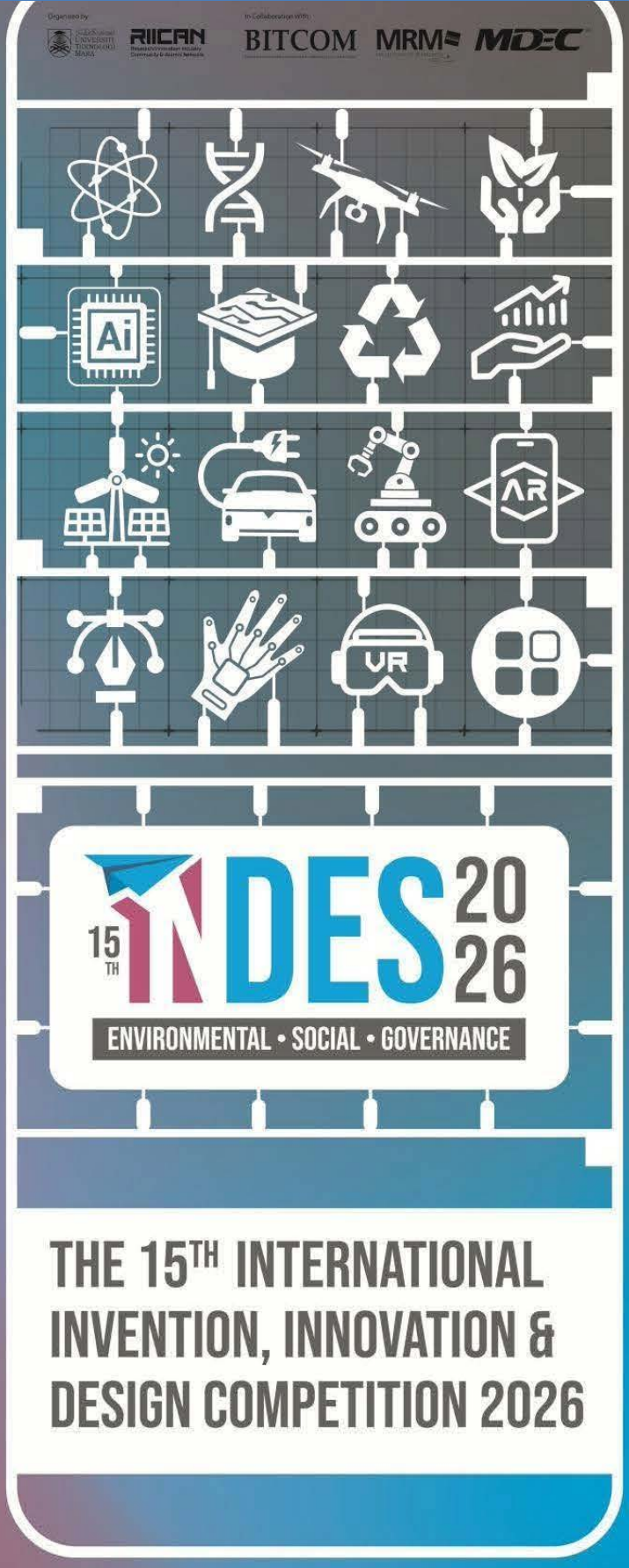


E-BOOK OF

EXTENDED ABSTRACT

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THE 15th INTERNATIONAL
INVENTION, INNOVATION &
DESIGN COMPETITION 2026

Organized by:
Office of Research, Industry,
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ABSTRACT

Triple “A” Study Game Board is a creative adaptation of the traditional Snake and Ladder game, designed to enhance learning through gamification. The innovation was initially developed for primary school students to address low engagement in conventional learning methods. Positive feedback from early implementation, including improved motivation, better retention, and successful academic outcomes, encouraged further development of the game. The second version has been expanded to target lower secondary students (Form 1–3), with content aligned to the secondary school curriculum and examination requirements. The game integrates subject-based questions into gameplay, where each colour represents a category: Red (Science), Blue (Mathematics), Green (History), and Yellow (Geography). Players must answer questions correctly to progress, promoting repetition, critical thinking, and self-assessment. The game has shown effectiveness even among average-performing students, as repeated exposure to questions helps improve understanding and memory. It also encourages active participation, peer learning, and interactive discussion. Designed as a flexible and adaptable tool, the game can be customized for different subjects and education levels. This innovation supports various learning environments, including classrooms, home revision, and group activities. With its engaging approach and proven impact, the game has strong potential for wider educational use and commercialization.

