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Proceeding of

International University Carnival on E-Learning

IUCEL2025

INTERNATIONAL UNIVERSITY CARNIVAL ON E-LEARNING

" Embracing AI for Innovative Learning and Inclusive Education "

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ENTOMANIA

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Abstract
Entomology, the study of insects, often poses a challenge in learning due to traditional, passive educational methods. This challenge is addressed by developing ENTOMANIA, an innovative card game designed to make learning insects interactive, strategic, and fun. ENTOMANIA is a portable, field-friendly game, making it accessible anywhere, in classrooms and even outdoors. It features local Malaysian insect species, colour-coded by taxonomic order, with interesting facts on the cards and engaging gameplay mechanics that teach through competition and discovery. A survey conducted among players of ENTOMANIA showed overwhelmingly positive feedback, confirming its effectiveness in enhancing knowledge and developing interest in insects. By transforming entomology education into a fun and social experience, ENTOMANIA bridges the gap between scientific content and public engagement, fostering a deeper appreciation for biodiversity and supporting the Sustainable Development Goals (SDGs) 4 (Quality Education) and 15 (Life on Land).

Keywords: Educational card game, entomology, game-based learning, biodiversity conservation, STEM education, Malaysia.

BACKGROUND OF THE RESEARCH / INNOVATION / INVENTION / DESIGN

Insects represent over 80% of all known animal species and play a critical role in maintaining healthy ecosystems (Hailay Gebremariam, 2024). However, public awareness of their importance remains low, creating a significant challenge for conservation efforts (Kaur et al., 2024). A major factor contributing to this gap is the traditional educational method, which nowadays struggles to motivate students and encourage curiosity in complex subjects such as entomology (Lampert et al., 2024). Entomology is a branch of zoology that studies insects and how they interact with their environment, other species and humans (Wigglesworth, 2025). Research consistently shows that interactive, experiential methods lead to higher knowledge retention and engagement (Chad, 2025; Kamran et al., 2023). With the rise of educational technology, artificial intelligence (AI) offers new opportunities to make entomology more accessible by enabling personalised learning, gamified and interactive experiences (Kassenkhan, 2025). Despite this proven potential, a clear gap exists in tools that effectively integrate scientific knowledge with competitive gameplay, especially in the field of entomology. ENTOMANIA addresses this by integrating entomological knowledge with engaging, strategic gameplay in a portable card format, featuring Malaysia's local biodiversity.

DESCRIPTION OF THE RESEARCH / INNOVATION / INVENTION / DESIGN

The name ENTOMANIA comes from ento- (derived from 'entomon,' the Greek word for insect)

and -mania (meaning enthusiasm or obsession). Together, it reflects a strong passion for insects. ENTOMANIA is a fast-paced, strategic card game for 2 - 6 players. The objective is to collect complete sets of insect cards, each colour-coded by taxonomic order (e.g., Coleoptera, Lepidoptera) (Figure 1). The deck includes Species Cards: species, their order, and a fascinating fact about the insect; Action Cards: enable strategic moves (e.g., "Bugged deal" to swap cards, "Morphin'" time to draw two extra cards); and Egg Cards: in-game currency to protect insect collections.

Players use strategy and action cards to collect sets, disrupt opponents, and protect their own insect collections. Designed for portability and durability, ideal for many settings, including classrooms and in the field. Learning occurs organically through gameplay, turning complex science into an engaging and memorable experience. To further enhance learning, ENTOMANIA embraces artificial intelligence through NFC-enabled species cards, where players can tap their cards to access AI-generated educational videos, bringing each insect to life beyond the tabletop.

ENTOMANIA is registered under the Intellectual Property Corporation of Malaysia (MyIPO) copyright, registration number CRAR2025Q07367.

SIGNIFICANCE OF THE RESEARCH / INNOVATION / INVENTION / DESIGN

ENTOMANIA transform entomology education into an engaging, strategy-based experience, effectively replacing passive learning with interactive gameplay that can significantly improve knowledge retention. Additionally, by featuring local Malaysian species, it fosters appreciation for regional biodiversity and highlights the country's status as a global biodiversity hotspot, thereby raising conservation awareness. This approach aligns with and supports the Sustainable Development Goals 4 (Quality Education) and 15 (Life on Land).

