2003, reported that people know the answer to awareness questions, but they do not act accordingly. NIST Special Publication 800-16(Wilson & Hash, 2003), defined awareness as follows: “Awareness is not training. The purpose of awareness presentations is simply to focus attention on security. Awareness presentations are intended to allow individuals to recognize IT security concerns and respond accordingly.” Therefore, it is necessary to develop interactive programs to set the secure mindset of the digital kids.

The proposed model will be based on following process

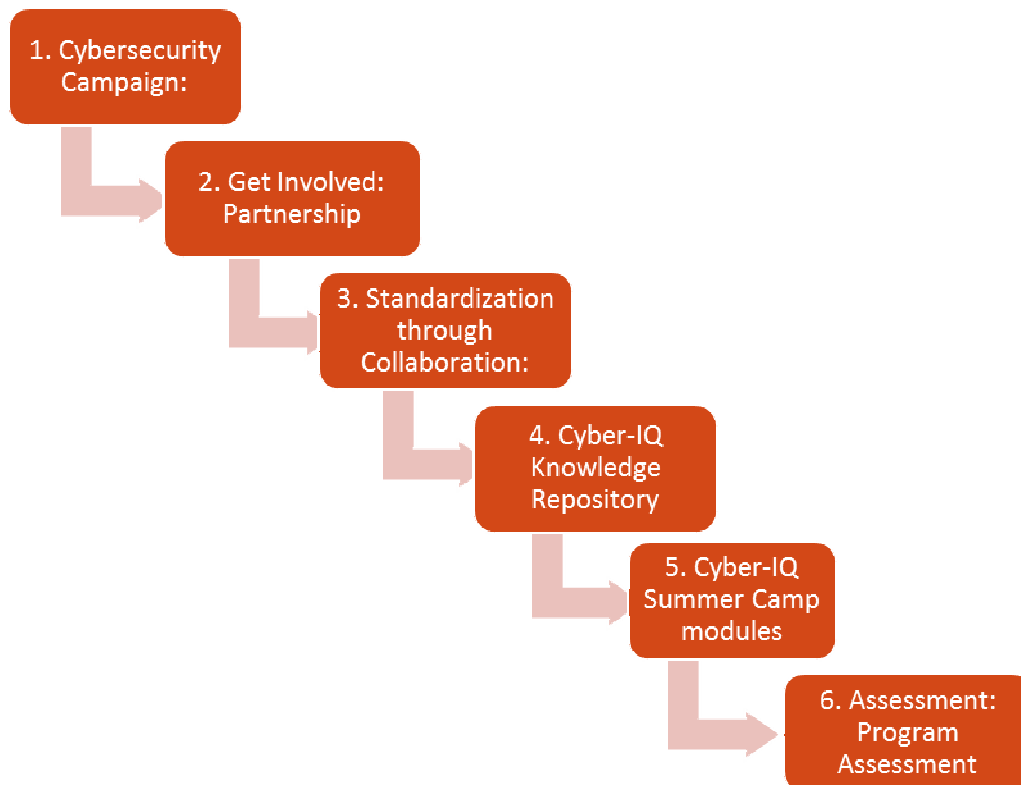


Figure 1 – Cyber Security Awareness Interaction

1. Cybersecurity Campaign: To show your support and dedication to promote cybersecurity education

2. Get Involved: Partnership. Visit schools and present the “CyberIQ Summer Camp” initiative
3. Standardization through Collaboration: Develop similar training modules related to CyberPatriot, an Air Force Association’s National Youth Cyber Education Program
4. Cyber-IQ Knowledge Repository: Provide value stream to gain knowledge management about Cyber security awareness to the students.
5. Cyber-IQ Summer Camp Modules: four week modules based on standardization in step 3
6. Assessment: Program Assessment

The inter-relative model interacts with the student in different work streams and provides a high level snapshot on what needs to be done in regards to Cybersecurity process.

Instruction through lectures or advice from a person of authority might set the tone of cybersecurity, but individual knowledge and understanding of cybersecurity are the main influences on behaviors (Coventry, Briggs, Blythe, & Tran, 2014). Consequently, the main purpose of the awareness model is to establish a competition among K-12 kids about Cyber-IQ. The Cyber IQ-Summer Camp will show them how to enact secure behaviors by passing a set of interactive awareness training through different standardized modules with the collaboration of CyberPatriot Program.

