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Linking Business Games to Business and Entrepreneurship Education: Insights from a Bibliometric and Literature Review

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Abstract

Business games seem like a sustainable solution to business and entrepreneurship education. Still, knowledge on the topic is so dispersed that educators lack a clear understanding of the conceptual path linking business games to business and entrepreneurship education. This article proposed to synthesize academic literature on business games. It analyzes bibliographic data from 733 documents from the Web of Science core collection published over the past 65 years. The results provide rich content on the main knowledge clusters in business game research, the key concepts driving each cluster, the relationships between them, emerging trends, and the seminal papers business scholars and practitioners could use to deepen their knowledge of each cluster. The results also led to a conceptual framework describing current research on business games in entrepreneurship education, identifying key research gaps, and proposing a research agenda that could help scholars make meaningful contributions to the entrepreneurship niche in business games research. Specifically, technology acceptance and experiential learning literature have laid the theoretical foundations for understanding the role of business games in business and entrepreneurial education. Research has mainly focused on higher-education students' entrepreneurial intentions and entrepreneurial self-efficacy as outcomes.

Keywords

Business Game, Bibliometric Analysis, Review, Entrepreneurship, Education

1. Introduction

The gig economy and digital transformation have led to the explosion of new business ventures and self-employment worldwide, explaining why business and entrepreneurship education are among the fastest-growing subject areas in the world (Kuratko, 2005; Ratten & Usmanij, 2021). They have become an integral part of several national higher education policies as an instrument for embedding an innovation culture in society (Pittaway & Cope, 2007; von Graevenitz et al., 2010; Wei et al., 2019). They have also become a component of many business and engineering school programmes to foster the creation of successful businesses upon graduation (Krajger et al., 2021; Wolfe, 2016).

However, the extant literature highlights that the systematization, content, and method of teaching business and entrepreneurship remain a longstanding challenge (Uetake et al., 2020; Xinaris et al., 2011). The COVID-19 pandemic has accentuated this challenge since it forced educators to divert to online instruction, which removes the practicality of traditional business and entrepreneurship courses. Many higher education institutions were bound to rethink their teaching approach. This phenomenon has led to several calls for research on effectively supporting business and entrepreneurship education during crises (Liguori & Winkler, 2020; Ratten & Jones, 2021).

In response to such crises-augmented pedagogical needs, one approach to sustaining quality business and entrepreneurship education is through digital business games. Digital business games (henceforth called business games for simplicity) are digital interactive learning tools designed to simulate a business environment in which learners' business skills (hard/soft) can be trained or evaluated (Greco et al., 2013; Liu et al., 2022). They are said to be highly effective for entrepreneurship education as they are renowned for providing students with experience-based learning opportunities needed to succeed in real-world business environments (Diachkova et al., 2020; Gresch & Rawls, 2017). Students increasingly prefer this learning approach because it is a fun yet profound way to better assimilate learned concepts and foretaste what to expect in the real world.

Despite these benefits, research on business games remains very dispersed due to their extensive use across business disciplines. Each business course can be the focus of a business game (see **Appendix A1**). Such dispersion limits the ability of scholars to have a clear general understanding of business game research and how it can support business and entrepreneurship education. Thus, knowledge of business games needs to (Buil et al., 2019; Hernández-Lara et al., 2018) be synthesized for scholars and practitioners worldwide to understand and make novel, meaningful contributions relevant to the systematization, content, and method of teaching entrepreneurship through this tool in this new digital era increasingly characterized by online education and distance learning (Bell & Bell, 2020; Ndofirepi, 2020).

Given this background, this study's objective is to synthesize the knowledge

structure and emerging trends in business game research and to inform business and entrepreneurship education scholars and practitioners about the evolution of the research area and the potential role of business games in enhancing entrepreneurship education in today's world. To this end, the following questions guide our research efforts:

1) What is the knowledge structure of business games research?

2) What are the known effects of business games on business and entrepreneurship education?

This study contributes to the objective discovery of the knowledge structure and emerging trends in business game research for business and entrepreneurship education through these research questions. It also reveals the known factors that affect business games' abilities to enhance business and entrepreneurship education, thereby creating an evidence-based platform for new contributions to this increasingly important research area. The next section presents the methodology used in this study.

2. Methodology

A bibliometric approach was adopted, given the broad scope of business game research. Bibliometric analysis has proven highly effective and extensively used by business scholars to summarize large quantities of bibliometric data (over 500 documents) to reveal the state of the conceptualand intellectual structure, as well as the emerging trends in a research domain (Donthu et al., 2021; Mukherjee et al., 2022). This study uses the same approach to summarize and analyze bibliometric data on business game research. This study adopts the bibliometric analysis and best practice guidelines proposed by Donthu et al. (2021) because it has proven to be a very effective systematic approach to conducting bibliometric analysis and uses the logic of most bibliometric tools used in business research (Lim et al., 2022; Maucuer & Renaud, 2019; Renaud & Maucuer, 2018). The procedure has four steps (**Figure 1**).

The first step is to define the aims and scope of the bibliometric study. This bibliometric study aims to identify the emerging trends in business game research and the research area's conceptual and intellectual structure. The second step is to choose the techniques for bibliometric analysis. Following this study's objectives, we used bibliographic coupling, citation, co-citation, co-word, and co-authorship analysis techniques (see Donthu et al. (2021)) for detailed explanations of each technique). These analyses enabled us to identify foundational (citation analysis), past (co-citation analysis), present (bibliographic coupling), and future (co-word analysis) research themes that characterize the conceptual framework of business game research.

Step 3 involves collecting data for the bibliometric analysis (**Figure 2**).

Since the scope of this research is business games, we began this step by identifying relevant search terms. Following Donthu et al.'s (2021) recommendations, we obtained bibliometric data on business games from one appropriate

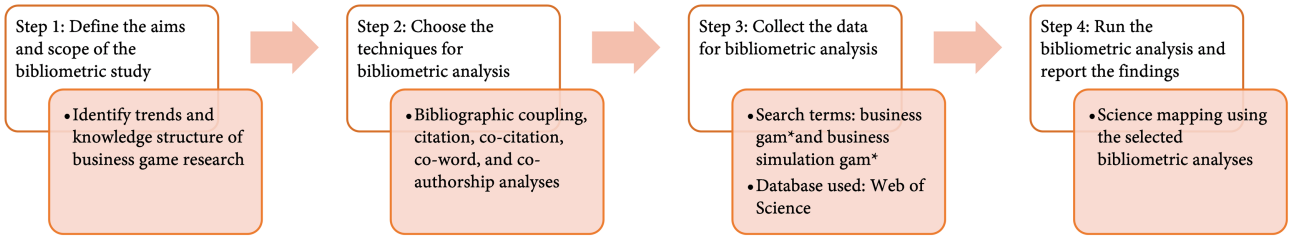

Figure 1. Research methodology (Source: Authors).

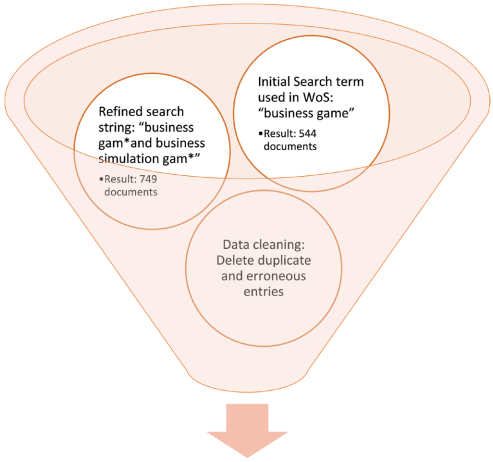

Figure 2. Data filtering process (Source: Authors).

database collection to remain consistent, mitigate the need for consolidation, and minimize risks of human error during data cleaning. Thus, we used data from the Web of Science (WoS) database collection for this study. Business scholars have extensively used WoS for bibliometric studies due to its broad scope of publication outlet coverage and rich collection of bibliometric information (Albort-Morant & Ribeiro-Soriano, 2016; Kent Baker et al., 2020; Rojas-Lamorena et al., 2022). Thus, we used *business games* and related keywords to search the WoS to identify relevant publications. This search resulted in 544 documents.

