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Systematic Review

Business Simulation Games for the Development of Intrinsic Motivation-Boosting Sustainability: Systematic Review

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Abstract: Background: The 4th Sustainable Development Goal (SDG) of the 2030 Agenda is supported by new educational trends that consider game-based learning as a pedagogical method in the classroom. In particular, simulation games and motivation are relevant elements since they can play a significant role in quality education. As a result, during the last few years, research into potential interventions as well as business simulation games (BSGs) for the development of intrinsic motivation (IM) in higher education have skyrocketed. However, no reviews of the interventions and outcomes in this topic have been released. Therefore, the goals of this research were (1) to analyze the relationship between the use of BSGs and the IM of students in higher education, and (2) to identify the aspects that can be promoted by the BSGs to develop IM. Methods: In accordance with PRISMA recommendations, a systematic review was carried out of PubMed, Web of Science, Scopus, and ProQuest. Results: From the 329 investigations that were initially selected, 12 studies underwent a complete assessment, in which all interventions and results were gathered and assessed. Conclusions: There was unanimity on the importance of using BSG to foster IM in higher education.

Keywords: business simulation games; innovation; digital technologies; intrinsic motivation; higher education; quality education; teaching practice; Sustainable Development Goals

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1. Introduction

The 2030 Agenda aims to ensure prosperity and well-being for all women and men while protecting our planet and strengthening the foundations of peace. Specifically, with respect to the 4th Sustainable Development Goal (SDG), as stated in UNESCO's declaration, it contributes to poverty eradication through its work in promoting quality education and skills development to help people obtain decent employment, harnessing science and technology; promoting culture as an enabler of sustainable development, media, and access to information; and strengthening resilience to the effects of climate change, natural disasters, and conflict [1]. In this aspect, universities are regarded as the primary agent for achieving the UNESCO sustainable goals in three ways, according to the new global framework of Education for Sustainable Development that was introduced by the 40th UNESCO General Conference, by educating socially responsible citizens, encouraging collaborative work among universities, and fostering collaborative and multidisciplinary research activities [2,3]. Additionally, educators are crucial because they are strong agents of change who can provide the educational support needed by students to make the transition to a sustainable society while also fostering their drive and commitment. High-quality education fosters sustainable development, as stated in the 4th SDG of the 2030 Agenda [4]. In this regard, intrinsic motivation (IM) plays a prominent role in fostering quality education [5–8] since students find the activity itself interesting and rewarding, allowing them to attribute meaning to their work, explore new topics, face learning challenges, and set their own goals or study what they want based on their curiosities.

In addition, the scientific community has analyzed the importance of motivation development in quality education [5,8,9]. Therefore, there are numerous studies that propose specific interventions to promote motivation at different stages and educational areas [10–13]. Self-determination theory (SDT) [14–16], which proposes a taxonomy consisting of demotivation, extrinsic motivation, and IM, served as the foundation for a large section of the scientific community that has focused on interventions for the development of motivation. IM is an outcome that arises when a person is performing some activity and gets some enjoyment just by performing the activity [17–20]. Additionally, there is a strong association between IM and achievement, high-quality education, and well-being [21]. Self-determination theory's main emphasis is on internal motivating factors that support the basic psychological needs for growth [5,22–25]: autonomy (the yearning for autonomy and an awareness of one's own responsibility), competence (where people have a sensation of being effective and qualified), and relatedness (where individuals and groups feel truly linked to, and cared for by, one another). Additionally, studies have recently emerged based on the SDT theory that specifically attempt to develop IM through different pedagogical interventions [5,22–25].

Currently, different pedagogical methods are used to promote IM in higher education. In this regard, there are studies that have analyzed the positive impact of game-based learning as a pedagogical method in an engaging and experiential game setting to teach information and skills [26,27]. Game-based learning can encourage motivation and meaningful learning, giving students a unique learning experience by influencing their emotions [26]. Furthermore, these authors add that game-based learning has a favorable effect on students' activation, emotional behavior, emotions of interest, and involvement, according to existing studies.

In particular, game-based learning includes business simulation games (BSGs), which are increasingly used in higher education and usually result in very positive experiences for students [28]. BSGs are tools used to promote enterprise management learning by providing a scenario with rules and competition in a low-risk setting. BSGs give students the opportunity to study by simulating various real-world scenarios in a secure environment [29]. Thus, for example, BSGs allow students to learn about the economic laws of business and the market through a game [30], or they can enable a breakthrough in entrepreneurial attitudes and self-efficacy [31]. There are also studies that claim that BSGs favor the higher-order thinking skills that are reliable predictors of school and work success [9] and improve decision-making skills [29]. Other studies have worked on how such an important aspect as sustainability can be implemented in BSGs, so it can be seen that they can be a very useful tool for working on very different aspects [2].

