

Proceeding of International University Carnival on E-Learning



INTERNATIONAL UNIVERSITY CARNIVAL ON E-LEARNING

*“ Embracing AI for
Innovative Learning and
Inclusive Education ”*

Chief Editor
Loh Ser Lee

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Nur Zareen Zulkarnain
Safiza Suhana Kamal Baharin
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Preface

We are pleased to present the e-Proceedings of the International University Carnival on E-Learning 2025 (IUCEL2025), organised by the Centre for Open and Distance Learning (CODL), Universiti Teknikal Malaysia Melaka (UTeM), in collaboration with the Ministry of Higher Education Malaysia (MoHE). The event was supported by the Department of Higher Education, MoHE, and the Public University e-Learning Council (MEIPTA).

Held on 13 November 2025, IUCEL2025 brought together 196 e-learning innovators from 26 institutions. All presenters were invited to submit extended abstracts in August 2025. After a thorough evaluation and peer-review process completed in September 2025, a total of 160 articles were accepted for inclusion in this publication. The papers compiled here represent diverse perspectives and practices aligned with the event's theme, *“Embracing AI for Innovative Learning and Inclusive Education.”*

We extend our sincere appreciation to all authors for their valuable contributions, as well as to the panel of reviewers for their time and expertise. Special acknowledgement is also extended to the Patron of IUCEL2025, Professor Datuk Ts. Dr. Massila binti Kamalrudin, and Chairman, Professor Ir. Dr. Gan Chin Kim, for their leadership and guidance throughout the preparation of this event.

We also express our heartfelt gratitude to the CODL and UTeM team members whose dedication made this publication possible. We hope that the research and ideas presented in this e-proceedings will serve as a meaningful reference for educators, researchers, and practitioners committed to advancing e-learning innovation.

Editors

IUCEL2025 E-Proceedings

Foreword

As Patron of the International University Carnival on E-Learning 2025 (IUCEL2025), I am pleased to present this e-proceedings, which reflects Universiti Teknikal Malaysia Melaka's (UTeM) continued commitment to advancing innovation in digital learning. In collaboration with the Ministry of Higher Education Malaysia (MoHE), IUCEL2025 stands as a testament to our aspiration to nurture a progressive and inclusive educational ecosystem enriched by emerging technologies.

The theme, "*Embracing AI for Innovative Learning and Inclusive Education*," captures the spirit of transformation shaping higher education today. Artificial intelligence, when applied thoughtfully, has the capacity to broaden access, personalise learning experiences, and strengthen teaching effectiveness across diverse disciplines. IUCEL2025 offered a valuable avenue for educators, researchers, and practitioners to reflect on these opportunities and share meaningful insights that will guide the future of e-learning in Malaysia and beyond.

I would like to express my appreciation to all contributors who have shared their work in this publication. My gratitude also goes to the organising committee members, especially those from Centre for Open and Distance Learning (CODL), for their dedication in ensuring the success of IUCEL2025.

I hope that this e-proceedings will serve as a useful resource and inspire continued exploration, collaboration, and innovation in the pursuit of excellence in teaching and learning.

PROFESSOR DATUK TS. DR. MASSILA BINTI KAMALRUDIN

Vice-Chancellor

Universiti Teknikal Malaysia Melaka (UTeM)

Patron, IUCEL2025



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INTEGRATING ARTIFICIAL INTELLIGENCE IN ASSESSING CHILDREN'S AWARENESS OF ENVIRONMENTAL ISSUES THROUGH E-DIGITAL GAMES

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Abstract

Sustainable development is a global priority, requiring future generations to adopt responsible practices that safeguard the environment. In Sarawak, persistent issues such as river and sea pollution, poor waste management, and community cleanliness continue to threaten both biodiversity and human well-being. This highlights the need for innovative educational approaches that promote environmental awareness, particularly among primary school children. The objective of this research is to assess children's awareness of environmental issues through an Artificial Intelligence (AI)-enhanced e-digital game, while simultaneously fulfilling the Construction Sustainability course learning outcome at Universiti Malaysia Sarawak (UNIMAS). The course emphasizes understanding the elements, benefits, constraints, and future directions of sustainable construction projects, making this assessment a practical teaching and learning method. The study adopted a qualitative methodology, combining game-based learning with AI-assisted observation and analysis. Primary school children participated in interactive digital games designed around pollution and environmental care. Their decision-making and behavioral patterns were observed, and AI tools such as ChatGPT were employed to generate insights on awareness levels. Undergraduate students engaged in evaluating the data, linking the findings to sustainability elements relevant to construction practices. The results show that e-digital games significantly enhanced children's engagement and improved their environmental awareness. AI integration provided meaningful assessment feedback, while students demonstrated deeper comprehension of sustainability dimensions, including environmental preservation, cost efficiency, and the challenges of limited resources and stakeholder involvement. In conclusion, this study highlights the dual benefit of using AI-based digital games to cultivate early environmental awareness and strengthen experiential learning for construction sustainability education.