We extracted the keywords from the dataset using the bibliometrix R package (Aria & Cuccurullo, 2017). We brainstormed on the relevant synonyms to maintain, resulting in the following search terms: *business gam*and business simulation gam**. This new search string returned 749 documents on June 20, 2022. These documents' complete records and references were extracted and loaded in the bibliometrix R package used for bibliometric analysis. Bibliometrix was used to clean the data by deleting duplicate and erroneous entries, like cases when the same author was indexed differently. After the cleaning process, 733 documents were validated for analysis.

The fourth and final step involves running the bibliometric analysis and reporting the findings.

3. Results

3.1. Citation Analysis—Foundations of Business Game Research

Citation analysis shows that the article "The Relation between group cohesiveness and Performance: An Integration" by Mullen and Copper (Mullen & Copper, 1994) remains the most influential article in business game research, with over 768 citations. The next most influential article, with a difference of 455 citations, was published 13 years later in *MIS Quarterly* on the impact of knowledge coordination on virtual team performance over time (Kanawattanachai & Yoo, 2007). Among the articles with over 200 citations, two key topics are recurrent: the **cohesiveness-performance relationship** (Gully et al., 1995; Mullen & Copper, 1994) and **virtual teams** (Kanawattanachai & Yoo, 2002, 2007). The studies on cohesiveness-performance relationships adopt a metanalytic approach to understanding work group behavior. At the same time, those on virtual teams focus on workgroups that are temporary, geographically dispersed, and communicate electronically. The underlying concept uniting these four articles and other leading articles in business game research is ***team performance,*** as observed from the titles of the articles (**Appendix A2**). Furthermore, interest in team performance in business game research is transdisciplinary, judging from the diversity of the publication sources. This glaring observation suggests that an underlying objective of business games was to improve team performance in business environments.

Specific to the practice of business games, the most outstanding document is titled "What influences college students to continue using business simulation games? The Taiwan experience" (Tao et al., 2009) (**Appendix A3**). The article registered 123 citations globally and 27 citations locally by articles within the analyzed dataset. It explores the factors influencing business game continuance by higher education students. Indeed, one can observe that **college students** is a foundational theme in the research area, with foundational studies addressing topics like student competencies (Fitó-Bertran et al., 2014), values (Lin & Tu, 2012), and attitudes and intentions towards entrepreneurship (Zulfiqar et al., 2019). The other leading articles focus on learning environments and experiences with business games (Fitó-Bertran et al., 2015; Jensen, 2003; Lainema & Nurmi, 2006; Matute & Melero, 2016). These findings suggest that business game research strongly interests **college students, learning environments**, and **learning experiences**.

The most locally cited references (**Appendix A4**) revealed that the articles titled "Developments in Business Gaming: A Review of the Past 40 Years" (Faria et al., 2009) and "The Role of Management Games and Simulations in Education and Research" (Keys & Wolfe, 1990) are the leading references in business games. The former presents a brief history of business games, related technologies, and their adoption and use. Meanwhile, the latter reviews the role of business games in education and research.

3.2. Co-Citation Analysis—Past Focus of Business Game Research

Four thematic clusters form the knowledge foundations of the research area (Appendix A5-A8). Cluster 1 contains seminal papers on **business game fundamentals**. Thus, they address foundational topics like the **history, taxonomy, evolution, nature of business games**, and **experiential learning**. Business and entrepreneurship education scholars and practitioners could use these seminal papers to understand the basics of business game research and practice. Cluster 2 is a collection of seminal papers on **business games and learners**, and it primarily contains articles on **simulation game users**. This theme would interest business and entrepreneurship education scholars and practitioners seeking to understand the known **benefits, experiences, competencies, and consequences of business games on learners**.

Cluster 3 is a collection of leading publications that generally describe the **practical potential of business games in education and research**. The theme would interest business and entrepreneurship education scholars and practitioners interested in understanding the **role of business games in education and research**. Specifically, it would help business and entrepreneurship education scholars and practitioners better understand business games' history, value, current usage levels, misconceptions, and effectiveness **in education and research**. Cluster 4 is characterized by seminal papers that discuss the **impact and effectiveness of business games**. Business and entrepreneurship education scholars and practitioners reading these articles would better understand what is known about the effectiveness of business games, their impact on management decision-making and learning, and the factors influencing their use. Specifically, interested parties would understand how business game effectiveness and impacts affect business game adoption in higher education institutions and business organizations.

3.3. Bibliographic Coupling—Present-Day Focus of Business Game Research

Four thematic clusters characterize present-day research on business games (Appendix A9). Cluster 1 is like the third cluster generated during the co-citation analysis, as most articles in this cluster address the **practical potential of business games**. It implies that this theme is of continued relevance to the business game community. Cluster 2 addresses **business games in management education**, emphasizing **higher education institutions**. Meanwhile, cluster 3 addresses business games in management education from a **broad perspective**. This distinction between clusters 2 and 3 in this bibliographic coupling analysis indicates that business and entrepreneurship education scholars and practitioners pay particular attention to business games in higher education institutions and study this phenomenon as a specific management education case. Finally, cluster 4 is like the fourth cluster in the co-citation analysis part, discussing the **effectiveness and impact of business games**. However, it also includes several

articles on **business game design**. These clusters indicate that present-day research on business games focuses on their **practical applications, design, and effects on management education**.

3.4. Co-Word Analysis—Future of Business Game Research

Co-word analysis uses keywords as a proxy to analyze publication content to reveal growing and future relationships among topics in business game research. Co-occurrence network analysis reveals the six clusters of author keywords that often appear together (Appendix A10). Three focus on **learning (interactive, experiential, and active)**. Interactive learning is associated with case studies; experiential learning is associated with business notions like supply chain management, project management, and entrepreneurship education. Meanwhile, active learning is associated with decision-making. These associations suggest growing research on the links between learning mechanisms that can be leveraged through business games and concepts.

A fourth cluster associates **business games with performance, efficiency and artificial intelligence (AI).** This cluster is coherent with current trends as business scholars interested in AI and its applications are rising. A fifth cluster associates **business games with management, decision-making, innovation, competence, and forecasting**. It implies that researchers are investigating how business games can contribute to management education from different perspectives. This revelation aligns with what was shown in the management education clusters revealed during the bibliographic coupling analysis. Finally, the sixth cluster associates **business games with higher education**, suggesting that business scholars are currently interested in the motivations for using business games in higher education.

Furthermore, a thematic analysis of author-provided keywords was used to identify four thematic categories (Aria et al., 2022): (i) *motor themes*—well-developed research areas which are highly relevant for structuring the conceptual framework of the business game domain; (ii) *basic themes*—lay the foundations of the business game research and cut across different research areas; (iii) *peripheral themes*—not fully developed or not very interesting for business game research; (iv) *niche themes*—well-developed research area but still new in business game research. Based on these categorizations (Appendix A11), **training and supply chain management** are the motor themes of business game research. These well-developed business game research areas are highly relevant for structuring the domain's conceptual framework. Meanwhile, **experiential learning** is the current basic theme of business game research, which aligns with the revelations of co-occurrence network analysis. **Given the growing use of these terms in recent research, game-based learning and simulations are peripheral emerging themes**. Finally, **game theory** is a niche theme, implying that it is a well-developed research area but new to business game research. Indeed, game theory is a concept from the field of economics whose exploration in business

game research is still nascent. It has been used a few times to show how business games could leverage this theory to help managers improve decision-making processes (Oderanti et al., 2012; Oderanti & De Wilde, 2010), leaving room for more research in this niche.