Finally, the BSGs are also a very useful because the results obtained after their application allow the development of the competences required by companies. Specifically, the BSGs provide students with multi-layered learning opportunities and help them develop soft skills like strategic thinking, decision-making, and data analysis [10]. BSGs also help students learn through their interactions with others, as well as from their reflections on their actions and results, and, based on self-determination theory, allow the development of generic skills and perceived learning [11].

As can be seen, the 4th SDG can find in higher education an ideal space to develop, with the aim of offering society quality education where IM plays a fundamental role because students have a deep involvement in their learning. In this regard, pedagogical interventions as interventions such as BSGs can allow students to increase their IM as well as learn, explore, and practice different tasks that they will have to develop in their future work. The scientific community places a high value on this subject, so it is useful to be able to compile the knowledge that is currently accessible on various BSGs that encourage IM because, as the most recent research indicates, the achievement of high-quality education greatly rests on the IM of the students. To the best of the authors' knowledge, although some authors have summarized BSGs for education [12,13,29], a systematic review that includes BSGs for the development of IM in high education has not been published.

Our research object is the BSGs used in higher education focused on one main domain, IM. Therefore, this systematic review had two research questions: (1) "What is the relationship between the use of BSGs and IM in higher education like?", and (2) "What aspects can be promoted by the BSGs to develop IM that contribute to quality education and thus to the development of the 4th SDG?". Therefore, the objectives of the present review are the following: (1) "to analyze the relationship between the use of BSGs and the IM of students in higher education", (2) "to identify the aspects that can be promoted by the BSGs to develop IM that contribute to quality education and thus to the development of the 4th SDG". As a result, it will be possible to gather up-to-date information on the many sorts of interventions being used and make insightful reflections for future research. This study will be especially useful for academics, researchers, and instructors looking for high-quality education that corresponds to the 4th SDG of the 2030 Agenda [4].

The article will be structured in the following way. Firstly, materials and methods of investigation are presented. Next, the results are developed. The discussion of the results is written in the next section. Then, the main conclusions, limitations, and future directions are presented in the final section.

2. Materials and Methods

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) criteria were followed when conducting this systematic review [30,31]. The PRISMA-supported criteria guarantee that each of the listed articles has undergone a careful review process.

2.1. Design

To find articles published before 2 July 2023, a thorough search was made in the Scopus, PubMed, Web of Science, and ProQuest databases. Search terms linked to (1) population, (2) intervention, and (3) words relevant to outcomes were used in the title, abstract, and keyword searches. The three groups of keywords were combined using AND, and the terms in each group were linked using OR: population—"university", "higher education", and "high education"; intervention—"business game*", "business simulation game*", and "management game*"; and outcomes—"intrinsic motivation".

2.2. Screening Strategy and Selection of Scientific Articles

Duplicate records were deleted when the search was complete. The remaining documents were then checked to see if they matched the inclusion/exclusion criteria, which are shown in Table 1 below.

Table 1. Inclusion/exclusion criteria.

Item	Inclusion Criteria	Exclusion Criteria
Population	University students.	Non-university students.
Intervention	Business simulation games (BSGs) to foster intrinsic motivation (IM).	BSGs that are not aimed at fostering IM.
Outcomes	Interventions that have communicated the development of IM.	Interventions that have not communicated the improvement of IM.
Study design	Only full-text studies that are original and written in either English or Spanish.	Not in English or Spanish and written in another language. Reviews, letters to the editor, trial registrations, protocol proposals, editorials, books, and conference papers are examples of article genres that are not original.

2.3. Data Selection

Information that can most accurately represent the BSG interventions as well as elements that could have an impact on the development of IM have been extracted. For this purpose, the data collected from the original articles were the country, sample, area, aim of the studies, measurement methods, results, conclusions, and a detailed description of the BSGs, including the following information: type of game, category, whether the game is general related to all company or specifically to a concrete business area (such as marketing), whether the game is collaborative or not and evaluable or not, and information about mechanics.

2.4. Methodological Assessment

The methodological evaluation procedure was utilized to discover acceptable papers for inclusion by adapting the STROBE evaluation criteria [32]. A numerical description was used to score each item (1 = finished, and 0 = not completed). The rating of each study was qualitatively reviewed in line with the following laws, according to O'Reilly et al. [15]: provide in the abstract an informative and balanced summary of what was performed and what was found (item 1). State-specific objectives, including any prespecified hypotheses (item 2). Give the eligibility criteria and the sources and methods of selection of participants (item 3). For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group (item 4). Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why (item 5). Give characteristics of study participants (item 6). Summarize key results with reference to study objectives (item 7). Discuss limitations of the study, considering sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias (item 8). Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence (item 9). Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based (item 10). Articles that score less than seven are seen to have a high risk of bias, whereas studies that score more than seven are considered to have a low risk.

