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Education on Scam Awareness through Digital Literacy

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Abstract: *With all the online scam cases appearing in the news every day, it is apparent that there is a dire need to incorporate the topic of scam awareness in the Malaysian education curriculum. This study focused on creating an effective educational tool using the concept of Cognitive Theory that leverages digital literacy to teach students how to spot possible online scams. The project, which is an instructional self-learning game, aimed to teach users how to identify linguistic cues in possible scams, comprehend the tactics used by con artists, and equip themselves with the knowledge and abilities needed to stay safe from fraudsters. The instructive game keeps users engaged, helps with knowledge retention, and promotes repeated practice with gamification features, including challenges, incentives, and feedback systems. A total of 60 undergraduate students at a Malaysian public university were selected through random sampling to test out the beta-version of the game designed. Adjustments were made according to these pilot users' feedback. It is hoped that this instructional design could become a pilot project in setting out an example of teaching scam awareness lessons in educational institutions or for the general public.*

Keywords: Cognitive Theory, digital literacy, gamification, instructional design, online scams

1. Introduction

With the increasing use of technology in our daily lives, the prevalence of online scams and digital frauds has also significantly grown. Mehrad et al. (2020) highlight that individuals using social media often receive a vast amount of information without filtering it for accuracy. These scams, ranging from phishing emails to fraudulent online purchases, can cause significant financial and emotional harm to unsuspecting victims. The sophistication of cybercriminals has been enhanced by artificial intelligence and technology. Owen (2023) notes that criminals leveraging generative AI can devise schemes more rapidly and intricately by simplifying the process of sending phishing messages and mimicking others' actions to deceive more individuals. Croll (2023) emphasises that AI poses a threat to everyone, not just older adults, as generative AI greatly enhances the sophistication of fraud tactics.

The increasing complexity of online fraud presents a pervasive threat, affecting the diverse lives of people who are continually engaged in the digital world. Consequently, understanding digital literacy and scam awareness has become crucial in today's society. Educating individuals on scam awareness through digital literacy is a potential solution to fostering critical thinking about online information, enabling users to develop well-rounded perspectives on important topics and to identify misinformation and disinformation. Apriya et al. (2023)

also emphasise the importance of promoting digital literacy across all levels of society, as it enhances community safety on social media. Given the growing prevalence of digital fraud on social media, this research aims to explore the effectiveness of an educational tool designed to promote digital literacy and scam awareness, thereby reducing the occurrence and impact of online scams.

2. Literature Review

2.1 Linguistic Features in Online Scams

"Scams are communication practices whose presence online constitutes a dramatic risk for the victims both from a financial and emotional perspective" (Anesa et al., 2021). Scammers utilise language that can trick victims in order to influence talks and manipulate them into complying with their aims (Juanda et al., 2024). This is how the fraud genre is carried out. In the realm of academia, much research has been done on the phenomenon of cybercrime from a linguistic perspective. Specifically, various scam categories, including retail, romance, and investment scams, have been thoroughly examined to enhance comprehension of the linguistic elements that could potentially facilitate the success of the scam. According to studies, the victim is coerced into unwitting cooperation with the con artist through skillful manipulation of language. More precisely, the victims comply with the scammers' requests due to the clever blending of words and expressions related to particular semantic domains and the strategic lexical choices that increase engagement (Anesa, 2022).

2.2 Scam Awareness Through Digital Literacy

A study conducted by Silvhiany et al. (2021) examined how students assessed the reliability of online information and the potential bias influencing the content. 152 EFL participants took part in an online critical literacy assessment, which included six tasks: assessing the credibility of visual information, evaluating a WhatsApp message, comparing and assessing websites, differentiating between news and sponsored content, assessing the credibility of claims in a YouTube video, and evaluating an Instagram post. The findings of the study revealed that the students were susceptible to being misled by the online information they encountered across various online platforms. They specifically encountered challenges in identifying unsupported claims in the YouTube video. Despite being part of Generation Z and regularly using social media and various online sources in their daily lives, the students struggled to critically evaluate the claims posted on these platforms. The study's implications emphasise the necessity of integrating critical digital literacy into language skill courses and providing intentional instruction on evaluating online sources.

