KIDDIESAFE: ENHANCING SAFETY AND CLEANLINESS AWARENESS IN PRIMARY SCHOOL STUDENTS THROUGH GAME-BASED LEARNING

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ABSTRACT

Health and safety education among children is vital to their overall well-being and development. However, children need to understand health and safety so that they can apply it in their daily lives. In the digital age, modern educational institutions face the challenge of engaging a generation of students accustomed to interactive and visually stimulating content. Therefore, this study explores how the KiddieSafe App, an educational tool infused with game design elements, helps students in primary schools learn issues of safety and cleanliness more effectively. Drawing from the concepts of digital game-based learning and the development of 21st-century skills, the app features bright animations, interactive quizzes, and an interactive interface to help engage young learners. User evaluation using the focus group technique was conducted among Year One primary school children. The children were given sufficient time to explore the App and later they were asked to answer the questionnaire. The finding shows that the KiddieSafe App has the potential to enhance learning outcomes and increase students' engagement. The majority of feedback is positive, thus proving this application to have potential as an effective supplementary educational aid for children, which proves the importance of interactive learning in early childhood education. Future enhancements will focus on content diversity and feedback mechanisms to make the learning experience as enriching as possible.

Keywords: Game-Based Learning, Health Education, Primary School Students, Safety Education, Cleanliness Education

INTRODUCTION

Schools should be devised for the generation of children born and raised in the digital age with various teaching methods. The changing technological and social conditions of modern civilization necessitate the development of new professional competencies, also known as "21st-century skills." These skills, which are more psychological and behavioral than physical, should be developed starting in primary school. Game-based learning is among good ways to develop these skills (Liu et al., 2020). Educators encounter increasing challenges in teaching and learning. Providing great course content alone is frequently insufficient to keep students engaged until the end of class. Therefore, integrating interactive methods such as game elements into regular classroom learning is critical (Ishak, 2020).

In addition to being entertaining, digital game-based learning (DGBL) has promised a positive impact in educational settings. DGBL can engage students in learning activities for an extended period (Al-Azawi et al. (2016). Hartt, Hosseini and Mostafapour (2020) highlighted DGBL's potential in promoting learning engagement and collaboration. Several researchers [45,46] have also determined that DGBL can help students gain experience and make well-informed decisions when playing digital games. DGBL has started to be broadly employed thanks to its advantages over traditional learning. This approach enhances learning motivation, engagement, and performance among students. Findings in Hwa ( ) study indicated that DGBL could help students acquire knowledge and better understand learning materials. Put simply, this learning mode is known to facilitate students' education.

The idea of the KiddieSafe App was motivated by the high usage and prevalence of digital technology in children's lives today. Children nowadays are born to become digital natives, growing up in a world full of technology. This is an opportune time to begin harnessing the potential of digital tools in the classroom for better educational experiences. Traditional classroom settings often struggle to hold the attention of young students who are used to interactive content that has highly visually stimulating images.

LITERATURE REVIEW

Health education in primary schools focuses on promoting physical, mental, and social well-being. Safety and cleanliness are among the essential topics covered in the health education. The curriculum typically integrates lessons on nutrition, hygiene, physical fitness, the importance of mental health, and body safety to encourage healthy habits among children from a young age.

Game-based learning (GBL) has been successfully implemented across various educational settings, including early childhood education. GBL is an innovative approach to education that incorporates the use of game elements and gameplay strategies to facilitate learning and engagement in the classroom. It leverages the motivational aspects of games to enhance the educational experience, making it more interactive, enjoyable, and effective for students. This approach helps students develop a deeper understanding of concepts by actively participating in problem-solving and decision-making within the context of a game environment.

In health and safety education, GBL offers significant potential in children's learning. By combining interactive learning with behavioral assessments, these games can support both cognitive and behavioral improvements, contributing to safer practices and healthier lifestyles among children. GBL has proven effective in promoting children's safety and health education. Several studies demonstrate how immersive and interactive educational games can enhance children's knowledge, behavior, and well-being. Research on the Safe City mobile game (Wong et al., 2024) found that playing this safety-focused game

improved children's understanding of hazards and their ability to adopt safer behaviors. The game's interactive design helped players engage meaningfully with safety concepts, highlighting the potential for technology-based interventions to prevent injuries and foster psychosocial well-being among young learners. Moreover, reviews of health-related games indicate that GBL effectively promotes various health behaviors, including disease management, obesity prevention, and sexual health awareness.