3. Results

3.1. Identification and Selection of Studies

The four phases of systematic reviews have been followed (identification, screening, eligibility, and inclusion) [16]. At the beginning, 329 documents were retrieved from the PubMed, Scopus, Web of Science, and ProQuest databases, and 1 was added from an external source, of which 4 were duplicates. As a result, a total of 325 articles were downloaded. After reviewing the titles, abstracts, and full texts of the remaining articles using the same criteria, 138 studies were ignored in compliance with criterion 5 (Study). Out of the 187 remaining articles, 54 were eliminated for not meeting Criterion 1 (Population), 114 were dropped based on Criterion 2 (Intervention), and 7 were dropped for not meeting Criterion 3 (Outcomes). Finally, 12 papers were selected in the qualitative analysis. The four PRISMA-recommended phases are depicted in a flow diagram in Figure 1, along with the inclusion and exclusion criteria for each study in each phase.

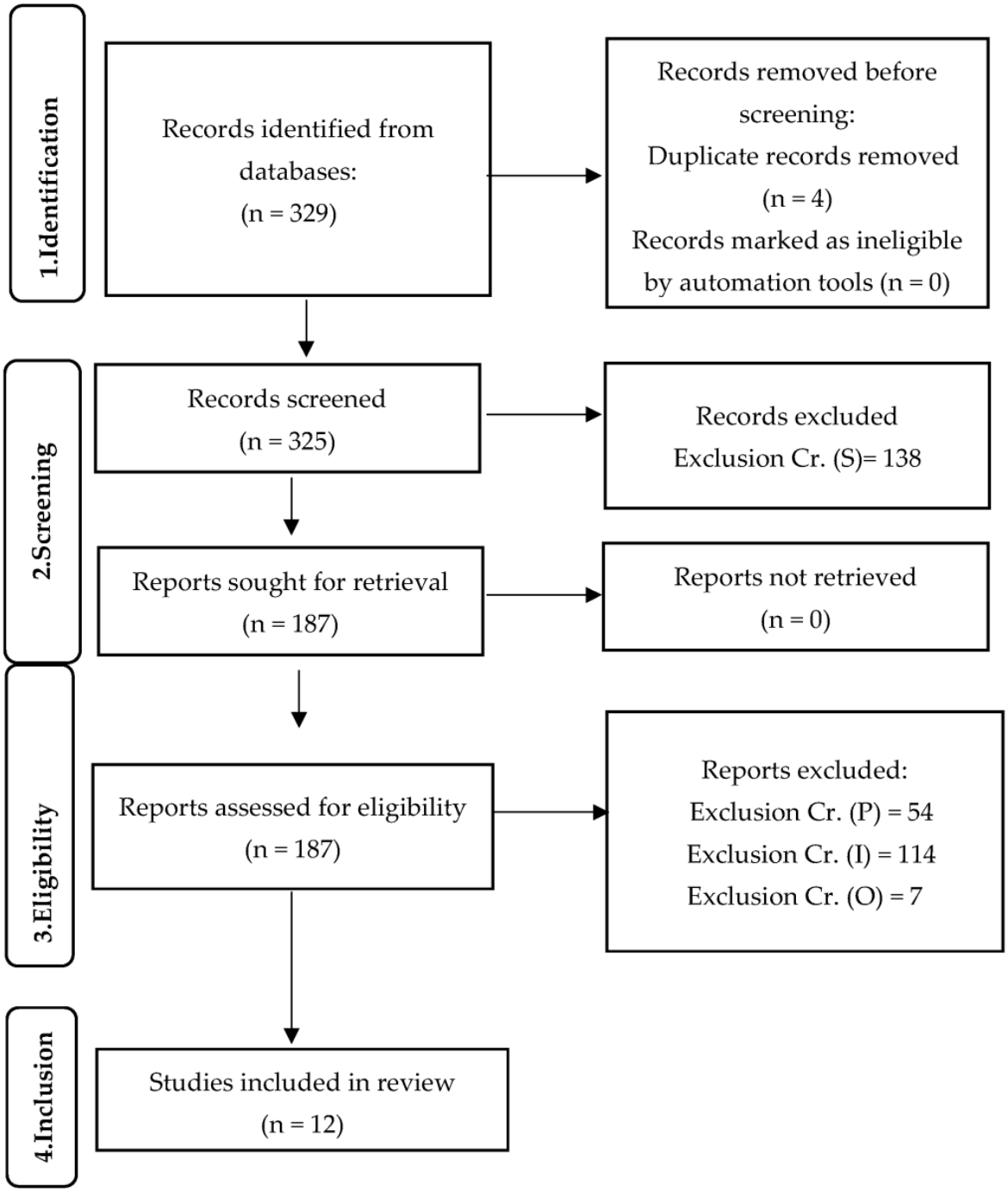

Figure 1. Flow diagram of the study.