According to literacy experts, in order for students to use information effectively in the digital age, they must acquire fundamental online information literacy (Leeder, 2019; McDowell & Vetter, 2020). This is due to the fact that the majority of students get almost all of their knowledge from the internet. The transition from mostly printed texts to texts that are accessed online has been facilitated by the widespread use of Internet-based literacy exercises. Competencies unique to the online environment are necessary for digitally mediated literacy practices (Silvhiany, 2019). Experts in digital literacy suggest a few skills required for 21st-century active participation. Hobbs (2010) highlighted the significance of being able to examine data from various sources by considering the information's source, purpose, and point of view, as well as assessing the reliability and quality of the sources.

Silvhiany et al. (2021) summarised how scholars like Alvermann (2017), Chaka (2019), Nagle (2018) and Potter and Gilje (2015) contend that it is important to consider how literacy

practices and social media texts are intertwined. Social media, according to Chaka, is a component of semio-technologies that combine language symbols, signs, and cultural practices into a data system where individuals connect and create meaning (Chaka, 2019). Scholars and educators must think about ways to encourage critical questions on these platforms as youngsters use them increasingly frequently for communication and civic engagement on various social media platforms.

In order to "engage learners in evaluating social media texts... for the purpose of identifying underlying assumptions not previously considered... to provide practice in arriving at well-reasoned analyses about the content; without ruining their enjoyment of it," Alvermann (2017, p. 336) recommends using critical inquiry instruction (Alvermann, 2017). Potter and Gilje (2015) include curating as a crucial literacy practice in the context of social media, in keeping with the critical inquiry. According to their beliefs, "young people's agentive activity is performed in and on the world through curatorship and learning identity in new media as an emerging literacy practice (pp. 123–124)."

Hence, Silvhiany et al. (2021) put forth the notion that the new literacy practices related to social media have also called for the possession of at least four competencies: trustworthiness, readability, and usefulness evaluation (Baildon & Baildon, 2012); navigation of the online environment (Breakstone et al., 2019); use of digital practices and online information critique (Beach et al., 2020); and the ability to assess the credibility of websites by taking into account the identities of the sources (Damico & Baildon, 2011).

2.3 Theories Related to Game-Based Learning

Game-based learning has emerged as a promising educational approach to engage learners and enhance their knowledge and skills. It effectively teaches essential life skills such as critical thinking, pattern recognition, and communication, all crucial for navigating today's technologically advanced society. The foundation of game pedagogy lies in the convergence of game mechanics and learning theories. While game mechanics provide a framework for creating engaging and rewarding experiences, learning theories offer insights into the learning process. Various learning theories can inform the development of educational games. For instance, behaviourist theories highlight the significance of feedback and reinforcement in learning, while cognitive theories focus on how students organise and construct information. Each learning theory brings its own representational principles, serving as theoretical guidelines for game-based learning.

Behaviourism theory asserts that players need to understand their goals and use the stimulus-response process to achieve them (Wu et al., 2012). In game-based learning, behaviourism can be implemented through in-game reward systems like badges, points, or other incentives to motivate players to engage with the instructional content. Several studies (Alhammad & Moreno, 2020; Bai et al., 2020; Ekici, 2021) have demonstrated that game-based learning consistently results in positive behaviourist outcomes. On the other hand, gamification, serious games, and game-based learning contribute to achieving numerous learning outcomes, most of which are cognitive in nature (Behnamnia et al., 2020; Sailer & Homner, 2020).

Cognitivism emphasises the transfer of knowledge from an expert to novice learners. Jean Piaget's theory of cognitive development has had a tremendous influence on learning processes worldwide. It suggests that learners process information by receiving, storing, relating it to prior knowledge, indexing, and retrieving it for future use. Piaget (2010) believes that games are essential for learning new concepts, developing knowledge and skills, integrating thinking

with action, and promoting children's intellectual growth. He posits that the fundamental reason learners engage in games is that they provide a space for experimentation without the fear of responsibility or punishment. Learners can improve their emotional experiences and strengthen their recently learned cognitive structures through this approach (Piaget, 2010). According to cognitive learning theory, learners are more inclined to devote their time and energy to tasks that they find interesting and exciting, which is why play-based learning activities may effectively promote meaningful deep learning.