***Keywords*:** active learning, classroom innovation, educational board game, peer assessment

1. INTRODUCTION

Traditional teaching methods often struggle to engage primary and lower secondary students who thrive on interactive learning (Prince, 2004). The Triple "A" Study Game Board addresses this by transforming Snakes and Ladders into an educational board game that integrates Malaysian Form 1-3 curriculum content with proven gamification principles (Kapp, 2012). Players navigate a color-coded board of Red (Science), Blue (Mathematics), Green (History), and Yellow (Geography) where answering subject-specific questions determines progression rather than chance alone (Landers, 2014). This classroom innovation promotes active learning through repetition, critical thinking, and peer assessment, proving particularly effective for average-performing students (Hamari et al., 2014; Topping, 2009). Designed for versatile use in formal lessons, home revision, or group study, its modular structure allows educators to customize content across subjects and difficulty levels, creating inclusive learning environments aligned with Malaysia's educational priorities.

2. METHODOLOGY

The development of the Triple "A" Study Game Board follows a structured approach that integrates formal game design principles with clear educational objectives. The project was executed through an iterative process involving four primary stages: conceptualization, content design, pilot testing, and refinement (Gee,2003; Kapp, 2012). This methodology emphasizes creating an immersive learning experience that not only enhances student motivation but also fosters deep cognitive engagement through targeted, curriculum-aligned academic content (Hamari et al., 2014).

2.1 Game Design and Structure

The game board is an adaptation of the traditional "Snakes and Ladders" layout, re-engineered as a dynamic educational tool. The board features a grid with interactive elements and color-coded squares, each corresponding to a specific academic domain: Red (Science), Blue (Mathematics), Green (History), and Yellow (Geography). The design utilizes an instructional course design framework, ensuring that learning outcomes are tightly coupled with gameplay activities to maintain pedagogical integrity (Plass et al., 2015; Sailer & Homner, 2020). Players navigate the board using tokens and dice; upon landing on a colored square, they must respond to a question from a corresponding deck. This mechanism necessitates active information processing, which has been shown to significantly increase retention compared to passive learning methods (Landers, 2014).

2.2 Gameplay Mechanics and Peer Assessment

The mechanics of the game are specifically crafted to facilitate collaborative learning and immediate feedback loops. Responses are recorded on mini-whiteboards or worksheets and subsequently verified by other players. This peer assessment strategy reduces the immediate cognitive load on the instructor and empowers students to develop critical evaluative skills by reviewing and discussing their peers' work (Topping, 2009; Van Zundert et al., 2010). By engaging in these interactive discussions, students reinforce their own understanding through social construction of knowledge, transforming the act of "playing" into a rigorous exercise of active learning (Prince, 2004; Slavin, 1996). The game proceeds until a winner reaches the final square, providing a structured yet engaging environment for repeated exposure to curriculum-based questions.

2.3 Sustainability and Design Adaptability

The Triple "A" Study Game Board is built upon the principle of modularity to ensure both long-term sustainability and cost-effectiveness (Bakker, 2019; Evans et al., 2017). A modular design allows educators to easily update, expand, or customize question decks to suit various subjects, topics, or academic levels without requiring physical modifications to the core board (Bakker, 2019). This flexibility renders the game highly adaptable for diverse educational settings, ranging from formal classroom environments to informal, home-based revision sessions. By promoting the reuse of components and reducing the need for disposable teaching materials, this innovation supports sustainable educational practices and ensures continuous student engagement across different developmental stages (Evans et al., 2017).

3. FINDINGS

Initial classroom trials of the Triple "A" Study Game Board demonstrated promising outcomes in student engagement, motivation, and peer collaboration. Findings indicated that players showed increased enthusiasm for learning activities, with many expressing higher levels of enjoyment compared to conventional teaching methods. As agreed by Sailer & Homner (2020), gamification significantly enhances motivational learning outcomes. The interactive and competitive nature of the game contributed to greater participation, especially among students who are typically less responsive in traditional classroom settings. Similar to findings by Sailer & Homner (2020), the competitive mechanics produced measurable improvements in behavioural learning outcomes, particularly when combining competition with collaboration. Observations revealed that the color-coded categorization of questions facilitated focused learning, reinforcing content through repetition and contextual application (Hamari et al., 2014). Furthermore, the peer-checking mechanism fostered a sense of accountability and mutual support, enhancing critical thinking and communication skills. This corroborates Sailer & Homner's (2020) findings that social interaction elements within gamification significantly moderate behavioural learning gains. Teachers reported that the game was seamlessly integrated into lesson plans, serving as an effective formative assessment tool to gauge students' understanding in a stress-free environment (Landers, 2014). As evidenced by similar implementations (Plass et al., 2015), such interactive workflows provide superior real-time feedback compared to traditional methods.

4. CONCLUSION

The Triple "A" Study Game Board represents a successful adaptation of traditional Snakes and Ladders into a powerful educational board game that addresses key challenges in student engagement and motivation. Through its structured methodology combining curriculum-aligned content, color-coded question categories, and peer assessment mechanics, the game has demonstrated measurable improvements in active learning, critical thinking, and collaborative skills among primary and lower secondary students.

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