3.2. Methodological Quality

According to the evaluation of each item provided by STROBE evaluation criteria [15], which have been explained in Section 2.4, Table 2 demonstrates that the general methodological quality of the publications is high.

Table 2. The methodological quality of the articles.

Reference	1	2	3	4	5	6	7	8	9	10	Q
Beranic and Hericko (2022) [17]	1	1	1	1	1	1	1	1	1	1	10
Buil et al. (2019) [11]	1	1	1	1	1	1	1	1	1	1	10
Carenys et al. (2017) [18]	1	1	1	1	1	1	1	1	1	0	9
Dumblekar (2010) [19]	1	1	1	1	1	1	1	1	1	0	9
Grijalvo et al. (2022) [10]	1	1	1	1	1	1	1	1	1	1	10
Herzig (2019) [20]	1	1	1	1	1	1	1	1	0	1	9
Manshoven and Gillabel (2021) [21]	1	1	1	1	1	1	1	1	1	1	10
Matute and Melero (2016) [22]	1	1	1	1	1	1	1	1	1	1	10
Mayer et al. (2014) [23]	1	1	1	1	1	1	1	1	1	1	10
Sedbrook (1998) [24]	1	1	1	1	1	1	1	1	0	0	8
Tews et al. (2020) [25]	1	1	1	1	1	1	1	1	1	1	10
Urquidi-Martín et al. (2019) [33]	1	1	1	1	1	1	1	1	1	1	10

3.3. Article Analysis

The outcomes of the analysis of the studies are displayed below. In order to facilitate the understanding and presentation of the results, two tables have been prepared. Table 3 details the information about the country, sample, area, aim, measurement methods, results, and conclusions. Then, Table 4 contains the most relevant data on type of game, category, if the game is collaborative and evaluable, and, finally, detailed information about mechanics.

According to Table 3, the issue of this study is interesting regardless of cultures or teaching methodologies because the study samples are large and representative and geographically show that they cover quite varied locations. The articles analyzed are student driven since the studies focus on the impact of the BSGs on student motivation and on formal or informal learning. Additionally, BSGs are becoming increasingly prevalent in universities for a variety of university degrees, not only in business administration. As for the measurement instruments, they are varied and include standardized scales, interviews, ad hoc questionnaires, as well as observations. In this way, very complete results can be extracted from different perspectives.

With respect to interventions detailed in Table 4, they can be classified in three different ways. First, a number of simulation games are board games, where students play by moving small objects around on a board [20,21,23], whereas other simulation games are digital, taking advantage of the great development that has taken place in recent years in information and communication technologies [10,11,17–19,22–25,33]. Additionally, we can find simulations carried out on the whole company [10,11,19–22,33], on a functional area of the company (such as finance) [17,23,24], or on a specific area (such as communication) [23,25]. Finally, there are games where students can compete in groups against other students [10,11,17–23,25,33], whereas other games can only simulate competing against the computer [23,24]. In general, most of the studies have worked with digital games, most of them are collaborative because they allow interaction with other participants, and they are not evaluable. In addition, the fact that there are BSGs in different categories means that IM can really be developed from many different management fields, not only simulating being a manager of a company. Therefore, BSGs offer multiple possibilities, are open or flexible, and, in the end, are applicable to a wide spectrum of business areas [29].

Table 3. Country, sample, area, intervention of Business Simulation Games, measurement methods, results, and conclusions.

Study	Country	Sample Size	Area	Aim	Measurement Methods	Results	Conclusions
Beranic and Hericko (2022) [17]	Slovenia	32	Business and Economy.	Analyze the relationship of ERPsim introductory session and improvement of the students' knowledge domain and intent for future course engagement.	Survey with Likert-type scale.	The simulation motivated the students to gain new knowledge and was also linked to obtaining the best possible result compared to other teams.	The findings supported the initial simulation's suitability for introducing ERP concepts to newcomers while also confirming the simulation's beneficial effects on students' intentions to engage in subsequent courses.
Buil et al. (2019) [11]	Spain	360	Business.	Analyze the effect of satisfying players' needs for competence, autonomy, and relatedness on their IM to play the BSG.	Situational Motivation Scale (SIMS).	The results offer compelling evidence in favor of using business simulation games in management education as a method to encourage players' intrinsic motivation (IM). Autonomy and competence have impacted IM while relatedness has not had a significant impact.	Encouraging student IM increases student engagement, skill development, and perceived learning.
Carenys et al. (2017) [18]	Spain	132	Accounting.	Assess the effectiveness of videogames in comparison to simulations in a higher education environment and with regard to their attributes, motivation, and learning outcomes.	Ad hoc questionnaire based on the Instructional Material Motivational Survey (IMMS).	Students obtained higher IM with the video game than with the simulator, as they found it more satisfying and relevant.	These findings support the use of videogames in higher education accounting and business contexts as a complement to simulations, and enable us to suggest a blended learning strategy that gives students the best of both interventions.