2.4 The ADDIE Model

Many models can be used to design and create instructional materials. One of them is the ADDIE model, which is a well-structured system that produces effective output for users (Kasi & Zaharudin, 2023). This model has been widely used by instructional designers, including Aziz et al. (2018), Ghani et al. (2022), Kasi and Zaharudin (2023), and Saidin and Mohd Fazly (2023). ADDIE is an abbreviation of analysis, design, development, implementation, and evaluation of the stages involved in designing and developing instructional materials. These stages provide a flexible framework for developing effective and efficient instruction (Braxton et al., 1995). The current study adopted the ADDIE model to guide the development of an instructional self-learning game.

The analysis phase is the first step in the ADDIE model. It forms the basis of the instructional design and development process. It is where the instructional designer analyses the target users' needs and determines the learning goals (Saidin & Fazly, 2023). This is accomplished through a needs assessment. Its findings frequently influence the subsequent phase of the process, which is design. The design phase is the model's second step. It is where the instructional designer outlines the strategy for achieving the goals. This includes setting learning objectives and assessing how those objectives are met (Peterson, 2003). It also includes designing the product and creating a storyboard (Falahah & Irrahali, 2019). The next phase of the ADDIE model is the development phase, during which the designer creates the product (Peterson, 2003). After developing the product, the designer would test it on their intended audience. It is the implementation phase of the ADDIE model. Following the implementation phase, the ADDIE model moves on to the evaluation phase. The designer would investigate the feasibility of their product with their target users (Falahah & Irrahali, 2019). It should be noted that these five stages may occasionally overlap and be linked (Braxton et al., 1995). For example, the implementation and evaluation stages can occur concurrently. While deploying the instructional game to its target users, gathering feedback can be done to identify areas for improvement.

3. Methodology

In this project, the ADDIE model stands as a foundational framework for the systematic development of the educational game designed. Several distinct stages were meticulously navigated when the ADDIE model was applied to craft this educational game which initiates digital literacy on scam awareness.

3.1 Phase 1: Analysis

Firstly, in the analysis stage, a comprehensive understanding of the characteristics, knowledge level, and specific needs of the target audience regarding scam awareness was rigorously obtained. This involved delving into an in-depth analysis of prevalent scam types within the community to ensure that the game addressed pertinent and current issues. Furthermore, the stage encompassed the identification of learning objectives and desired outcomes of the game,

as well as the identification of potential constraints that may have impacted game development, such as resource availability, technological considerations, and time constraints.

Due to limitations such as time constraints and lack of manpower for technical parts of the game development, it was decided that a simple PowerPoint feature would be used as the game platform. Initially, a larger-scaled and more technical version of the game had been planned. However, due to limitations on manpower, time and availability of devices that can handle such technicalities, the game was simplified to using basic PowerPoint slides with hyperlinks. On the plus side, this method is not only convenient but also replicable and can be initiated by educators who want to be a part of the cause in advocating digital literacy through gamification.

The learning objective of the game was that by the end of the gamified self-learning session, learners would be able to identify 10 basic linguistic features that are usually present in online scams. The target audience was set to be undergraduate students at a local university. Undergraduates were deemed to be a suitable target because they would be able to read the game instructions on their own and attempt to solve the challenges in the game independently. The 60 participants selected to try out the game were chosen randomly by convenience sampling.

3.2 Phase 2: Design

Moving forward to the design stage, the game concept and storyline were meticulously crafted to engender engaging narratives that closely simulated real-life scam scenarios. The storyline of the game is about a main character which would be represented by the player. The main character needs to help their family members distinguish between legitimate texts and potential scam texts. The challenge in the game is to identify the probability of the text messages being either legit or fraudulent. The player must solve this task by identifying the linguistic features that usually appear in scam texts. Additionally, game mechanics and elements were included to incentivize learning and foster engagement. Freedom was given to the player to choose which section of the game to attempt on first. This adds on to the element of surprise and mystery, building up on the player's curiosity. Moreover, the educational content to be seamlessly integrated into the game was meticulously outlined to ensure that players acquired comprehensive scam awareness knowledge while immersed in gameplay. This is done by having an explanatory comment after each stage is completed, in order to consolidate and fossilize the learning input. Lastly, the user interface and visual elements of the game were designed to be visually appealing and intuitive for players, further enhancing the overall experience. The pictures in the game are static, but they are colourful and attractive for young adults of this generation who fancy cute and adorable things.

