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Kodepoly: An Engaging Approach to Blended Futuristic Learning in Coding

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ABSTRACT

This project introduces Kodepoly a board game prototype inspired by Monopoly, designed to teach basic coding principles in a fun and interactive way. This innovative pedagogical tool seeks to address the prevailing challenge of enhancing coding education's accessibility and appeal, particularly in the Malaysian context where the stimulation of interest in STEM disciplines is critically needed. By combining the strategic elements of Monopoly with a curriculum comprised of coding challenges, debugging exercises, and algorithmic puzzles, Kodepoly aims to render the learning process both enjoyable and substantial in content. The methodology employed encompasses a blended learning strategy, integrating tangible board game components with a complementary digital platform or application. This blended learning is designed to facilitate the tracking of learner progress, provide additional pedagogical challenges, and share hints and educational resources, thus catering to various learning styles and environments. The game is designed to introduce students to the fundamentals of coding and emerging technologies, promoting interactive and student-centred learning. Preliminary outcomes derived from playtesting sessions indicate a positive learner engagement with Kodepoly, alongside a noted enhancement in the comprehension of coding concepts. The inherently interactive and cooperative nature of the game underscores its potential to cultivate essential skills such as collaboration and strategic thinking, which are crucial in the STEM fields and preparing them for future opportunities in a technology-driven world. In conclusion, Kodepoly demonstrates significant potential in enhancing coding education through a blended, futuristic learning model. Making coding accessible and fun not only demystifies technology but also encourages students to explore STEM, preparing them for future opportunities in a technology-driven world.

Keywords: Coding education, Blended learning, Educational board games, STEM, Interactive learning

INTRODUCTION

In an increasingly digital world, the ability to code is becoming as fundamental as reading and writing. Coding serves as a pivotal entry point to STEM (Science, Technology, Engineering, and Mathematics) education, equipping students with computational thinking and problem-solving skills that underpin success in various STEM fields (Grover & Pea, 2013). In Malaysia, the emphasis on STEM education is particularly significant as the nation strives to build a knowledge-based economy and create high-skilled jobs (Ministry of Education, 2013). However, the current educational models face several challenges, including a lack of student interest and engagement in STEM subjects (Saat & Fadzil, 2022).

One of the primary motivations for enhancing STEM education in Malaysia is to address the declining interest among students in these fields. Studies have shown that innovative educational tools and approaches are essential to capture and sustain students' interest in coding and other STEM subjects. For instance, digital game-based

learning has been shown to significantly improve learning outcomes in STEM education (Gui et al., 2023). Kodepoly, a board game prototype inspired by Monopoly, has been developed as an innovative pedagogical tool to address these issues. By combining gaming with coding principles, Kodepoly provides a blended and interactive approach to learning, making coding more accessible and enjoyable. This paper explores how Kodepoly blends traditional board game elements with digital platforms to enhance learner engagement, comprehension of coding concepts, and essential skills such as collaboration and computational thinking. Research indicates that game-based learning can effectively enhance students' engagement and understanding of complex subjects (Wang et al., 2022; Videnovik et al., 2023). This paper explores the development and impact of Kodepoly, focusing on how it combines board game elements with digital platforms integration. By answering the coding questions and tracking scores. Kodepoly boosts student engagement and understanding of web development coding concepts that include Hypertext Markup Language (HTML), Cascading Style Sheets (CSS), and JavaScript (JS).

Aligned with the IIUM (International Islamic University Malaysia) Sejahtera Academic Framework (SAF), Kodepoly promotes a holistic educational approach by integrating knowledge, ethics, and personal well-being (Borhan et al., 2021). It embodies the Sejahtera philosophy, encouraging players to solve coding challenges and reflect on their actions' broader social, moral, and spiritual implications. This nurtures intellectual, emotional, and spiritual growth in accordance with SAF's vision of whole-person development. Moreover, Kodepoly aligns with SAF's emphasis on blending revealed (Islamic) and acquired (modern academic) knowledge. The game tasks players with applying technical skills while considering ethical dimensions, such as solving real-world problems with technology in ways that align with Islamic values. By promoting ethical and responsible digital behaviour, Kodepoly ensures that players develop both technical expertise and moral integrity, fulfilling SAF's goal of cultivating socially responsible graduates.