A comparative study conducted by Sabirli and Çoklar (2020) found that educational games significantly increased overall learning motivation and performance. GBL has equipped learners with motivational techniques and made them more engaged. Even though game scores were used to represent internal motivation, external motivation as well as cognitive and behavioral participation indicators, the findings showed that such motivation and engagement were significant predictors for deep learning approaches (Zheng et al., 2024).

To investigate the relationship between gamification and 21st-century skills acquisition, Liu et al. (2020) conducted a study among primary school students. This research is intended to show that it is difficult for traditional approaches to instruction to maintain student interest. Gamification used in classroom learning effectively maintained students' engagement and involvement. The research showed that gamified learning environments resulted in significant improvements in critical thinking, problem-solving, and sharing of ideas among learners. Gamification enables students to pay attention to complex works by transforming conventional educative materials into interactive activities that are interesting and captivating which provide them with more enriching educational experiences.

In conclusion, GBL offers significant potential in children's health and safety education. By combining interactive learning with behavioral assessments, these games support both cognitive and behavioral improvements, contributing to safer practices and healthier lifestyles among children.

METHODOLOGY

The KiddieSafe App came up as a result of an extensive and systematic process that aimed to meet early childhood learning needs with an engaging and interactive application. This entailed various processes such as selection and choice of development tools, content creation, integration for user interface design with interactive features, and user evaluation.

Adobe Animate was chosen for the development of KiddieSafe App because it is powerful in making animations and interactive content. Due to their flexibility, interesting animations and interactivities that would easily capture children's attention could be created from scratch through conceptualization. Other supplementary instruments or facilities were also employed to make the app more functional and user-friendly. These comprised of graphic design software for creating visual display elements and sound editing instruments which assist in incorporating audio components to enhance the learning process.

For content creation stage was about making an animation video contained topic of the human body, safe and unsafe touch, and cleanliness covered in Health Education Year 1 syllabus. This selection was made based on the significance of these topics in the early education curriculum. The picture presentation sought to be visually attractive and suitable for children of that age where bright colors were extensively utilized in simple pictures conveying the lessons well (Figure 1). Every segment of the video was done with a lot of care to ensure clarity and engagement with a narrative style that is easy for young children to follow and understand. The animation took a storytelling approach using dynamic visualizations aimed at educating as well as capturing the children's attention.

Figure 1

KiddieSafe App Content page.

To enhance the learning experience, the KiddieSafe App incorporated several interactive features, most notably a quiz functionality. This feature included dynamic text questions, answer drop boxes, and buttons for answer options creating an interactive environment where children actively participate. The questions were meant to consolidate what had been taught in the animation video thus ensuring that learners can apply their knowledge gained earlier. Dynamic text questions were generated programmatically to provide different kinds of situations while answer drop boxes allowed them to choose accurately correct answers.

The user interface (UI) design of the KiddieSafe App was a critical aspect of the development process, as it needed to be both child-friendly and educationally effective. Figure 2 shows KiddieSafe App main interface. Design considerations included using large, easily clickable buttons and incorporating bright, attractive colors to keep the children engaged. The layout was however kept straightforward and self-explanatory so that children could go through the whole application without any problems. The UI elements were visually appealing but functional too which means they were well balanced in terms of beauty as well as utility. In addition, sound effects and visual feedback were also used to give immediate responses to children's interaction with it, thus enhancing engagement and learning experience further.