3.3 Phase 3: Development

Subsequently, in the development stage, a prototype or beta version of the educational game was constructed, involving programming, graphic design, and content creation. The game was then tested with a small group of target users to gather feedback on usability, engagement, and educational effectiveness. This feedback was utilised to refine the game, ensuring its effectiveness and appeal through iterative testing.

3.4 Phase 4: Implementation

During the implementation stage, the educational game was deployed to the target audience. This was done in the form of a survey form using Google Forms. A link to the PowerPoint game was included in the survey form. Participants needed to play the game and then answer some survey questions. Clear instructions and support for users on how to access and play the

game were provided, and initial usage was closely monitored to gather data on user engagement, learning outcomes, and any technical issues that arose. Since the target participants were undergraduate students, they were able to communicate seamlessly with the research team to express any technical issues regarding accessibility. Hence, it is notable that choosing this age group as target participants is convenient, especially when developing a new concept.

3.5 Phase 5: Evaluation

Lastly, in the evaluation stage, the game's impact on scam awareness was meticulously assessed by collecting feedback from players. The game's effectiveness in meeting the learning objectives identified during the analysis stage was measured based on the data and feedback gathered in the survey questions that the participants had to answer after playing the game. These questions included rating how much they had learnt about the detectable linguistic features present in online scams and also how much they enjoyed the game. In the said survey form, participants were also given an opportunity to share suggestions on how to improve the quality of the game, accessibility, and enjoyment. All these responses were used to make informed decisions about updates, improvements, or future iterations of the educational game.

4. Findings and Discussion

User feedback for this first version of the PowerPoint educational game was helpful for future development. Since the game was straightforward, there was no confusion about the instructions. Users found the visual design engaging. To enhance the learning experience, it was suggested that more interactive elements like quizzes or challenges be included. The level of difficulty was moderate for this age group. Adding audio cues or sound effects was recommended to make the game more engaging. Moreover, incorporating a leaderboard or scoring system could add a competitive element and motivate players to improve. The game mechanics were praised for being simple and intuitive, making it easy for players to navigate. Providing more feedback or explanations for incorrect answers was suggested to aid in learning. Additionally, incorporating different difficulty levels could cater to a broader range of players and skills. Overall, the game was considered fun and educational, but there were suggestions for improving the user experience. On the technical side, the PowerPoint presentation feature was not mobile-friendly. It is more suitable for devices with wider screens such as laptops and tablets. However, the layout does not fit well for smaller screens like smartphones.

5. Conclusion

In conclusion, educating individuals on scam awareness through digital literacy is crucial in today's digital age. By equipping people with the knowledge and skills to identify and avoid scams online, we can empower them to protect themselves and their personal information. Through targeted educational programs, workshops, and resources, we can raise awareness about common scams and fraudulent schemes and help individuals make informed decisions when navigating the digital landscape. We must continue prioritising digital literacy education to build a more secure and resilient online community. Together, we can work towards a safer and more informed society where individuals are empowered to navigate the digital world confidently.

As for suggestions for further development on this project, the educational game has the potential to be a successful tool for learning and engagement. Several recommendations can be

implemented to further enhance the game and improve the user experience. Firstly, incorporating multimedia elements like videos and animations will make the game more engaging and interactive. Additionally, user testing can be conducted on a bigger scale to identify usability issues and gather feedback for further improvement. Finally, expanding the game to cover more topics or concepts will cater to a wider audience and foster lifelong learning. By implementing these recommendations, the educational game can become a more effective tool for learning and engagement, providing users with an interactive and immersive learning experience that caters to their individual needs and abilities.

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Conflict of Interest Statement
The authors declare that there is no conflict of interest regarding the publication of this study.

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