Thematic analysis was conducted within two timelines (1957-2012; 2013-2022). During the first timeline (1957-2012), entrepreneurship did not evolve as a concept within this research area. From 1957 to 2012 (**Appendix A12**), experiential learning was a basic theme as it is nowadays. Today, entrepreneurship is a concept in the experiential learning cluster. It was a different niche theme, indicating that it was new in the business game research domain. Also, business education and game theory were the motor themes. Unlike today, business education is no longer a research theme; game theory has become a niche theme. This result suggests that game theory was highly relevant for structuring the conceptual framework of the business game domain. However, it has become a niche in the research area, supporting the idea that further research is needed in this area. This observation raises questions in business and entrepreneurship education research on the slow development of game theory in business game research. Entrepreneurship was a niche theme, indicating that it was a well-developed field but still new to business game research. Also, simulations, e-learning, and forecasting were peripheral themes. Simulations remain a peripheral theme today, e-learning has become part of the experiential learning theme (basic theme), and forecasting was an emerging theme, given its appearance in the management education theme identified during co-occurrence analysis.

Experiential learning remained a basic theme from 2013-2022 (**Appendix A13**). Meanwhile, training became a basic theme. However, with all the timelines put together, it is a motor theme, indicating that it has become an essential conceptual element of business game research. Active learning became a motor theme. However, with all the timelines put together, it is currently part of the experiential learning theme (basic theme), indicating it has become a foundational concept in business game research and cuts across different research areas. Game-based learning, which did not appear in previous years, emerged as a peripheral theme and is still one when keywords are analyzed across all timelines. It indicates that game-based learning is an emerging theme in business game research. Finally, **supply chain management, AI, and competence** joined entrepreneurship as niche themes. These niches indicate new research areas currently being developed (emerging trends) in business game research.

4. Discussion

4.1. Conceptual Framework for Business Game Research

This study's findings enabled the discovery of several key concepts and themes that characterize the foundations, past, present, and future of business game research. A triangulation of the results from the bibliometric analysis with insights

from a literature review of empirical research on business and entrepreneurship education in our dataset revealed more profound insights into the conceptual framework and gaps in business and entrepreneurship education research.

Specifically, learning experience is a common denominator in this research area. Although the concept of learning binds business game research, most authors use David Kolb's (1984) conceptualization of learning—"the process whereby knowledge is created through the transformation of experience" (p.41). This definition was the most widely used by authors, given that experiential learning theory (ELT) was the most recurrent learning theory among the publications that grounded their work in theory (e.g., Beranič & Heričko, 2019; Garber et al., 2017; Geithner & Menzel, 2016; Haapasalo & Hyvonen, 2001; Memar et al., 2021). Several authors agree with ELT's logic that experience is indispensable for learning in management education (Fenwick, 2000; Kolb & Kolb, 2005). According to the theory, learning needs to go through a four-step process to be effective: (i) concrete experience, (ii) reflective observation, (iii) abstract conceptualization, and (iv) active experimentation (Kolb, 1984).

Later, the theory showed that learning could occur in different styles and spaces. For example, management education is mainly characterized by people *thinking* and *acting* learning styles (Kolb & Kolb, 2005). Although ELT has been criticized for a limited account of social processes, lack of historical context and recognition of barriers, and lack of fit with an institutional paradigm (Kayes, 2002), it remains the dominant learning theory in business game research, proving its effectiveness in providing theoretical foundations for business game development. It implies that business game research is highly grounded in the belief that experiential learning shapes personal development (Kolb, 1984). However, future research could assess alternative learning theories and compare their ability to lead to the development of more effective business games for entrepreneurship education. For example, some authors have used the situated learning theory to explore learning transfer between contexts using business games (Scherpereel et al., 2022). The theory helped show that learners can successfully apply the skills learned in business games in real-world situations.

Active learning describes instructional methods that require learners to engage cognitively and actively perform activities during a learning process (Mingazova, 2014; Prince, 2004). Business games are the most modern form of active learning tools. They are often described in the literature as interactive learning systems, usually computer-based (simulations), designed to help learners assimilate new concepts (Baldwin & Sabry, 2003; Siewiorek et al., 2012; Wei et al., 2022). Most studies occurred in active learning environments during which learners had to interact actively and engage with business (simulation) games to learn some aspect of management through a near-real-world learning experience (Butzke et al., 2021; Kuang et al., 2021; Morin et al., 2020).

Figure 3 presents a conceptual framework synthesizing business game research

on business and entrepreneurship education. The model shows that technology acceptance (blue labels) and experiential learning (orange labels) literature have laid the theoretical foundations for understanding the role of business games in entrepreneurial education. Research has mainly focused on entrepreneurial intentions and entrepreneurial self-efficacy of students in higher education (Geithner & Menzel, 2016; Siewiorek et al., 2012; Wei et al., 2022).

4.1.1. Conceptual Path from Business Games to Entrepreneurial Intention

Entrepreneurial intention, defined as the degree to which individuals desire to be self-employed or establish their own business, is shown to be affected by the student's learning performance during business games (Pérez-Pérez et al., 2021; Tao et al., 2012). Learning performance has been assessed both objectively (e.g., attendance, individual tests, group reports and competition scores) (Tao et al., 2012) and subjectively (student perceptions) (Tao et al., 2009). The better the students performed, the stronger their entrepreneurial intentions. However, this effect was fully or partially moderated by students' academic performance, proximity to entrepreneurship, propensity for risk, and age (Pérez-Pérez et al., 2021). The effects of these relationships are stronger for older students who have an overall better academic performance, understand the challenges involved in entrepreneurship through experience, and have a higher risk propensity. Meanwhile, learning performance is found to be positively affected by perceived usefulness (Tao et al., 2009).