Table 3. *Cont.*

Study	Country	Sample Size	Area	Aim	Measurement Methods	Results	Conclusions
Dumblekar (2010) [19]	India	391	Business management.	Understand the composition of the construct ofinterpersonal competitiveness and study its factors in terms of available research.	The Competitiveness Index (CI).	The intervention fostered IM by competing against other teams.	The notion that interpersonal competitiveness is a combination of calculated push, early action, and the drive to act without visible gain, by the individual, is strongly supported by IM.
Grijalvo et al. (2022) [10]	Spain	346	Industrial Engineering.	Identify the context and conditions that support the integration of business simulators within formal learning environments. Analyze if the use of a BSG is beneficial and is aligned with the needs, requirements, and objectives of all agents of the educational ecosystem.	Student surveys.	Intervention promotes IM that depends on the presence of satisfaction and a sense of competence.	Simulators provide students with multi-layered learning opportunities and help them develop soft skills like strategic capacity, decision-making, and data analysis. Simulators also help students learn through their interactions with others as well as from their reflections on their actions and results. The simulator is, therefore, a fantastic opportunity and a very practical tool.
Herzig (2019) [20]	United States	15	Arts Administration.	Analyze the effect of the use of a BSG on learning outcomes.	Interviews with Likert-type scale.	Most students felt more intrinsically motivated and with more engagement after the intervention.	Using a simulation game as a low-risk way to experience reality will increase motivation, engagement, as well as depth learning and practical applications.

Table 3. *Cont.*

Study	Country	Sample Size	Area	Aim	Measurement Methods	Results	Conclusions
Manshoven and Gillabel (2021) [21]	Belgium and United Kingdom	71	Business and Engineering.	Explore how the strategic, operational, and financial opportunities and challenges of circular economy strategies and circular business models can be conveyedto students and business executives through a BSG.	Observation and student surveys.	Most of the participants increased their IM by indicating that the game was interesting, engaging, and fun.	Players who considered the game to be a learning tool underlined the realistic, unpredictable character of the game's events and complimented how it encouraged strategic thinking. After the game, having a discussion prompted players to consider their newly learned material, which deepened their learning experience.
Matute and Melero (2016) [22]	Spain	266	Business Administration and Management.	Analyze aspects that can improve the experience and the attitude and behavioral intentions towards the BSGs.	Likert-type scales.	The simulation game has increased students' IM, interaction with peers and development of critical thinking.	Findings show that strong teacher support, high levels of learner motivation, and perceived fun have a very positive impact on the opinions of students about this learning instrument.
Mayer et al. (2014) [23]	Holland	26	Engineering.	Analyze to what extent the use of BSGs contributes to entrepreneurship (or to learning related to entrepreneurship), and which factors determine its contributions.	Situational Motivational Scale (SIMS).	In general, the intervention promotes IM. However, there are significant differences in the IM reported by the students.	The perceived effects on entrepreneurship following the training may be strongly influenced by personality factors, motivation, and previous gaming experience.

Table 3. *Cont.*

Study	Country	Sample Size	Area	Aim	Measurement Methods	Results	Conclusions
Sedbrook (1998) [24]	United States	110	Business.	Analyze if visual–interactive games better support pedagogical goals and motivate students with complex business simulations.	Observation.	Simulation only highly motivates one segment of students, whereas the rest of the students have notably less IM.	Visual elements provide game creators with the ability to make their creations more realistic and complex. However, careful planning is needed when using visual interactivity to help students make accurate generalizations.
Tews et al. (2020) [25]	Australia	13	Project Management.	Analyze the learning experience evidenced by students who played project management serious games as part of their educational experience.	Seven-item, Likert-type scale.	Most of the students encouraged IM and they reported high level of enthusiasm for game-based learning.	Students enjoy learning through games; however, it is advised against using games to formally assessstudents' learning.
Urquidi-Martín et al. (2019) [33]	Spain	326	Economics.	Identify the determining factors in the effectiveness of using BSGs for the development of critical thinking.	Ad hoc questionnaire with four-item Likert-type scale.	The intervention fosters IM and thus leads to more critical thinking. IM depends on the realism of the game, the perceived use of the game and the structure of the game.	The results in accordance with the experiential learning theory shown that the game's realism allows students to recognize its usefulness and, along with a suitable simulation structure, determines the students' learning motivations by fostering critical thinking.