Figure 2

KiddieSafe App main interface
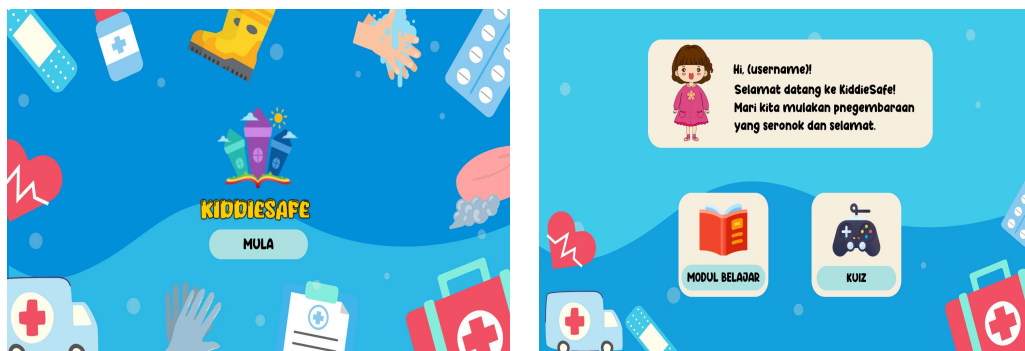
After completed the development process, this study conducted user evaluation using focus group technique to evaluation the KiddieSafe App. Focus group evaluation involved a total of 10 Year 1 children from primary school. Firstly, children were given some briefing regarding objective of the evaluation and the KiddieSafe App. Then, the children were given a plenty of time to explore the App by themselves. After that, the questionnaire was distributed to the children. The questionnaire used for this study was adapted from USE Questionnaire (Lund, 2000). The USE adapted for this study consist of four dimension, Usability, Ease of use, Easy to Learn and Satisfaction. The evaluation sought to evaluate how usable the app was as well as how engaging and educational it could be in real-life situations. Subsequently, feedback from students was collected to identify areas where changes could be made as well as validate the influence of this app on their understanding of safety and cleanliness concepts. The children provided their answer by selecting the scale of response of strongly agree, agree, not agree and strongly not agree. Overall, the children took around 20 to 30 minutes to participate in this evaluation. The data gathered were verified for completeness and analysed using descriptive analysis. The next section encompasses the results and findings of the evaluation.

In brief, developing the KiddieSafe App was multifaceted involving the use of software such as Adobe Animate and other supportive tools; comprehensive content creation with a focus on key educational areas; integrating interactive quizzes; well thought out user interface; and finally evaluating the app. Each step was carefully organized and implemented to make sure that it's an application that is informative as it is enjoyable for young children, in a bid to help them appreciate issues of cleanliness and safety in fun ways.

RESULT

In overall, the positive feedback gain across four key aspects include usability, ease of use, learning easy and satisfaction.

For the usability aspect, it is include four statements. The first statement which is "This app helps me complete my schoolwork faster and easier" from Figure 3, a significant majority (7) strongly agree, with 2 agreeing, indicating high efficiency in aiding schoolwork completion. The statement "This app helps me learn better" received equal responses of 5 for both 'Agree' and 'Strongly Agree,' suggesting users feel the application significantly enhances learning. Regarding "This app is useful to me," 5 users strongly agree, 3 agree, and only 1 strongly disagrees, showing general usefulness despite a minor negative response. Lastly, for "This app saves me time," responses are split evenly between 'Agree' and 'Strongly Agree' (5 each), with minimal disagreement (1 strongly disagree, 1 disagree), highlighting the application's effectiveness in time-saving. Overall, users perceive the application as a valuable tool for their academic tasks, with minor areas for improvement.
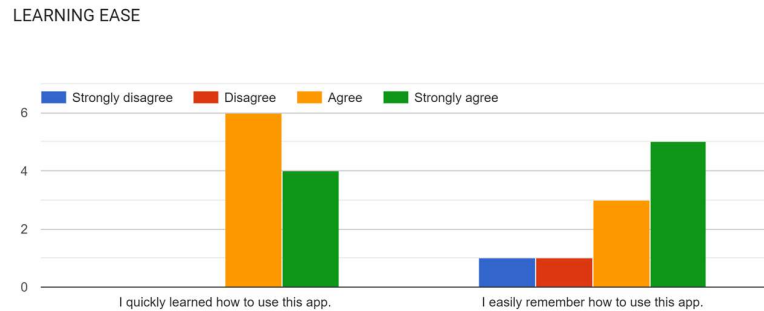
Figure 3