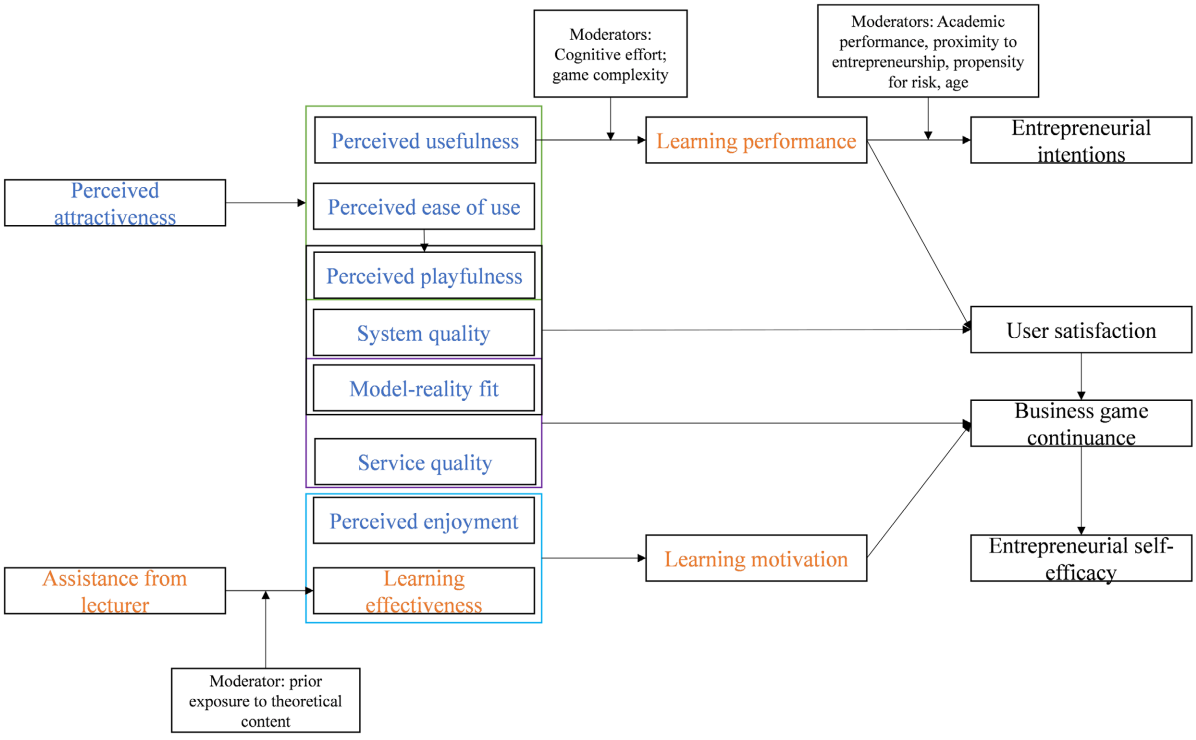

Figure 3. Conceptual framework of business game research on business and entrepreneurship education (Source: Authors).

Perceived usefulness is a construct from the technology acceptance model (TAM) (Davis, 1989) applied in this context to describe the extent to which a student believes the business game will enhance their learning performance. The strength of the relationship between perceived usefulness and learning performance may vary depending on the cognitive effort needed to play the game and the game's complexity, measured through the number of decision-making options available to the student playing the game (Scherpereel et al., 2022; Vos et al., 2011). The physical appearance of the business game is also important to students since they tend to perceive business games they find attractive as more useful (Tao et al., 2009). Furthermore, perceived attractiveness increases the perceived playfulness of the business game and its perceived ease of use, while the latter also positively affects the perceived playfulness of business games (Tao et al., 2009). However, there is no evidence of a mediating effect of perceived ease of use on the effect of perceived attractiveness on perceived playfulness.

4.1.2. Conceptual Path from Business Games to Entrepreneurial Self-Efficacy (Through Business Game Continuance Only)

Entrepreneurial self-efficacy is used in business game research to describe an individual's belief that business games can help boost their capacity to execute the behaviors of a performant entrepreneur. The extant literature reveals that entrepreneurial self-efficacy is strongly affected by the continuance of the business game. The rationale is that repetitive learning and experiential feedback strengthen an entrepreneur's self-efficacy. Thus, business game continuance would enable students to better understand business environments in their complexity and uncertainty and gain experience dealing with them (Wei et al., 2022). From a technology perspective, business game continuance is driven by service quality and model-reality fit. Service quality, originating from the information systems (IS) success model (DeLone & McLean, 2003), was used to measure the quality of support provided by the business game provider. The rationale for this relationship is that students will be more willing to continue using a business game if they receive good service quality from the provider. Meanwhile, model-reality fit measures the extent to which the business game scenario matches real-world occurrences. Students who perceive the scenario as matching what truly happens in the real world strongly desire to continue using the business game for learning (Wei et al., 2022).

From a learning perspective, business game continuance is driven by learning motivations. Students with a stronger intrinsic motivation to experiment with new interactive technology-driven approaches to problem-solving would have a stronger propensity for business game continuance (Matute & Melero, 2016; Matute-Vallejo & Melero-Polo, 2019). Furthermore, learning effectiveness determines learning motivation because business games increase learning motivation and better knowledge assimilation due to the effective and enjoyable learning environment they create (Butzke et al., 2021; Pacheco-Velazquez et al., 2019). In addition, the learning experience is better when faculty assists students with needed

training during business games (Gresch & Rawls, 2017). However, this effect is moderated by students' prior exposure to theoretical (explicit) knowledge because students have a low ability to use tacit knowledge in business games (Švec et al., 2014). Thus, exposing the students to essential theoretical knowledge before playing the games increases their knowledge assimilation capabilities during the game. This claim was supported by several studies that showed how students found learning with business games more effective when they participated after attending the course, taking a test, or reading about the concepts (Barzilai & Blau, 2014; Kuang et al., 2021; Morin et al., 2020; Oliveira & Melo, 2020).

4.1.3. Conceptual Path from Business Games to Entrepreneurial Self-Efficacy (Through Satisfaction)

Another path to entrepreneurial self-efficacy is through user satisfaction, another construct from the IS success model (DeLone & McLean, 2003), used in this research context to measure the extent to which students are satisfied with their business game experience. In line with the IS success model and the IS expectation confirmation model (Bhattacherjee, 2001), authors found that students will continue using business games if they are satisfied with their actual use experiences, which will eventually help them enhance their entrepreneurial self-efficacy overtime (Wei et al., 2022). In the same light of the IS success model, user experience is determined by the system quality (i.e., how well the business game meets desirable characteristics, e.g., responsiveness, flexibility), the quality of services provided by the business game service provider (service quality), and the fit between the business game scenario and real-world occurrences (model-reality fit) (Wei et al., 2022). Another study adds that learning performance is a key determinant of user satisfaction (Tao et al., 2009). It implies that students would be more satisfied with their business game experience if they performed well.

Analyzing all three conceptual paths reveals patterns for advancing knowledge of business games in entrepreneurship education. It begins with theorizing about the user's perceptions of the game's attributes, such as playfulness, enjoyment, and quality. Authors have mostly used technology acceptance theories like TAM, IS success model, and ECM. This part of theorizing seeks to answer the question: *Is the business game fit for the specific learning purpose*?

The next level of theorizing is at the learning level. It involves theorizing about the learning environment and experience of the business game user. It consists of theorizing about learning attributes like learning support, effectiveness, motivations, and performance. This conceptual level seeks to answer the question, *does the game provide the required learning experience?* Experiential learning theories are the most dominant theories used at this stage. The third stage of theorizing involves individual attributes. Theories used at this stage seek to understand the user's appreciation of the learning experience, including their satisfaction with the game and learning experience. It aims to answer the question, *how do learners respond to the learning experience*? User satisfaction and continuance theories have

been used to this effect. The fourth and final stage of theorizing seeks to explain the outcome of the learning process for entrepreneurial factors—*how has the learning experience affected the learner's entrepreneurial learning goals*? The theories used to explain this phenomenon depend on the learning goals. For example, entrepreneurial intentions have been theorized using the effectuation theory to understand if the learner has developed intentions to createa new venture (Memar et al., 2021). Meanwhile, entrepreneurial self-efficacy has been researched through the lens of the self-efficacy theory (Bandura, 1977) to determine if the business game experience has affected their capacity to become successful entrepreneurs (Scherpereel et al., 2022).

The above pattern can be observed in **Figure 4**, which shows the pattern currently used by researchers to theorize how business games affect entrepreneurial intentions. It shows that physical attractiveness and perceived usefulness are business game attributes that affect learning performance, affecting entrepreneurial intentions.

In the same way, **Figure 5** shows researchers' current pattern of theorizing the effect of business games on entrepreneurial self-efficacy. Once again, it shows the flow from business game attributes like perceived playfulness, enjoyment, quality, and fit to learning attributes like learning support, effectiveness, motivation, and performance. However, in this specific case, the relationship between learning attributes and the outcome of entrepreneurial education (entrepreneurial self-efficacy) is mediated by individual attributes.