Table 4. Description of Business Simulation Games.

Study	Type of Game	Category	Collaborative	Evaluable	Information about Mechanics
Beranic and Hericko (2022) [17]	Digital.	General.	Yes.	No.	In the game ERPSim Distribution, participants work for a distributor that supplies Convenience Stores in a German market with bottled water. The business sells ClearPure, Spritz, and Lemon Spritz water in 1 L and 500 mL versions, for a total of six different products. Three regions make up the market, and each has its own set of purchasing habits. To free up the participants' attention for more inventive, decision-based transactions, some of the transactions are automated. Three consecutive rounds are used to run the simulation.
Buil et al. (2019) [11]	Digital.	General.	Yes.	Not reported.	Each team ran a business to compete with other businesses run by other players, creating an environment of competition. Players had to immerse themselves in a technology industry that had been artificially constructed for each round in order to produce and sell various air-conditioning products in three simulated marketplaces that were modeled after the markets in the European Union, North America, and South America. Players had to manage one productive factory, thus in addition to choosing which products to promote in which regions, they had to deal with inventory, quality controls, outsourcing, and buying new equipment, among other things. Finally, players had to make choices on financial management and marketing-related issues (including price, distribution, and media planning investments).
Carenys et al. (2017) [18]	Digital.	Specific.	No.	No.	In the game "Working Capital Simulation: Managing growth V.2′, students take on the role of the CEO of a small business and choose whether to invest in growth and cash-flow improvement prospects. The financial profile of each opportunity varies, and students must assess how it will affect working capital. The relationship between the income statement, balance sheet, and statement of cash flows must be understood by the students, and they must also take into account how each possibility can affect the firm's financial condition. The company has tight liquidity constraints, a small pool of available loans, and works on razor-thin margins. As they strike a balance between the necessity to retain liquidity and the goal for expansion, students must maximize the utilization of both internal and external resources. By managing net operating working capital and learning about the trade-offs between sales and EBIT growth, the simulation tries to improve intuition about a firm's cash conversion cycle.

Table 4. *Cont.*

Study	Type of Game	Category	Collaborative	Evaluable	Information about Mechanics
Dumblekar (2010) [19]	Digital.	General.	Yes.	Not reported.	In the team IceBreaker, each team was given a company to handle. Decisions that would increase their post-tax profit were to be made. Their choices affected the functions of manufacturing, marketing, and finance. They competed in the same market, where customers' decisions to purchase from one team over another had an impact on sales and other business success. Teams anticipated and responded to each other's resources and anticipated decisions, creating a competitive atmosphere. They were given a variety of economic and business data and given the task of debating matters pertaining to the distribution of team resources for the achievement of its objective.
Grijalvo et al. (2022) [10]	Digital.	General.	Yes.	No.	In the games Gestionet and GCM, students managed a business in a competitive industry in an effort to maximize their return on investment. Teams receive information about the company they will be managing before the games begin, and they use the Internet to submit their initial management choice in the areas of marketing, production, human resources, and finances. Teams then receive a thorough result in the financial and operational aspects of their market after the simulator evaluates and compares the decisions made by the teams. Teams also receive various game documents during play that describe business and management scenarios and have the option to purchase market data that could aid in improved decision-making. They face off against groups that sell the same goods in the same marketplace.
Herzig (2019) [20]	Board.	General	Yes.	Not reported.	In the game Fame and Fortune, the main learning objectives were to show how specific contract clauses between artists and their team members—specifically, a record label—affect market behavior, consumer behavior, market constraints imposed by finite budgets, and chance factors such as well-known performances, viral success, human error, or emerging technologies. The best financial results are the team's primary focus. Action cards, resource cards, value cards in the form of simulated money, interactive rounds with chance elements, and final value calculations are all employed in the simulation to decide the results and levels of success.