Although the Internet has provided powerful educational tools for student learning, it has also created many illegal, inappropriate, and unsafe behaviors among users, especially K-12 students. It is required to add knowledge of cybersecurity in all grade levels. Virginia, requires school districts to teach all kids Internet safety and cybersecurity issues, and districts receiving certain Federal E-rate funds; however, this process not available in all states. The proposed cybersecurity awareness program offers an opportunity to the Alabama District School Systems to join Cyber-IQ Summer Camp and participate in Cyber-IQ competitions.

Various Security Awareness Program

According to Abawajy (2014), there is no doubt that cyber security topics provide a great value to the industry, as well as in Computer Information System (CIS) world with a concrete delivery method such as information security awareness using text-based, game-based and video delivery methods. Cyber enhances a strong collaboration and interaction of individuals with cybersecurity. PCI Data Security report (2014) identified the various best practices for implementing Security Awareness programs in different organizations. Global Cyber Security Capacity Centre identified Cyber Security Awareness Campaign in different countries such as

Canada, UK, Australia, and Africa. All the campaigns are related to professional and organizations.

This paper is an effort to develop a Cyber-IQ Summer Camp, where students in the Montgomery School district understands the issue and prevention techniques about cybersecurity.

CyberSecurity Awareness Benefits

- Desire – Establish a desire to participate and support the change about Cybersecurity
- Earn Certification of Completion – Students will earn a “Certificate of Completion” by attending this awareness program and are eligible to participate in local and state level Cyber-IQ competitions.
- Mindset – Establish a secure mindset to accept the importance and ability to implement required skills and behavior in the industry
- Jobs Creation – Awareness program helps the students to enter into the industry as a pre-requisite knowledge [Collaboration effort with Department of Homeland Security (DHS) workforce development]
- Program Assessment- One of the key factors in having a successful effort is being able to prove that your effort is successful. Therefore, different assessment methods will be used such as surveys on internet usage attitudes, pre and post awareness training data, and identify the factors which potentially will lead to failure of Cyber-IQ Summer program.
- Develop a collaboration with USAPatriot, an Air Force Association effort to develop standardized modules of training
- Develop a bridge to encourage students to get certified through standardized security test and pursue their education in security related discipline

Conclusion

National Cyber Security Alliance (NCSA) organized different resources related to Internet literacy such as cyber security that focuses on how to avoid spam and viruses. These free resources can be used in the classrooms. Similarly WiredSafety.org has various free videos and presentations which can be used in order to develop secure mindset, but the average cost of cybercrime for US retail stores more than double from in 2013 to an annual average of US \$8.6 million per company in 2014. Different universities and colleges have engaged K-12 kids in their summer technology programs in order to prepare them for use of technology, but there are no Cyber-IQ summer programs in the Alabama region where K-12 students can be educated to understand the challenges of cybersecurity in today’s world. Also, these students are not provided with the opportunity to participate in Cyber-IQ competitions.

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References

- [1] International Business Times (13 Feb, 2013). Obama Signs Cyber Security Order to Safeguard Critical Infrastructure, retrieved July 10, 2016 from: <https://www.rt.com/usa/obama-signs-cyber-security-order-042/>
- [2] (2011, n.d) U.S. Schools not preparing kids for digital age. (Cover story). Computer Security Update.12 (6).1-5, retrieved July 10, 2016 from: <http://connection.ebscohost.com/c/articles/61014311/u-s-schools-not-preparing-kids-digital-age>
- [3] Butler, K. (2010). Cybersafety in the Classroom. District Administration, 46(6). 53-57
Cyber Security Digital district Program, Consortium for School Networking (2010).
Cybersafety in the Classroom. District Administration, 46(6). 53-57.
- [4] Marcoux, E. (2014). Cyberbullying and Technology. Teacher Librarian. 42(2). 69-70.
- [5] Adele E. H., Indrajit, R., Mark, R., Malgorzata, U., & Zinta, B. (2012). The Psychology of Security for the Home Computer User. IEEE Symposium on Security and Privacy. DOI 10.1109/SP.2012.23
- [6] Charles, S. (2014). Ponemon Institute, “2014 Cost of Cyber Crime Study: United States,” Retrieved July 20,, 2016 from ; www.ponemon.org/library/2014-global-report-on-the-cost-of-cyber-crime
- [7] Forbes.com (2016). The Navigator, retrieved July 25, 2016 from: http://docs.tcml.com/user/PublicDocs/Navigator/January_2016.pdf
- [8] Setalvad, A. (2015). Demand to fill cybersecurity jobs booming, retrieved July 25, 2016
from : <http://peninsulapress.com/2015/03/31/cybersecurity-jobs-growth/>
- [9]. White, G. L., Hewitt, B.; Kruck, S.E. (2013). Incorporating Global Information Security and Assurance in I.S. Education. Journal of Information Systems Education. 24(1).11-16.
- [10] CyberPatriot, AFA(2009). CyberPatriot , Air Force Association, National Youth Cyber Education Program. retrieved July 20, 2016 from : <http://www.uscyberpatriot.org/>
- [11] Nelson, K. (2015). Cybersecurity jobs are hard to fill. Retrieved July 25, 2016 from: <http://www.washingtonexaminer.com/cybersecurity-jobs-are-hard-to-fill/article/2562693>