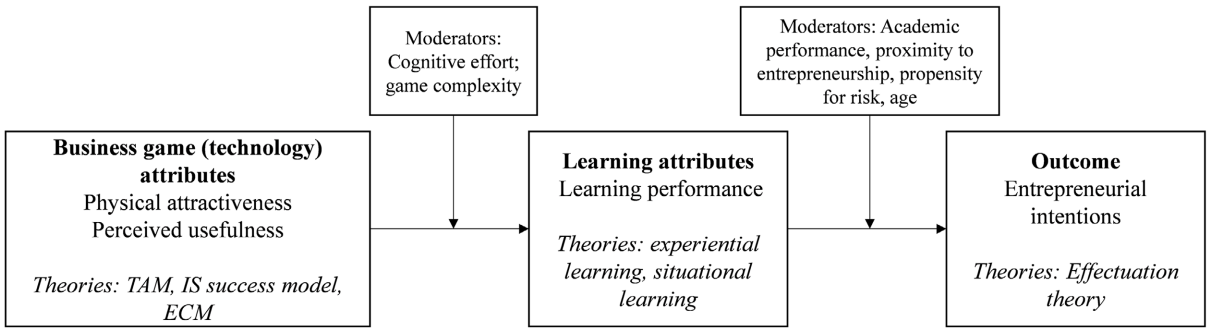

Figure 4. Current conceptual path to understanding the effect of business games on entrepreneurial intentions (Source: Authors).

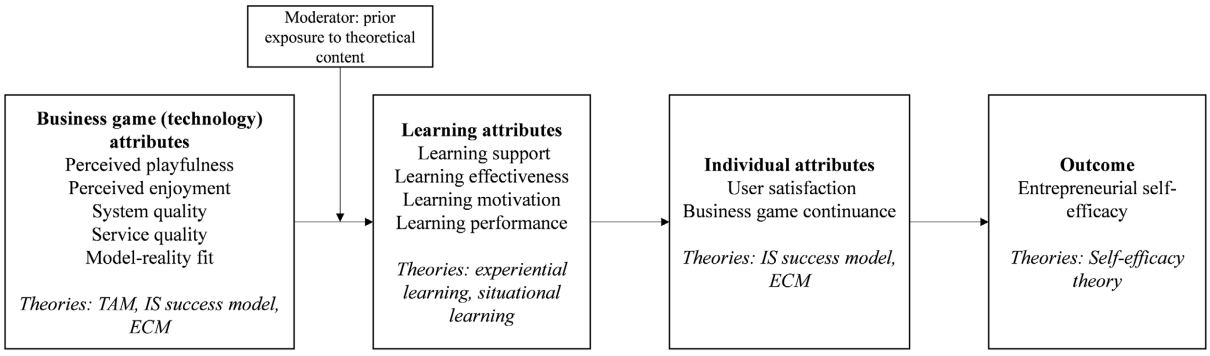

Figure 5. Current conceptual path to understanding the effect of business games on entrepreneurship self-efficacy (Source: Authors).

4.2. Research Implications and Agenda

This study highlights several gaps, which are opportunities for future research on the role of business games in business and entrepreneurship education. First, it highlights that business games are at the frontier of information systems (IS), education & learning, and entrepreneurship research. Thus, these disciplines can actively contribute to theorizing on the technological, learning, and entrepreneurial aspects of using business games in entrepreneurial education.

IS researchers can contribute to this research stream by identifying other relevant theories and technological aspects of business games that can help explain students' learning experiences. For example, no empirical evidence exists to show that any given entrepreneurial task is well-suited for the business game learning approach. Thus, IS researchers could leverage the task-technology fit theory (Goodhue & Thompson, 1995) to identify how business game characteristics and entrepreneurial tasks complement each other to enhance learning performance and business game use. In addition to perceived playfulness and enjoyment, IS researchers could extend the extant literature by identifying different hedonic motivations for using business games that may affect entrepreneurial learning experiences. Hedonic factors are implicitly important in understanding peoples' experiences in this context because business games intrinsically communicate the notions of amusement or fun, even if they are designed to be challenging for learning purposes. Thus, theories like the Hedonic-motivation system adoption model (HMSAM) (Lowry et al., 2013) and the consumer version of the Unified theory of acceptance and use of technology (UTAUT 2) (Venkatesh et al., 2012) could enable entrepreneurship scholars to understand other hedonic factors affecting students' learning experiences. Exploring this research area could lead to new IS theories specific to entrepreneurship contexts.

Meanwhile, entrepreneurship education researchers could advance theories on learning attributes and their relationship with individual attributes and the outcomes of entrepreneurial education. Recent studies have shown that COVID-19, the gig economy and digitalization are changing entrepreneurial education and have called for further research on this phenomenon. Among them, Ratten & Usmanij (2021) suggest investigating the intensity of entrepreneurship courses in relation to the success of new ventures launched after an entrepreneurship course. They also suggest the need for further research on how entrepreneurship education affects entrepreneurial ecosystems, especially regarding knowledge-sharing and collaboration behaviors. Furthermore, they highlight the need for more research on gender roles in entrepreneurship education to influence learning dynamics such that entrepreneurial teaching practices can promote entrepreneurship for all genders. Ratten & Jones (2021) propose a research agenda calling for entrepreneurship researchers to advance research on the evolution of entrepreneurship education from the beginning of the COVID-19 pandemic.

Liguori & Winkler (2020) call for further research and the development of additional resources for online entrepreneurship education, especially to learn entrepreneurship basics as well as the entrepreneurial mindset and competencies. It will be interesting to extend such research agendas to answer questions on contemporary issues in entrepreneurship education, such as: How can business games provide the course intensity needed to stimulate the creation of successful new ventures over a given period? How can business games help educate students on knowledge sharing and collaboration in entrepreneurial ecosystems? How can business games help to address biases related to gender identity in modern-day entrepreneurship education? How can online business games improve entrepreneurial education on entrepreneurship basics, mindset, and competencies? Bell & Bell (2020) show that researchers could leverage educational learning theories and philosophies like behaviorism/cognitivism, constructivism, Schön's theory of reflection-in-action (Schön, 2017), Mezirow's theory of transformative learning (Mezirow, 1997), and Kolb's theory of experiential learning (Kolb, 1984) to better understand how business games could deliver the best experiential entrepreneurship education, to help in answering the aforementioned research questions. As sustainability remains a global concern of growing importance in management education (Butzke et al., 2021), future research could also investigate the effect of business games in helping with the integration of sustainable development practices in entrepreneurship education, which is a necessary step towards the revitalization of entrepreneurial education to adopt a socially responsible approach rather than a solely profit-oriented one (Zawadzki, 2019). **Table 1** summarizes the research questions raised and the rationale supporting the need for research to answer the questions.

4.3. Contributions to Research

This study contributes to research by providing insights into the key concepts and themes that characterize the foundations, past, present, and future directions of business game research in the context of business and entrepreneurship education. Indeed, this study contributes to the extant knowledge of business game research by revealing that college students, learning environments, and learning experiences form the basis of business game research. The research domain has a strong past in exploring the benefits, experiences, competencies, and consequences of business games on learners and the role, practical potential, and effectiveness of business games in education. Today, business game research is mainly focused on their effectiveness and impact within the context of management education in terms of practical applications and design. Future research on business games is geared towards learning (interactive, experiential, and active), performance, efficiency, decision-making, innovation, competence, forecasting, and training in higher education contexts.

Table 1. Summary of research gaps and sample questions for future research on business games in entrepreneurship education.