Table 4. *Cont.*

Study	Type of Game	Category	Collaborative	Evaluable	Information about Mechanics
Manshoven and Gillabel (2021) [21]	Board.	General	Yes	Not reported.	In the game Risk&RACE, players inherit a production firm in a setting where resources are few and markets are unstable. In the span of 10 rounds, which corresponds to 10 years, they hope to raise the worth of their business. Players will need to reconsider their material supply chain, product design, sales strategy, and product end-of-life in order to adapt to the challenges placed upon them. The player's cash and debt position, investments, stocks of raw materials and finished goods, and personnel count are all scored together to determine the value of the company.
Matute and Melero (2016) [22]	Digital.	General.	Yes.	No.	In the game RAD-MTK, each team of students participating in the simulation had to virtually manage the production and distribution of a climate control products company in three different markets: the local market, the European market and the Latin American market. In addition, the student teams had to decide on financial, production, marketing, human resources, and logistics policies. In the simulation, the different teams had to deal with different conditions of inflation, interest rates and exchange rates.
Mayer et al. (2014) [23]	Digital and Board.	Specific.	Teamup: Yes.Slogan: No,	Not reported.	1. TeamUp, a multi-player, 3D digital game on teamwork and leadership. A group of four players are stuck on a tropical island with Mayan ruins (a high-quality 3D gaming setting) as impersonal avatars wearing red, green, yellow, or blue sweaters. The four players must cooperate to solve a series of cooperative puzzles as quickly and accurately as possible in order to get their avatars to the other side of the island. To do this, they must communicate and self-organize (e.g., pick up cues, build a language, arrange leadership, and coordinate actions). 2. Slogan: A non-digital management game for higher education and professional development that addresses change, markets, communication, and management. Players represent four departments inside a business whose primary product is "slogans, " which it designs, produces, markets, and sells. By assigning a value to each slogan based on undefined quality and quantity standards, a facilitator assumes the role of the "market" and serves as the players' "market". Only closed queries are permitted from the players when trying to determine what the market wants. 3. SimVenture is a single-player, computer-based corporate strategy game. One person (or a small group of players sharing a computer) can engage in a variety of activities to launch and grow a virtual company. The game has a tutorial video included, and there are many difficulty settings, from easy to advanced.

Table 4. *Cont.*

Study	Type of Game	Category	Collaborative	Evaluable	Information about Mechanics
Sedbrook (1998) [24]	Digital.	Specific.	No.	Yes.	1. Simulation Queuing Game: Students can experiment with training expenses, customer discounts, advertising spending, and process design in the game while waiting in line. Service delays are simulated through a negative exponential distribution, and processed customers each generate $80.00 in revenue and arrive according to a Poisson distribution. In the scenario, if servers are busy, clients are less inclined to wait. 2. Quality Control Games: By developing plans for sampling a day's production run and establishing control limits, students assume the role of quality control managers to determine if a process is under control or out of control.
Tews et al. (2020) [25]	Digital.	Specific.	Yes.	No.	SimulTrain® is a collaborative, interactive game aimed at enhancing teamwork and project management skills in the areas of cost, schedule, quality, risk, and team dynamics. Teams from various locations can fight together because of the application's internet accessibility. Real-time team performance is updated on a leaderboard. Each team receives project evaluation that identifies both strong and weak methods of operation.
Urquidi-Martín et al. (2019) [33]	Digital.	Specific.	Yes.	Not reported.	1. Fishbanks is a multiplayer online game where players take on the role of fishermen and attempt to maximize their net worth while competing with other players and adjusting to changes in fish stocks and their catch. Participants bargain with one another while also buying, selling, and building ships. 2. World Energy: A Climate and Energy Policy Negotiation Game provides participants with an interactive environment in which to learn about climate and energy policy and examine the dynamics that develop between different stakeholders and economic sectors when tackling climate change. World Energy is concerned with the effects of energy supply, agriculture, economic consumption, and other factors on the climate. Additionally, participants gain expertise in policy evaluation, presentation, and negotiation.

In relation to the results and conclusions of the studies presented in Table 3, it can be observed that the majority of them consider that IM has been promoted after the interventions. There are different aspects that have allowed the interventions to promote the increase in IM: the simulator must have a well-defined structure and be realistic to allow students to think strategically and autonomously [11,17,18,21,24,33]; it must be user-friendly and clearly arranged [20–22,24]; it must allow competition against other students [19,23]; there must be feedback throughout the process with other students and with the instructor [10,19,21,22]; and the task must not be marked [25].

It should be noted that the studies analyzed have some limitations that should be pointed out. Thus, some results could also be biased due to the subjectivity of students since the questionnaires were based on retrospective and self-assessment statements [11,17]; some investigations have a small sample size [18,25]; other studies did not cover any demographic variables such as age and gender [19], or the dataset was collected in one academic year, in a specific school or institution [23,33]; and finally, the software could have been more intuitive, visual, and, in general, better designed [22].

4. Discussion

This systematic review has resolved the following research questions: (1) "What is the relationship between the use of BSGs and IM in higher education like?", and (2) "What aspects can be promoted by the BSGs to develop IM that contribute to quality education and thus to the development of the 4th SDG?".