- [12] Cybersecurity (Feb 12, 2013). President Obama signed Executive Order 13636, “Improving Critical Infrastructure Cybersecurity.” Retrieved July 20, 2016 from: <https://www.whitehouse.gov/issues/foreign-policy/cybersecurity>
- [13] Kortjan, N, Von Solms, R., (2014). A conceptual framework for cyber-security awareness and education in SA. South African Computer Journal; Vol. 52, p29-41, 13p. Robles, A.C.M.O. (2012). Cyber Portfolio: The Innovative Menu for 21st Century Technology. Psychology Research, 2(3).143-150
- [14] Information Security Forum (ISF) (2014). From Promoting Awareness to Embedding Behaviours, Secure by choice not by chance. Retrieved July 20, 2016 from: <https://www.securityforum.org/shop/p-71-170>
- [15] NIST, National Institute of Standards and Technology (2003). Building an Information Technology Security Awareness and Training Program. Wilson, M. and Hash, J. Computer Security Division Information Technology Laboratory. Retrieved July 20, 2016 from: <http://csrc.nist.gov/publications/nistpubs/800-50/NIST-SP800-50.pdf>
- [16] Coventry, D.L., Briggs, P., Blythe, J., Tran, M. (2014). Using behavioural insights to improve the public’s use of cyber security best practices. Government Office for Science, London, UK. Retrieved from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/309652/14-835-cybersecurity-behavioural-insights.pdf
- [17] Abawajy, J. (2014). User preference of cyber security awareness delivery methods. Behavior & Information Technology: 33(3). 236-247
- [18] PCI Data Security report (2014).PCI Security Standards. Retrieved from July 20, 2016 from: https://www.pcisecuritystandards.org/documents/PCI_DSS_V1.0_Best_Practices_for_Implementing_Security_Awareness_Program.pdf
- [19] Wilson, M., Hash, J. (2003). NIST Special Publication 800-16. Retrieved from: http://csrc.nist.gov/publications/drafts/800-16-rev1/draft_sp800_16_rev1_2nd-draft.pdf
- [20] Giannakas, F, Kambourakis, G, Papasalouros, A, Gritzalis, S. (2016). Security Education and Awareness for K-6 Going Mobile. International Journal of Interactive Mobile Technologies; 10(2). 41-48
- [21] Kortjan, N, von Solms, R., (2014). A conceptual framework for cyber-security awareness and education in SA. South African Computer Journal; 52, 29-41.

Biographies

Dr. Idongesit Mkpong-Ruffin is a professor and chair of the Computer Science department at Faulkner University. She has her Ph.D. in computer science and software engineering from Auburn University (2008), a master's degree in computer science from Troy University (2007); an MBA from Tennessee State University (1992) and a bachelor's degree in computer information systems from Freed-Hardeman University (1985). Mkpong-Ruffin has been an educator since 1992. Prior to joining Faulkner's faculty, she was a faculty member in the Computer and Information Science Department at Troy University (2002 – 2004) and ran her own consulting business, IMR Associates, as a software developer and corporate trainer. Her research interests are in software security, information assurance, software engineering, data mining and computer science education.

Sajid Raza is currently working in project management capacity at Walmart Stores Inc.,. Sajid, has almost 15 years of IT enabled companies experience particularly in product and services arena. He is an active member of TOASTMASTER, a non-profit organization and served his duties as a Vice President, Education and received Competent Communicator (CC) certificate. Moreover, Sajid, also a doctorate student at Grand Canyon University of business administration program.

Syed Raza is currently an Instructor for Computer Information Systems at Trenholm State Community College. He has also finished his Leadership Montgomery training. During his training he was involved different community services and addresses the issues in higher education or business industries. He has also over 16 years of experience as an educator and software engineer. Dr. Raza may be reached at sraza@trenholmstate.edu