Research gap	Sample research question	Rationale derived from the study
Focus on the business games		
Utilitarian value	Which entrepreneurial skills or tasks are well-suited for the business game learning approach?	Not all entrepreneurship skills can be best learned effectively using business games.
Hedonic value	What hedonic factors contribute to improving learners' entrepreneurship learning experiences with business games?	Business games are games and are expected to be intrinsically fun by design.
Task-technology fit	Which technologies best suit business games for learning different entrepreneurship skills?	Different devices (mobile, laptops, etc.) have different affordances that would provide different learning experiences.
Task-technology fit	Which demographic factors determine the most effective business game learning device for entrepreneurship education?	People of different demographics (ages, genders, levels of education, etc.) learn and use technology differently.
Focus on business and entrepreneurship education		
Entrepreneurship basics	How can online business games improve entrepreneurship education on entrepreneurship basics, mindset, and competencies?	Learners, especially the younger generations, highly appreciate online business games.
Course intensity	How can business games provide the course intensity needed to stimulate the creation of successful new ventures over a given period?	The intensity of entrepreneurship courses may affect the success of new ventures launched after an entrepreneurship course.
Knowledge sharing and collaboration	How can business games help educate students on knowledge sharing and collaboration in entrepreneurial ecosystems?	Knowledge-sharing and collaboration behaviors affect entrepreneurial ecosystems.
Gender identity	How can business games help to address biases related to gender identity in modern-day entrepreneurship education?	Gender roles in entrepreneurship education may influence learning dynamics, such as team performance and decision-making.
Sustainability	How can business games help to integrate sustainable practices in entrepreneurship education effectively?	Integrating sustainability in entrepreneurial education is necessary for a socially responsible approach to entrepreneurship rather than solely profit-oriented.
Learning theories	What could other learning theories contribute to understanding the role and effectiveness of business games in entrepreneurship education?	Entrepreneurship performance is shaped by the way an individual learns.
Target population (individual level)	How can business games help to improve the quality of education and performance of learners who have not been to college (inclusiveness)?	Current research is too focused on college students' learning experiences, neglecting the significantly large population of entrepreneurs who have not attended college.
Target population (country level)	What is the role of business games in entrepreneurship education in emerging economies?	Business game research is conspicuously absent in many emerging economies, especially in Africa and South America.

This research also contributes to understanding business games research within specific business and entrepreneurship education contexts. Indeed, the study highlights that entrepreneurship has evolved from a niche theme focused

on game theory to an integral part of experiential learning within the business game research space. The dominant role of ETL in shaping business game research, particularly David Kolb's conceptualization of learning, is widely used by authors in grounding their work and providing a theoretical foundation for business game development. However, future research could assess alternative learning theories like the situated learning theory to enhance the development of more effective business games for business and entrepreneurship education and increase learning transfer between contexts using business games.

Furthermore, this study contributes a synthesized conceptual framework highlighting the relationships between key concepts in business game research on business and entrepreneurship education. It outlines conceptual paths from business games to entrepreneurial intention and self-efficacy. It particularly highlights learning performance, perceived usefulness, satisfaction, and continuance in relation to these entrepreneurial outcomes. This framework visually represents relevant theoretical foundations, focusing on technology acceptance and experiential learning literature. It integrates theoretical models such as the TAM, IS success model, and experiential learning theories to understand the impact of business games on entrepreneurial intention and self-efficacy. Thus, it proposes a sequential theorizing pattern involving user perceptions, learning environment and experience, individual attributes, and entrepreneurial factors. This multi-stage theory approach provides insights into the fit of business games for business and entrepreneurship learning purposes (in terms ofthe learning experience provided and learner responses), and the outcomes of entrepreneurial goals.

5. Conclusion

To conclude, this study's objective was to reveal the knowledge structure and emerging trends in business game research and inform business and entrepreneurship education scholars and practitioners about the evolution of the research area and the potential role of business games in enhancing entrepreneurship education today. It contributes to extant research on business games by objectively identifying the knowledge clusters, key concepts driving each cluster, the relationships between them, emerging trends, and the seminal papers business scholars and practitioners could use to deepen their knowledge of each cluster. It also contributes a conceptual framework describing current research on business games in business and entrepreneurship education, revealing key research gaps and proposing a research agenda that could help scholars make meaningful contributions to the entrepreneurship niche in business games research. Despite these essential revelations, the fact that the WoS was the only data source used does not allow us to rule out the possibility of missing data. We hope our contributions inspire future research on the contemporary role of business games in business and entrepreneurship education.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Appendices

Appendix A1. Business games used to teach various business and entrepreneurship concepts.

Author, year	Context	Target population	Business concepts	Business game used
(Balashova & Pavlovskaya, 2014)	HEI	Students	Project management method and tools paper for paper airplane production	Production process
(Hishiyama & Nakajima, 2015)	HEI	Students from non-business backgrounds	Business model with uncertainty	Croquette factory game
(Kuang et al., 2021)	High school	High school accounting students	Foundational accounting concepts	Monopoly
(Pacheco-Velazquez et al., 2019)	HEI	Undergraduate students from industrial engineering and business	Logistics – decision-making in the area of supply chain	Logistic simulator (lost)
(Hamada et al., 2018)	Engineering education	Engineers	Business, management and accounting	BASE manufacturing game
(Morin et al., 2020)	HEI	Students	Business finance	Capsimcore simulation game
(Bergner & Brooks, 2017)	HEI	Students	Accounting cycle	Monopoly
(Haapasalo & Hyvönen, 2001)	N/A	N/A	Decision-making in industrial engineering, operations management of entire production line, logistics, and business in the electronics industry	Green-power, Operex-power
(Takahashi & Nakano, 2019)	N/A	Supply chain managers/students	Improving interpersonal skills to manage supply chain performance under conflict	Candy OG
(Hefley & Thouin, 2017)	HEI	Students	Agile project management simulation	Fissure agile simulation
(Memar et al., 2021)	HEI	University business students	Strategic management - strategic evaluation of a competitive business environment (production & trade)	Strategic Business game
(Švec et al., 2014)	HEI	Students studying strategic management	Strategic management	Power grid
(Carreiro & Oliveira, 2018)	HEI	Business administration students	Project management	Project management simulation (PMS-sim)
(Garber et al., 2017)	HEI	Undergraduate business students	Marketing	The marketing game
(Blum & Bergsch, 2009)	Organizations	Corporate learners in German insurance companies	How to act in environments with complex business and economic inter-relationship networks	Siva - a simulation of an insurance agency

Continued

(Matyas & Schachner, 1998)	HEI	Production management students	Production management (production planning, production control, scheduling, material management and cost calculation)	Winprost
(Qudrat-Ullah, 2010)	HEI	Undergraduate business students	Improve their understanding about "the tragedy of the commons"	Fishbankile
(Siewiorek et al., 2012)	HEI	Multicultural graduate business students	Leadership skills	Realgame
(Matute & Melero, 2016)	HEI	Bachelors in business administration degree students	Manage The production and distribution of a climate control company's Products in three different markets (local, European and Latin American markets)	Rad-mtk
(Geithner & Menzel, 2016)	HEI	Students	Improve both technical project management knowledge and soft skills	"c-2" business simulation game
(Williams, 2015)	HEI	Undergraduate students	Entrepreneurship	SimVenture
(Fitzgerald & Stokes, 2009)	HEI	Students	Entrepreneurship	Apprentice Entrepreneur
(Kerremans & Walraevens, 2013)	Secondary/higher education; companies	Anyone	Entrepreneurship	ECOMAN

Appendix A2. Most global cited publications (at least 100 citations).