Usability of KiddieSafe App
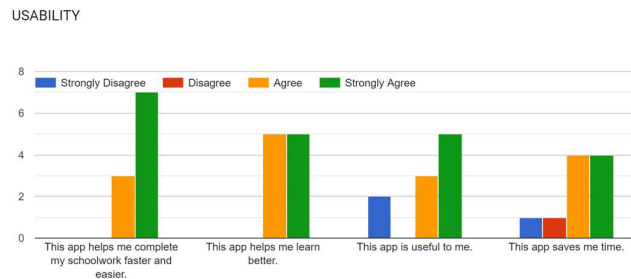
The survey results in Figure 4 show that children have a predominantly good view of the ease of use of the KiddieSafe App. The feedback on the application's ease of use is largely positive across four statements. For "This app is easy to use," the majority (8) strongly agree, with 2 agreeing, and no disagreements, indicating a high level of user-friendliness. For "I do not need help to use this app," responses are mixed with 3 disagreeing, 3 agreeing, and 4 strongly agreeing, suggesting some children still require assistance. The statement "I do not encounter problems using this app" sees 4 children strongly agreeing, 3 agreeing, 2 disagreeing, and 1 strongly disagreeing, indicating that while most children find the app problem-free, some issues persist. Finally, "I enjoy using this app" received strong agreement from 6 children, agreement from 3, and disagreement from 1, showing that the majority find the application enjoyable. Overall, the feedback highlights the app's user-friendliness and enjoyment, with minor areas for improvement in user assistance and problem resolution.

Figure 4

Ease of Use of KiddieSafe App
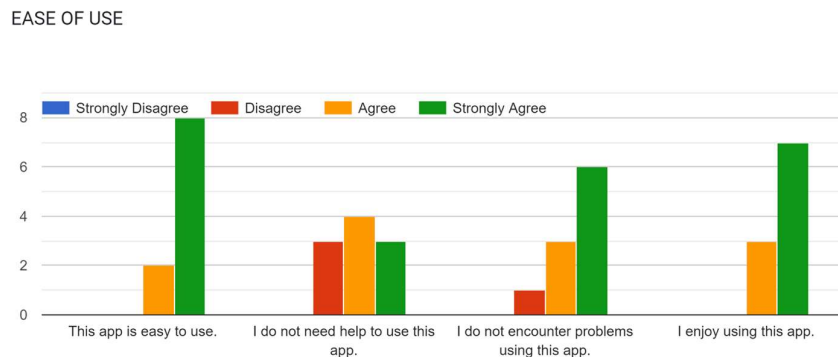
The feedback from Figure 5 on learning ease shows mixed but generally positive responses across two statements. For "I quickly learned how to use this app," the majority (6) agree, with 4 strongly agreeing, indicating that most children find the app easy to learn. However, a significant portion (5) disagree, suggesting that a notable group did not find the learning process quick. For "I easily remember how to use this app," 5 children strongly agree, 3 agree, and a few (1 strongly disagree, 1 disagree) indicate difficulties in recalling how to use the app. Overall, while the majority of children find the application easy to learn and remember, there is a notable minority who face challenges, highlighting areas for potential improvement in children on boarding and retention.

Figure 5

Learning Ease of KiddieSafe App

LEARNING EASE

The bar graph of Figure 6 outlines the level of satisfaction towards the KiddieSafe application. The satisfaction bar graph reveals predominantly positive feedback across three statements. For "I am satisfied with this app," the majority (6) strongly agree, while a smaller group (3) agree and only 1 disagrees, indicating high overall satisfaction. In terms of willingness to recommend the app, the children are equally positive, with 5 children strongly agreeing and 4 agreeing that they would tell their friends about the app. Finally, for "This app is really interesting to me," the majority (6) strongly agree, and 2 agree, although 2 children are neutral, showing that most children find the app engaging. Overall, the graph suggests a high level of satisfaction and interest among children, with strong recommendations to others.

