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INNOVATING TRoW AS WORKFORCE GAME-BASED LEARNING FOR SUSTAINABLE EDUCATION

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ABSTRACT

Tactic Rush Workforce (TRoW) is a board game developed to simulate real-world human resource (HR) challenges and sustainable education in higher education. As a physical and interactive educational learning tool, TRoW engages students in workplace scenarios that require them to manage key HR functions, including recruitment, skill matching, workforce development, compensation planning, and strategic decision-making. The game employs experiential learning to help students explore essential HR practices and understand current labor market trends. Unlike digital simulations, TRoW is expected to encourage active, in-person participation, fostering collaboration, critical thinking, communication, and competencies vital to academic success and career readiness. Its design enhances both cognitive and social engagement, prompting students to reflect on policies, sustainability goals, and long-term planning in workforce management. This idea generation aligns with sustainable education principles by requiring players to consider the environmental, social, and economic implications of their decisions. This integration supports the development of well-rounded, future-ready skills consistent with the United Nations Sustainable Development Goals (SDGs). By combining game-based learning with strategic thinking and sustainability awareness, TRoW is introduced as a potential educational tool. It will prepare students not only for employment but also for responsible decision-making in complex, real-world contexts. This paper explores the game's design and potential to cultivate workforce competencies for various jobs available in different industries.

Keywords: Workforce, Human Resource, Board game, Sustainable education, Higher education

INTRODUCTION

Game-based learning (GBL) has shown sustained value in higher education as both a means of delivering course content and a platform for developing sustainability literacy, collaboration, systems thinking, and autonomous, reflective participation. Research in sustainability-focused contexts demonstrates that incorporating varied GBL elements such as sensory cues, rewards, game choice, and storytelling enhances the effectiveness of experiential learning, with both digital and non-digital board games improving students' knowledge and attitudes toward sustainability while leveraging the benefits of physical interaction to achieve course-level objectives (Waite et al., 2024; Ho et al., 2022). Beyond sustainability, digital GBL has proven effective in disciplines such as biochemistry and physiology, where it creates low-stress environments for reinforcing concepts, correcting misconceptions, and promoting self-assessment, thereby increasing motivation and deepening engagement even without direct links to exam performance (Tejada-Simon, 2024). Comparable outcomes have been reported in nursing education, where both digital and non-digital GBL support knowledge acquisition, skills development, and critical thinking (Nylén-Eriksen et al., 2025; Anwer & Abdullah, 2023). Non-digital games, in particular, provide flexible, screen-free opportunities for creativity, problem-solving, and collaborative dialogue, often surpassing screen-based alternatives in facilitating deeper cognitive processing (Debrenti, 2024; Ness et al., 2024). These approaches have also been associated with improved academic performance (Masich et al., 2025), highlighting their capacity to remove digital barriers, reduce screen fatigue, and remain adaptable across diverse instructional contexts and learning environments.

METHODS

This study adopted a qualitative approach that involved information search using academic databases accessible through Google Scholar and the university's digital library portal, including Scopus. The search was guided by keywords "game-based learning" or "game-based learning" on 13 July 2025. The Scopus database was selected as a primary source of academic literature for this study due to its comprehensive coverage, interdisciplinary scope, and rigorous indexing standards. However, only articles published between 2019 and 2025 were included to ensure recency and relevance to the evolving pedagogical landscape. The string used was TITLE-ABS-KEY ("game based learning" OR "Game-based Learning") AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (PUBSTAGE , "final")) AND (LIMIT-TO (EXACTKEYWORD , "Game-based Learning")) AND (LIMIT-TO (SRCTYPE , "j")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2022) OR LIMIT-TO (PUBYEAR , 2023) OR LIMIT-TO (PUBYEAR , 2024) OR LIMIT-TO (PUBYEAR , 2025)) Specifically, Scopus enables access to high-impact, peer-reviewed publications that align with the pedagogical, psychological, and technical dimensions of non-digital educational game design. This method enabled the grounding of TRoW in both pedagogical theory and evidence-based practice, ensuring its relevance as a teaching tool for the human resource management course.

RESULTS AND DISCUSSION

The following figure provides a quantitative overview of how GBL research is spread across various academic disciplines, revealing the interdisciplinary nature and growing relevance of this pedagogical approach.