Paper	Source	Title	TC	TC per Year
(Mullen & Copper, 1994)	Psychological bulletin	The relation between group cohesiveness and performance: An integration	768	26.48
(Kanawattanachai& Yoo, 2007)	MIS Quarterly	The impact of knowledge coordination on virtual team performance over time	313	19.56
(Gully et al., 1995)	Small group research	A meta-analysis of cohesion and performance: Effects of level of analysis and task interdependence	289	10.32
(Kanawattanachai& Yoo, 2002)	Journal of Strategic Information Systems	Dynamic nature of trust in virtual teams	234	11.14
(Kleijnen&Smits, 2003)	Journal of the operational research society	Performance metrics in supply chain management	168	8.40
(Kiili, 2007)	British journal of educational technology	Foundation for problem-based gaming	156	9.75

Continued

(Barzilai& Blau, 2014)	Computers & Education	Scaffolding game-based learning: Impact on learning achievements, perceived learning, and game experiences	141	15.67
(van den Bossche et al., 2011)	Instructional Science	Team learning: building shared mental models	135	11.25
(Y. H. Tao et al., 2009)	Computers & Education	What influences college students to continue using business simulation games? The Taiwan experience	123	8.79
(Apesteguia et al., 2012)	Management Science	The Impact of Gender Composition on Team Performance and Decision Making: Evidence from the Field	106	9.64

Appendix A3. Most local cited publications (at least five local citations).

Paper	Journal	Title	LC	GC	LC/GC Ratio (%)
(Y. H. Tao et al., 2009)	Computers & Education	What influences college students to continue using business simulation games? The Taiwan experience	27	123	21.95
(Ben-Zvi, 2010)	Decision Support Systems	The efficacy of business simulation games in creating Decision Support Systems: An experimental investigation	22	47	46.81
(Pando-Garcia et al., 2016)	Journal of Business Research	Business simulation games with and without supervision: An analysis based on the TAM model	20	48	41.67
(Fitó-Bertran et al., 2014)	Computers in Human Behavior	Comparing student competences in a face-to-face and online business game	18	44	40.91
(Fitó-Bertran et al., 2015)	Computers in Human Behavior	The effect of competences on learning results - an educational experience with a business simulator	13	30	43.33
(McKenney, 1962)	The Journal of Business	An Evaluation of a Business Game in an MBA Curriculum	10	35	28.57
(Vance & Gray, 1967)	Academy of management Journal	Use of a performance evaluation model for research in business gaming	10	29	34.48
(Y. L. Lin & Tu, 2012)	Computers & Education	The values of college students in business simulation game: A means-end chain approach	10	36	27.78
(Babb et al., 1966)	The Journal of Business	The Potential of Business-Gaming Methods in Research	9	40	22.50
(Jensen, 2003)	BT Technology Journal	Business Games as Strategic Team-Learning Environments in Telecommunications	9	18	50.00
(Tao, Y.H., Yeh, et al., 2012)	Computers & Education	Effects of the heterogeneity of game complexity and user population in learning performance of business simulation games	9	16	56.25
(Zulfiqar et al., 2019)	Journal of Educational Computing Research	An Analysis of Influence of Business Simulation Games on Business School Students' Attitude and Intention Toward Entrepreneurial Activities	9	34	26.47

Continued

(Lainema & Nurmi, 2006)	Computers & Education	Applying an authentic, dynamic learning environment in real-world business	7	44	15.91
(C. L. Goi, 2019)	Journal of Education for Business	The use of business simulation games in teaching and learning	7	15	46.67
(Matute & Melero, 2016)	Universia Business Review	Game-based learning: using business simulators in the university classroom	6	6	100.00
(Deep et al., 1967)	Journal of Applied Psychology	Some effects of business gaming on previous quasi-T group affiliations	5	32	15.63
(Oderanti & De Wilde, 2010)	International Journal of Production Economics	Dynamics of business games with management of fuzzy rules for decision making	5	21	23.81

Appendix A4. Most local cited references (cited at least 20 times).

Authors	Journal title	Publication title	Total Citations
(Faria et al., 2009)	Simulation & Gaming	Developments in Business Gaming: A Review of the Past 40 Years	38
(Keys & Wolfe, 1990a)	Journal of Management	The role of management games and simulations in education and research	38
(Garris et al., 2002)	Simulation & Gaming	Games, Motivation, and Learning: A Research and Practice Model	36
(Kolb, 2014)	FT press	Experiential learning: Experience as the source of learning and development	31
(Faria & Wellington, 2004)	Simulation & Gaming	A Survey of Simulation Game Users, Former-Users, and Never-Users	29
(Tao et al., 2009)	Computers & Education	What influences college students to continue using business simulation games? The Taiwan experience	27
(Doyle & Brown, 2000)	Journal of European Industrial Training	Using a business simulation to teach applied skills–the benefits and the challenges of using student teams from multiple countries	25
(Faria, 1998)	Simulation & Gaming	Business simulation games: Current usage levels—An update	24
(Ben-Zvi, 2010)	Decision Support Systems	The efficacy of business simulation games in creating Decision Support Systems: An experimental investigation	22
(Faria, 2001)	Simulation & Gaming	The changing nature of business simulation/gaming research: A brief history	20
(Faria, 1987)	Simulation & Gaming	A survey of the use of business games in academia and business	20
(Pando-Garcia et al., 2016)	Journal of Business Research	Business simulation games with and without supervision: An analysis based on the TAM model	20

Appendix A5. Cluster 1: Fundamentals of business games.

Author, year	Title
(Faria et al., 2009)	Developments in business gaming: A review of the past 40 years
(Garris et al., 2002)	Games, Motivation, and Learning: A Research and Practice Model
(Johnson, 2000)	Experiential learning: Experience as the source of learning and development
(Faria, 2001)	The Changing Nature of Business Simulation / Gaming Research: A Brief History
(Anderson & Lawton, 2009)	Business simulations and cognitive learning: Developments, desires, and future directions
(Greco et al., 2013)	An exploratory taxonomy of business games
(Prensky, 2001)	Digital Game-based Learning
(Gosen & Washbush, 2004)	A Review of Scholarship on Assessing Experiential Learning Effectiveness
(Summers, 2004)	Today's Business Simulation Industry
(Crookall, 2010)	Serious games, debriefing, and simulation/gaming as a discipline
(Ruben, 1999)	Simulations, games, and experience-based learning: The quest for a new paradigm for teaching and learning
(Salas et al., 2009)	Using simulation-based training to enhance management education
(Wolfe & Crookall, 1998)	Developing a scientific knowledge of simulation/gaming

Appendix A6. Cluster 2: Business games and learners.

Author, year	Title
(Faria & Wellington, 2004)	A survey of simulation game users, former-users, and never-users
(Doyle & Brown, 2000)	Using a business simulation to teach applied skills–the benefits and the challenges of using student teams from multiple countries
(Zantow et al., 2005)	More than fun and games: Reconsidering the virtues of strategic management simulations
(Fitó-Bertran et al., 2014)	Comparing student competences in a face-to-face and online business game
(Chang et al., 2003)	Business simulation games: the Hong Kong experience
(Fu et al., 2009)	EGameFlow: A scale to measure learners' enjoyment of e-learning games
(Fitó-Bertran et al., 2015)	The effect of competences on learning results an educational experience with a business simulator
(Siddiqui et al., 2008)	Supply chain simulator: A scenario-based educational tool to enhance student learning

Appendix A7. Cluster 3: Practical potential of business games in education and research.

