4th Global Conference on Innovations in Education
20-22 February 2026 London, United Kingdom

ChatGPT-Enhanced Educational Board Game: Evaluating Learning Effectiveness and Human-AI Interaction in Elementary Entomology

Su-Ju Lu[1], Yu-Lien Chen[1], Nien-Chiu Lin[1] and Ying-Chieh Liu[2, 3, *]

[1]*Department of Digital Technology Design, National Taipei University of Education, Taipei, Taiwan*
[2]*Department of Industrial Design, College of Management, Chang Gung University, Taoyuan, Taiwan*
[3]*Internal Medicine, Chang Gung Memorial Hospital, Taoyuan, Taiwan*
*Corresponding author

Abstract

With the rapid advancement of artificial intelligence (AI), educational tools and instructional methodologies increasingly overcome traditional limitations. Integrating AI into educational board games creates interactive human–AI learning environments with the potential to promote adaptive learning experiences. However, empirical evidence remains limited on whether AI assistance effectively enhances motivation and learning outcomes. This study developed an AI chatbot integrated into a board game created by our team, specifically designed to enhance elementary students' domain knowledge of insect ecology and conservation. The chatbot, implemented using ChatGPT 4.0, guided players through three interaction phases—Description, Judgement, and Scoring—via text or voice. We aimed to foster autonomous learning behaviors and evaluate impacts on motivation and achievement. A one-group pretest–posttest experimental design was employed, using knowledge assessments and the ARCS (Attention, Relevance, Confidence, Satisfaction) motivation scale to measure gains among fourth- and fifth-grade students. Forty-seven students participated in a 160-minute session, with each grade group playing under identical AI-enhanced conditions. Both grades demonstrated significant learning gains, with fourth graders showing the largest improvement. Pre- and post-intervention ARCS scores also rose significantly across both age groups, indicating that the AI chatbot effectively boosted learning motivation. Our AI-enhanced board game shows promise for improving learning outcomes and motivation among elementary students. The quality of human–AI interaction may depend on factors such as language comprehension and gameplay fluency. Future designs will refine age-appropriate interactions—adding graphical prompts and simplifying question phrasing—to enhance fluency and immersion in AI-enhanced learning environments.

Keywords: Boardgame-based learning, ChatGPT-assisted learning, Human–AI interaction, Artificial intelligence in education, Elementary entomology