Digital Professionalism in Health and Care: Developing the Workforce, Building the Future
P. Scott et al. (Eds.)

doi:10.3233/SHTI220931

The Development and Evaluation of an Anti-Phishing E-Learning Intervention for Nurses

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Abstract. Interactive games can be included in e-learning and train users to avoid web phishing. A multimodal educational intervention consisted of a serious game was developed in order to train nurses about phishing on Internet and was evaluated by experts and end users. The system was considered acceptable and can be used as an interesting learning resource for self-regulated learning. Future research will focus on evaluating the effectiveness of the educational intervention.

Keywords. Gamification, E-learning, Anti-phishing

1. Introduction

The fast pace of modern life requires flexible e-learning opportunities which can be used to train students as well as employees [1]. E-learning is effective in achieving positive learning outcomes [2]. Educational games can be used in e-learning and can improve learning outcomes and enhance motivation [3]. The aim of our study is to present the Development and Evaluation of an anti-phishing e-learning intervention for Nurses as part of the thesis: "Examining Nurses' IT non secure practices in hospitals."

2. Methods

The e-learning intervention was consisted of text, video, quiz and the game which was developed using open source Construct 3 running on JavaScript. Six experts in the fields of Health Informatics, Nursing, Engineering, Methodology of Science, and Education evaluated the intervention. A two-round Delphi approach was applied [4]. In the first round, experts used SUS to assess the system [5] and recorded their opinion on material, techniques, and the game through open ended questions. In the second round, experts indicated their degree of agreement/disagreement to the statements developed based on the results of the first round using a 5-point Likert scale.

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3. Results

The intervention is uploaded on Moodle and the game is online (https://www.construct.net/en/free-online-games/phish-invader-39134/play). The system was acceptable (SUS=76.25). The game was easy to use and learn, with well-integrated functions and inspired self-confidence. According to experts, material was well written (4.50), correct (4.33), understandable (4.17) and relevant to the topic (4.33) with appropriate techniques used (4,00). Adding other features (3.83) such as forums and messages were proposed. Technical issues (3.50) such as image resolution were discussed. According to experts this multimodal (4.50) e-learning intervention can be an interesting learning resource for self-regulated learning (4.33).

4. Discussion

Other studies developed interactive educational applications [6] using text, graphics, comics [7], game or video [8] to educate users on phishing scams. Interactive games can be an effective way of educating users to avoid web phishing [9]. In our study multiple tools were combined such as text, video, quiz and the educational game. The intervention was evaluated by experts with good results. Nevertheless adding other features were recommended.

5. Conclusions

A multimodal e-learning intervention was evaluated by experts. Appropriate iterations will be done and the final version will be distributed to Nurses for further evaluation. Effectiveness of the intervention and learning outcomes will be assessed.

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