Author, year	Title
(Keys & Wolfe, 1990b)	The role of management games and simulations in education and research
(Wolfe, 1993)	A History of Business Teaching Games in English-Speaking and Post-Socialist Countries: The Origination and Diffusion of a Management Education and Development Technology

Continued

(Faria, 1998)	Business simulation games: Current usage levels—An update
(Faria, 1987)	A survey of the use of business games in academia and business
(Sterman, 1989)	Modeling managerial behavior: Misperceptions of feedback in a dynamic decision-making experiment
(Cohen & Rhenman, 1961)	The role of management games in education and research
(Greenlaw & Wyman, 1973)	The teaching effectiveness of games in collegiate business courses
(Wolfe, 1978)	The effects of game complexity on the acquisition of business policy knowledge
(Horn, 1995)	The guide to simulations-games for education and training
(Raia, 1966)	A Study of the Educational Value of Management Games
(Kibbee, 1961)	Management games: A new technique for executive development

Appendix A8. Cluster 4: Effectiveness/impacts of business games.

Author, year	Title
(Tao et al., 2009)	What influences college students to continue using business simulation games? The Taiwan experience
(Ben-Zvi, 2010)	The efficacy of business simulation games in creating Decision Support Systems: An experimental investigation
(Pando-Garcia et al., 2016)	Business simulation games with and without supervision: An analysis based on the TAM model
(Pasin & Giroux, 2011)	The impact of a simulation game on operations management education
(Adobor & Daneshfar, 2006)	Management simulations: determining their effectiveness
(Sitzmann, 2011)	A meta-analytic examination of the instructional effectiveness of computer-based simulation games
(Kiili, 2005)	Digital game-based learning: Towards an experiential gaming model
(Kriz & Auchter, 2016)	10 Years of Evaluation Research into Gaming Simulation for German Entrepreneurship and a New Study on Its Long-Term Effects
(Lean et al., 2006)	Simulations and games: Use and barriers in higher education
(Hernández-Lara et al., 2019)	Students' perception of the impact of competences on learning: An analysis with business simulations

Appendix A9. Thematic clusters are generated through bibliographic coupling.

Cluster label	Sample publications
Cluster 1: Practical potentials of business games	(Araujo et al., 2015; Ben-Zvi, 2010; Ben-Zvi & Carton, 2007; Beranič & Heričko, 2019; Betzwieser et al., 2021; Butzke & Alberton, 2017; Carenys et al., 2017; De Souza Rodr José et al., 2011; Dumblekar & Dhar, 2021; Garber et al., 2017; Hauser & Nieffer, 2018; Heričko et al., 2017; Hühn & Rausch, 2022; Jerman Blažič & Džonova Jerman Blazic, 2015; J. B. Kim & Watson, 2017, 2018; Kiss & Schmuck, 2021; Krajger et al., 2021; Kuang et al., 2021; Lainema et al., 2018; Mera et al., 2015; Morin et al., 2020; Palmunen et al., 2021; Pérez-Serrano et al., 2020; Poonnawat et al., 2015; Rogmans & Abaza, 2019; Siewiorek et al., 2012; Smeureanu & Isăilă, 2017; Stummer & Kiesling, 2021; Y. H. Tao et al., 2015; Y. H. Tao, Yeh, et al., 2012; Tiron-Tudor et al., 2013; Utesch, 2015; Van Krevelen et al., 2011; Vogel, 2008; Vojtko & Dusek, 2017; Wach & Gaweł, 2020; Wellington et al., 2017; Xinaris et al., 2011; Zhang, 2015)
Cluster 2: Management education (in higher education institutions)	(Barzilai & Blau, 2014; Bitrián et al., 2020; Buil et al., 2020; Butzke et al., 2021; J. Chen et al., 2022; J. C. Chen et al., 2022; Ferreira et al., 2021; Fitó-Bertran et al., 2014, 2015; Fraccascia et al., 2021; Häusler et al., 2021; Huang & Wang, 2022; Jääskä et al., 2021; Januszewski & Kujawski, 2020; Jhan et al., 2022; Lerro et al., 2020; Y. W. Liao et al., 2015; Y. L. Lin & Tu, 2012; Matute & Melero, 2016; Newbery et al., 2018; M. A. Oliveira & Melo, 2020; Pérez-Pérez et al., 2021; Petridis et al., 2015; Reginato et al., 2022; Schmitt et al., 2021; Y. H. Tao, Cheng, et al., 2012; Y. H. Tao et al., 2009; Y. Y. Wang et al., 2020; Wei et al., 2022; Zulfiqar et al., 2019, 2021)
Cluster 3: Management education (in general)	(Bika et al., 2021; Boseman & Schellenberger, 1974; Cavus et al., 2020; Dion, 2004; Dufranne & Cleeremans, 1999; Goi, 2019; Gonen et al., 2008; Jensen, 2003; Katsaliaki et al., 2014; Memar et al., 2021; Monk & Lycett, 2016; Nebenzahl, 1984; Norris, 1986; Scherpereel et al., 2022; Wolfe, 1993; Wolfe, 1993; Wolfe & Chacko, 1980; Yasarcan, 2010)
Cluster 4: Design and effects	(Biggs et al., 1991; Boone et al., 1998; Eindor & Segev, 1986; Greco & Murgia, 2007; Hagg et al., 1970; Hishiyama & Nakajima, 2015; Keys et al., 1988; Lainé, 2021; Lainema & Nurmi, 2006; Mullen & Copper, 1994; Oderanti et al., 2012; Pando-Garcia et al., 2016; Pinho Oliveira, 2018; Rabl & Kühlmann, 2008; Sadler-Smith & Riding, 1999; Sedbrook, 1998; Siemer & Angelides, 1997, 1998; Teach & Govahi, 1993; Wolfe et al., 1989)

Appendix A10. Co-occurrence network analysis.

Author keywords	Cluster label
case study, interactive learning	Interactive learning
business simulation game, performance, efficiency, artificial intelligence	Performance
education, business simulation games, gamification, serious games, experiential learning, e-learning, game-based learning, supply chain management, game theory, learning outcomes, project management, system dynamics, business education, competences, entrepreneurship education	Experiential learning
business game, management, training, decision-making, innovation, teaching, competence, forecasting	Management education
Learning, business, business simulation game, decision making, simulation games, active learning, assessment	Active learning
higher education, simulation game, motivation	Motivations (*for using business games in higher education*)

Appendix A11. Global thematic map.

Author keywords	Theme name	Theme category
business game, simulation, education, business simulation games, learning, business, gamification, serious games, business simulation, experiential learning, management, e-learning, decision making, higher education, entrepreneurship, active learning, assessment, learning outcomes, performance, project management, system dynamics	Experiential learning	Basic
business simulation game, training, innovation, teaching	Training	Motor
supply chain management, simulation game	supply chain management	Motor
game-based learning	game-based learning	Peripheral
simulations	simulations	Peripheral
game theory	game theory	Niche

Appendix A12. Thematic time slice 1 (1957-2012).

Author keywords	Theme name	Theme category
business game, business simulation, experiential learning, decision making, system dynamics	Experiential learning	Basic
business education, business gaming, serious games	business education	Motor
game theory, business	Game theory	Motor
business simulation games, performance, management game	Management performance	Niche
entrepreneurship	entrepreneurship	Niche
Simulations	simulations	Peripheral
E-learning	e-learning	Peripheral
Forecasting	forecasting	Peripheral

Appendix A13. Thematic time slice 2 (2013-2022).

Author keywords	Theme name	Theme category
business game, education, gamification, simulation, business, serious games, management, experiential learning, higher education, business simulation games, decision making, e-learning, decision-making, assessment, innovation, project management, competences, development, experience-based learning, soft skills	Experiential learning	Basic

Continued

training, teaching	training	Basic
active learning, simulation games, case study, efficiency, university	active learning	Motor
game-based learning	game-based learning	Peripheral
business simulation games, entrepreneurship, learning outcomes, motivation, serious game, skills entrepreneurship education	Entrepreneurship	Niche
supply chain management, human factors, simulation game	supply chain management	Niche
artificial intelligence	artificial intelligence	Niche
competence	competence	Niche