Keywords: Artificial Intelligence (AI), Digital Game-Based Learning, Environmental Awareness, Primary School Children, Sustainable Development

BACKGROUND OF THE RESEARCH / INNOVATION / INVENTION / DESIGN

Sustainable development is a critical global priority that requires integrating environmental consciousness into the education system to prepare future generations for responsible decision-making. Environmental degradation, including deforestation, river and sea pollution, loss of biodiversity, and unsustainable resource use, continues to pose serious challenges in Malaysia, particularly in Sarawak (Zaini et al., 2022). While environmental education has been introduced in formal curricula, evidence shows that conventional teaching methods often fail to capture the interest of young learners or produce measurable behavioral change (ScienceDirect Study, 2020).

Children, as primary stakeholders in sustainability education, require innovative and engaging methods that combine learning with interactive experiences. Digital game-based learning (DGBL) has emerged as a promising pedagogical tool, offering immersive experiences that enhance knowledge retention and promote sustainable behavior (Janakiraman et al., 2023). Integrating Artificial Intelligence (AI) into these digital platforms further strengthens learning by personalizing the experience, analyzing responses, and providing real-time feedback (Arif et al., 2025).

In addition, embedding this research into higher education, specifically the Construction Sustainability course at Universiti Malaysia Sarawak (UNIMAS), ensures alignment with course learning outcomes (CLOs). Students are expected to analyze the elements, benefits, constraints, and way forward of sustainable construction projects. The dual-purpose design of this research serves both as a pedagogical innovation and a tool for environmental assessment, bridging theory, practical application, and community engagement.

DESCRIPTION OF THE RESEARCH / INNOVATION / INVENTION / DESIGN

The innovation consists of an AI-enhanced e-digital game designed to teach environmental concepts while assessing primary school children's awareness. The game includes scenarios such as waste disposal, river pollution, biodiversity conservation, and sustainable practices in daily life. Players are required to make decisions in these scenarios, which are tracked and analyzed by AI algorithms to assess knowledge comprehension, critical thinking, and decision-making patterns.

The design follows the Game Development Life Cycle (GDLC) methodology, ensuring systematic phases of conceptualization, storyboarding, prototyping, testing, and refinement (Nurul Huda & Ramadhan, 2021). The AI component not only evaluates responses but also adapts the difficulty and complexity of scenarios based on player performance, creating a personalized learning path for each child.

A mixed-methods research approach was employed. Quantitative data were collected through pre- and post-game surveys measuring knowledge, attitudes, and intended behavior toward environmental issues. Qualitative insights were derived from observation, focus group discussions, and AI-generated reports on children's decision-making patterns. University students enrolled in the Construction Sustainability course actively participated in analyzing these findings, linking them to course objectives, and reflecting on the broader implications for sustainable construction practices.

SIGNIFICANCE OF THE RESEARCH / INNOVATION / INVENTION / DESIGN

This research is significant for several reasons:

1. Educational Innovation: Integrates AI with digital game-based learning to enhance engagement, retention, and understanding among young learners.

2. Sustainability Awareness: Cultivates environmental consciousness in children, empowering them to act responsibly in their daily lives.
3. Experiential Learning for Higher Education: Allows university students to analyze real-world sustainability interventions, meeting CLOs in sustainable construction courses.
4. Data-Driven Assessment: AI provides measurable feedback on learning outcomes, which is rare in traditional environmental education programs.

By combining technology, pedagogy, and sustainability, the research exemplifies how interdisciplinary approaches can advance both education and community well-being.

IMPACT OF THE INNOVATION/INVENTION/DESIGN TOWARDS EDUCATION OR COMMUNITY

The impact of the project extends across both the educational landscape and the local community. In education, the integration of AI in digital game-based learning enhances teaching and assessment strategies. University students experience sustainability learning in an applied manner, while primary school children develop knowledge and awareness through interactive play.

In the community, the innovation fosters a culture of environmental responsibility among young learners, encouraging them to influence their families and peers. By addressing pollution, waste management, and biodiversity issues through accessible tools, the project contributes directly to local and regional sustainability goals.

Furthermore, the initiative aligns with national and regional agendas such as the Sarawak Digital Economy Blueprint 2030 and the Rural Development Policy (DPLB), which emphasize the integration of digital technology and sustainable practices in development.

COMMERCIALIZATION POTENTIAL

The AI-driven digital game holds strong commercialization potential as an educational technology product. It can be adopted by primary and secondary schools, non-governmental organizations, and government agencies for environmental education campaigns. Beyond schools, the tool can be customized for corporate social responsibility (CSR) initiatives or integrated into digital learning platforms.

The AI-based analytics component makes the innovation highly attractive for stakeholders, as it provides measurable outcomes of learning interventions. This unique feature differentiates the product from conventional educational games, giving it a competitive advantage in the growing EdTech and sustainability markets. With proper investment, the tool could be scaled nationally and internationally, creating opportunities for cross-border educational collaboration.

CONCLUSION

In conclusion, this research highlights the potential of integrating AI and digital games to both assess and promote children's awareness of environmental issues, while simultaneously enriching the sustainability curriculum in higher education. The project contributes to knowledge advancement, practical skill development, and community empowerment, making it a holistic educational innovation. By embedding sustainability concepts into engaging digital experiences, the project not only supports the development of environmentally conscious future generations but also strengthens the role of higher education in addressing global sustainability challenges. With its clear impact, scalability, and commercialization potential, this innovation represents a meaningful step forward in uniting technology, education, and sustainability.

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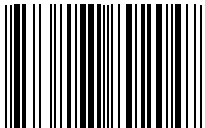
***“ Embracing AI for
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