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

ENTOMANIA significantly boosts public and student engagement in STEM by transforming complex entomological concepts into an immersive, enjoyable learning experience (Figure 2). Through strategic gameplay, it promotes critical thinking, strategy, collaboration, and deeper cognitive retention of scientific content. Most importantly, the game raises awareness on insect biodiversity, instilling a sense of pride and responsibility for native species.

ENTOMANIA was awarded the Gold Prize and Best Award under the Sustainable Ecosystems and Biodiversity Cluster at the Festival of Ideas - 2nd Natural Science and Technology Conference (NaSTeC) 2025 on 10th - 11th September 2025. Additionally, ENTOMANIA was exhibited at the Postgraduate Open Day FRST, UNIMAS on 29th October 2024 and Sarawak Career & Training (SCaT) Fair 2025 on 5th July 2025 (Figure 3).

COMMERCIALIZATION POTENTIAL

1. Educational Sector: A direct tool for schools, universities, and educational centres to meet STEM and biology curriculum needs.
2. Eco-Tourism & Retail: Ideal for gift shops at national parks and zoos, appealing to tourists and families seeking educational games.
3. Versatility: The core game system allows for limitless expansion packs (such as “Insects of Borneo"), creating a recurring revenue model and long-term product lifecycle.
4. International Scalability: The gameplay is scalable through region-specific editions featuring local insect fauna, making it relevant and marketable in any country.

CONCLUSION

ENTOMANIA makes learning fun and educational by turning science into an engaging card game. This game can foster appreciation towards insects, especially Malaysia's native insect species, increasing entomological knowledge as well as conservation awareness. This innovation is a step toward making entomology education engaging and meaningful for all.

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Figure 1: Implementation of ENTOMANIA

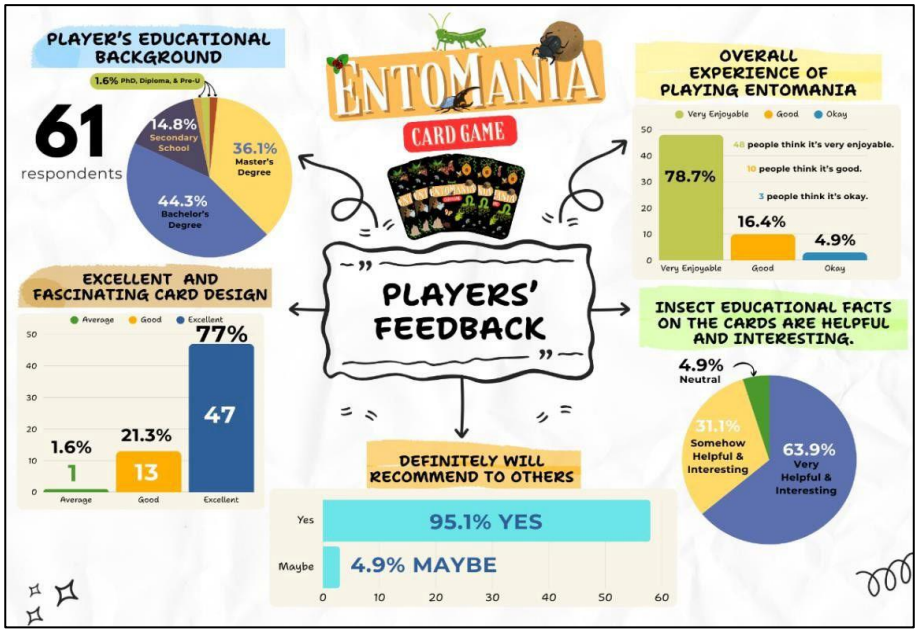

Figure 2: Summary of feedback for ENTOMANIA

Figure 3: Our participation in innovation competition, exhibitions, expeditions and casual play with friends

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