RESULTS AND DISCUSSION



Fig. 1 Students with computer science background and without

The preliminary playtesting of Kodepoly produced promising results, particularly in terms of player engagement and understanding of coding concepts. The playtesting involved twenty-seven students from the Foundation of Computer Science (FCS) program at the Centre for Foundation Studies, IIUM. Fig. 1 shows these students were divided into six groups: three with a computer science background and three without. Most participants were beginners in coding with other programming languages as shown in Fig. 2.

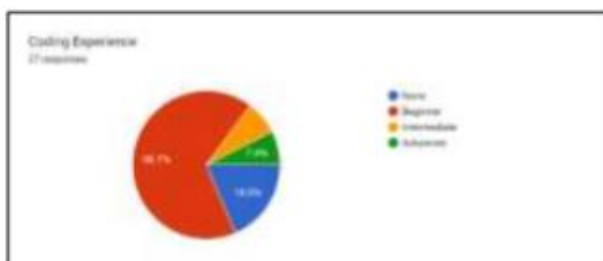


Fig 2 Coding experience of the students

Quantitative feedback indicated high levels of engagement and enjoyment. The “Fun Factor” and “Challenge” aspects of the game each received a notable rating of 66.7%, reflecting that students found the game

both enjoyable and stimulating. The “Replayability” aspect also received a strong score of 51.9%, suggesting that players were interested in revisiting the game. These ratings emphasise the effectiveness of Kodepoly in making coding education engaging and interactive. Regarding qualitative feedback, participants overwhelmingly reported that Kodepoly improved their comfort with coding concepts. Many students highlighted that the game helped them better understand coding principles in a fun and interactive manner. Students particularly enjoyed the social and collaborative aspects of Kodepoly. Playing the game with friends made it more fun and educational. This positive feedback matches the observed boost in students' motivation and enthusiasm for learning coding and solving problems. Overall, the playtesting results demonstrate that Kodepoly effectively captures students' interest, enhances their comprehension of coding principles, provides a stimulating and enjoyable learning experience, and demonstrating how gamified elements can foster a supportive learning environment and boost engagement.

The blended learning strategy, which integrates a physical game board with digital tools, was well received by participants. Using Google Forms for answering questions and LeaderBoardHQ for tracking scores seamlessly integrates digital resources into the traditional board game format. This approach not only supports interactive and student-driven learning but also allows for efficient progress tracking. The positive reception of this blended learning model suggests that integrating digital tools with physical games can enhance the educational value and accessibility of complex subjects like coding. Kodepoly's approach has broader implications for educational practices. The game's success in introducing coding concepts to beginners, including those with no prior experience in HTML, CSS, or JavaScript, highlights its potential for wider application in coding education. By making coding concepts approachable and engaging, Kodepoly could serve as a model for similar educational tools aimed at other subjects. Additionally, its focus on collaborative problem-solving and logical thinking aligns with key skills needed in STEM fields, making it a valuable resource for fostering essential competencies in a technology-driven world.

CONCLUSION

In conclusion, Kodepoly effectively combines gamification and blended learning to enhance coding education. The game's engaging and interactive approach makes learning coding fun and accessible, promoting both individual and collaborative skills. Its early success in boosting student engagement and understanding highlights its potential as a valuable educational tool. Particularly in Malaysia, where there is a growing need to stimulate interest in STEM subjects, Kodepoly could play a key role in preparing students for future technology-driven opportunities by developing essential skills like problem-solving and teamwork. With continued

development and broader use, Kodepoly has the potential to make a significant impact on coding education.

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