Figure 6

Satisfaction of KiddieSafe App

SATISFACTION
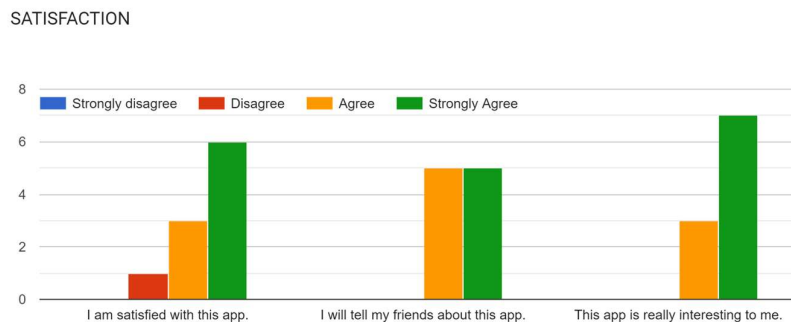
The analysis of the four-bar graphs indicates a generally positive user experience with the app. In terms of usability, most users find the app helpful in completing schoolwork faster, aiding learning, and being useful overall, with minor exceptions. Regarding ease of use, the app is perceived as easy to navigate, requiring minimal help, and enjoyable, although a small segment encountered some difficulties. Learning ease shows that users quickly learn and easily remember how to use the app, with very few exceptions. Finally, user satisfaction is high, with strong agreement on overall satisfaction, willingness to recommend the app to friends, and finding the app interesting. Collectively, these insights highlight the app's effectiveness, ease of use, and high user satisfaction.

DISCUSSION

User evaluation results on KiddieSafe App have provided a strong indication of its effectiveness as an educational tool for young children. Among the findings, it was observed that students actively participated and better-grasped concepts on safety and hygiene taught. This is consistent with literature which posits that interactive and gamified learning tools are effective in promoting student engagement and retention (Liu et al., 2020; Ishak, 2020).

Vibrant animations and interactive questions made use of by KiddieSafe App are among its greatest strengths as they kept the learners engrossed in the process. For this reason, dynamic content that was attractive to Year ones at primary school was used. Furthermore, the app displayed child-friendliness so that children could navigate through it conveniently thus promoting impenetrable engagement for early schoolgoers.

However, there were several limitations noted during the evaluation. One limitation was the lack of enough feedback mechanisms on wrong quiz answers when it began to be tested by the users' group. This gap was noted during user testing and addressed by inserting immediate constructive responses to assist users in comprehending their flaws as well as learning from them. Another restraint was the lack of more materials with different difficulty levels to meet the learning needs of the different types and levels of learners. The next versions of the KiddieSafe app should contain even more types of activities and diverse contents that can help to avoid this problem.

The development process was not without its problems; mainly concerning the implementation and creation of animations and program coding using Adobe Animate. To overcome these issues, frequent trials and testing were carried out up to the point of achieving the final stable version. Moreover, the planning of the user evaluation, as well as the need for coordinating with the educators and the students to complete it, was a logistical issue but was effectively prevented through the means of planning and constant rearranging of the schedule.

In conclusion, these results emphasize the significance of developing the tool step-by-step and incorporating the users' feedback. In general, the status of the KiddieSafe App, presented in the study, indicates high potential as a supplementary application supporting education for children, which proves the importance of interactive learning in early childhood education.

CONCLUSION

In essence, the KiddieSafe App is a promising tool for teaching children about safety and cleanliness. The interactive features of the app, interesting animations and user-friendly design have proved effective at improving students' understanding and retaining important concepts. A summative evaluation was done using Year one children in primary school where it gave the app positive feedback because of its ability to capture and sustain children's interest in learning.

The importance of the KiddieSafe App lies in how it addresses some limitations associated with traditional education methods by making use of digital technology that can provide more engaging and interactive learning experiences. Such tools when incorporated into the educational curriculum can significantly improve learning outcomes as children increasingly interact with digital devices.

To provide the future directions of the KiddieSafe App, include expansion of its content to cover a broad range of issues relating to safety and hygiene, as well as the addition of more diverse interactive activities for various learning styles. It is also worth exploring further research on the effect of the long-term use of gamified educational tools on children's education and behavior.

In conclusion, the app can serve as an initiative towards improving early childhood education through technology. We will keep working on this model, making it even better than before so that our generation can be safer and cleaner regarding their studies

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