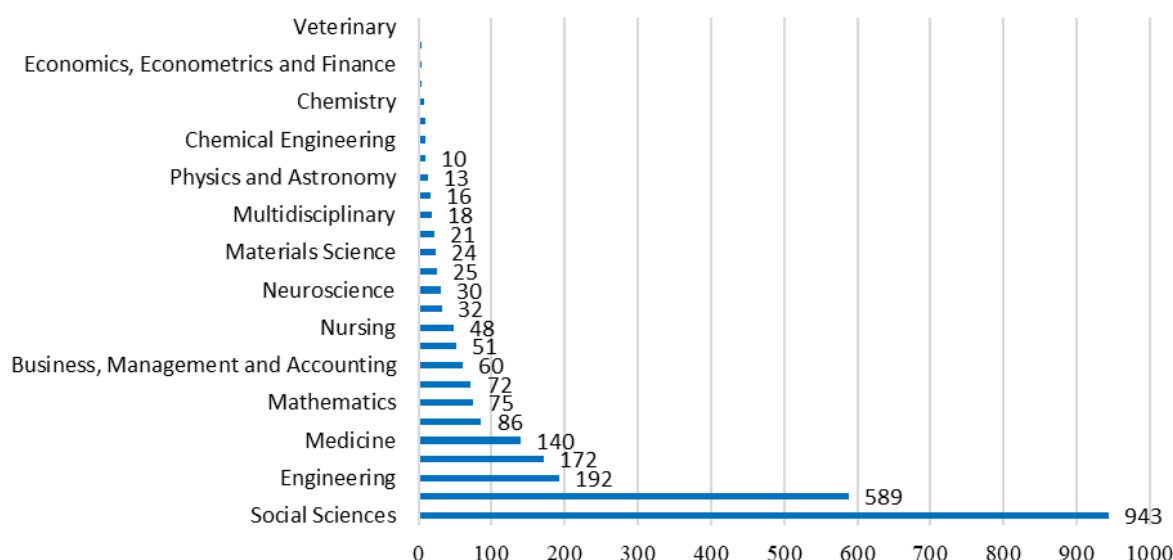


Figure 1.: Articles by subject area

Figure 1 illustrates the distribution of 1384 articles on game-based learning (GBL) indexed in the Scopus database, categorised by subject area from 2019 until 2025, for more than 100 articles recorded for every year. Social Sciences dominate the landscape, accounting for 943 articles, or approximately 68% of the total. This underscores the centrality of GBL in pedagogical research, learning theory, and educational innovation. The relatively low representation of business, management, and accounting with 60 articles suggests a significant gap in non-digital GBL research for workforce education and human resource development. TRoW, as a physical game aligned with sustainability and SDG outcomes, is well-positioned to contribute meaningfully to this underrepresented area. Its integration of decision-making, ethical dilemmas, and multi-goal sustainability makes it both timely and pedagogically valuable.

Effective educational game design requires a balance between narrative immersion, meaningful gameplay, and cognitive clarity. Ho et al. (2022) designed a physical and digital board game simulating global sustainability scenarios. Their study found both formats improved students' knowledge and attitudes towards sustainability, but physical games uniquely fostered peer dialogue and tactile learning. In addition, Whitney (2024) emphasized that physical, game-based activities allow learners to embody abstract concepts, leading to long-lasting cognitive imprints. In the case of Tactic Rush Workforce (TRoW), tactile elements like dilemma and scenario cards, rewards, and a modular board layout help simulate actual human resources (HR) functions such as human resources planning, performance

management, compensation strategies, and sustainability reporting, thereby reinforcing real-world applicability.

Moreover, this approach aligns strongly with Kolb's (1984) experiential learning theory (ELT), which provides a scientifically grounded framework that explains why physical board games a powerful pedagogical tool are. By aligning with each stage of Kolb's cycle consisting of experience, reflection, conceptualization, and experimentation, it is believed that board games transform passive learning into dynamic, adaptive, and socially enriched experiences. This not only enhances knowledge retention but also fosters higher-order thinking and real-world readiness. A recent study by Yaman et al. (2025) offers a systematic literature review on game-based learning (GBL), affirming the value of analogue tools like board games in enhancing engagement, collaboration, and conceptual learning through active, experience-based methods.

TRoW embraces these pedagogical advantages by encouraging active decision-making, team negotiation, and iterative learning cycles, helping students internalize complex HR scenarios and sustainable decision-making principles in a meaningful, memorable way. In addition, colour selection in educational board games plays a critical role in shaping cognitive engagement and emotional resonance, particularly in context-rich subjects like human resource (HR) management. Drawing on experiential learning theory by Kolb (1984), the integration of colours such as blue, green, orange, and grey in board game design supports distinct learning functions. Blue fosters trust and enhance creative, relational problem-solving as the key to HR ethics and leadership as mentioned by Mehta and Zhu (2009), while green, symbolizing balance and growth, has been shown to activate fairness and ethical judgment in learning environments. Orange stimulates collaboration and active engagement, ideal for simulating negotiation and recruitment strategies by Elliot and Maier (2014) while grey, serving as a neutral anchor, delineates rule-based zones and reduces cognitive load, thereby aiding in visual segmentation and clarity by Plass et al. (2015). In comparison, earlier board games like Career Racing by Soesilo et al. (2025) employed vibrant color palettes to sustain motivation but lacked conceptual alignment between color and content, leading to limited reflective engagement. The TRoW board game, by contrast, applies color psychology deliberately to reinforce learning outcomes: blue is used in leadership zones, green in growth scenarios like training and development, orange for team-based tasks, and grey for policy-related decisions. This deliberate alignment mirrors color-coded by Yaman et al. (2025) that thematically structured game environments align visual cues with pedagogical objectives, which supports efficient navigation of complex decision spaces and improves both knowledge retention and problem-solving accuracy. Hence, compared to earlier models that prioritized aesthetic appeal, this design demonstrates that a functionally integrated color scheme can support both emotional and cognitive learning goals in a measurable and sustainable way.

CONCLUSION

This study suggests the pedagogical efficacy of game-based learning (GBL), particularly non-digital board games, in enhancing student engagement, skill development, and sustainability-oriented thinking within higher education. Through the lens of experiential learning, the idea generation of Tactic Rush

Workforce (TroW) board game embodies core educational principles such as active participation, reflective learning, and real-world application by integrating physical game mechanics with human resource management (HRM) content. The deliberate use of color psychology, tactile elements, and scenario-based gameplay not only supports cognitive processing and emotional engagement but also mirrors professional HR practices in areas such as decision-making, planning, and ethics. TroW's alignment between design and learning outcomes offers a more robust and transformative educational experience. This is particularly significant given the underrepresentation of GBL in business and HR contexts, as revealed in the Scopus review. By addressing this gap, TroW contributes both to academic discourse and to practical instructional strategies for future-ready HR education. The findings reinforce that non-digital GBL, grounded in theory and evidence-based design, can serve as a powerful tool for fostering collaborative learning, systems thinking, and long-term knowledge retention across diverse higher education disciplines.

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