In relation to the first research question, the BSGs encourage IM, explaining this finding on the basis of SDT and the three elements that underpin IM (autonomy, competence, and relatedness) [14]. This is consistent with authors who claim that they foster student motivation [12]. The BSGs provide all the key information and game instructions to make decisions autonomously, and students can feel that they are in control of the situation experimenting freely. Furthermore, participants gain new knowledge, and they have a feeling that they know how to do the tasks well, developing the competence required by the company. Regarding relatedness, students have a sensation of being interconnected to each other, communicating or having feedback or discussing within their teams, and they also have interaction with instructors. It is noteworthy that all studies agreed on the significance of using BSGs in higher education because students are inspired to get more involved in their studies and feel more engaged when they do this. In addition to the development of IM, the BSGs analyzed also provide other benefits such as improved critical thinking, engagement, and knowledge acquisition. These results are congruent with the conclusions obtained in other studies on game-based learning [12,13].

In relation to the second research question, different aspects that favor the development of IM have been extracted that contribute to quality education and to the development of the 4th SDG. Some authors highlight the importance of having a well-defined structure and being realistic. Interventions must be well structured, and the different areas must be well defined according to the objective of the BSGs to allow students to think strategically and autonomously [11,17,18,21,24,33]. In particular, several interventions aim to simulate the management of a company, so these BSGs should enable decision making in all key areas of a company. In the case where the objective of a BSG is a particular area of the company, it should take into account all the important elements of that area. For example, one intervention [17] focuses on the distribution area and contains all key elements. Likewise, the simulator should provide all the key information to make decisions and the consequences that ensue. Also, the interrelationships between different areas should be considered when making a decision. As the desire for autonomy is preferred, and students feel competent and effective, these findings are compatible with the self-determination theory, which is based on basic psychological needs, namely, in this case, autonomy and competence. The BSGs should be realistic, so they should contemplate unexpected events, as they arise in the real business world [21]. In addition, it is very helpful if the difficulty level of the game is customizable [18]. All these aspects are more feasible in digital games,

due to the multiple possibilities offered by new information technologies. In this way, it is possible to contribute to the development of the 4th SDG, and specifically to target 4.4 on employability skills by significantly increasing the number of young people and adults who have the necessary skills to access employment, as the work experience simulation provides access to real experience. Target 4.3, which deals with equal access to higher education, is also promoted, ensuring that all people acquire quality technical, professional, and higher education, including university education.

Other research [20–22,24] highlights the importance of being user-friendly and clearly arranged. Thus, BSGs must be intuitive so that participants can manage the game without great difficulty and feel comfortable. For this, the functioning and rules of the game should be clear through the instructions in the case of board games or through the tutorial for digital games. In the case of digital games, it would be interesting if the participants could do some test rounds as a rehearsal, competing against the computer, before facing other participants, in order to learn the dynamics of the game. Moreover, BSGs must be visually attractive to participants. In the case of digital games, there has been a great evolution in this area from the first games of two decades ago [24] to the most recent ones of the last few years [10,11,17]. The International Telecommunication Union (ITU) and The International Labor Organization (ILO) are leading the campaign. The "Digital Skills Campaign" aims to close the skills gap by promoting partners to pledge financial support for young people's digital skill development. By doing so, young people's employability and innovation skills may improve, supporting other areas of the digital economy, as it is the first United Nations system-wide global initiative to promote youth employment worldwide.

Most of the identified studies allow participants to compete against other students [10, 11,17–23,25,33]. Only a few investigations about computer-based BSGs enable only playing against the computer [23,24]. Students like to compete against other students, finding the competitive situation as pleasurable since they wish to win in interpersonal situations, and, furthermore, competitive individuals can be expected to try harder, earlier, or more effectively than others [19]. Self-determination theory thus provides a basis for the significance of the basic psychological need for relatedness, where participants have a sensation of being interconnected to each other, and competence because they get a feeling that they know how to do the tasks well, and they are in control of the situation.

Another aspect advocates for promoting feedback and interaction throughout the process with other students and with the instructor [10,19,21,22]. In order to promote learning, students should have the chance to communicate within their teams and have discussions with other students who compete on different teams [21]. Instructors could also schedule tutoring sessions and provide participants with data from prior competitions, such as videos or reports [10,19]. In this respect, the instructors must explain the previous instructions of the game, technical doubts that may arise during the game, and give feedback of the whole process of the simulation [22]. Again, these findings are congruent with self-determination theory since relatedness would be strengthened as a basic psychological need thanks to this strategy. Additionally, relatedness is very enriching for learning since, according to Vygotsky's social constructivism theory of learning, the concept of learning is represented by the students' self-effort in building new knowledge and constructing meaning via social interaction and collaboration [34]. Aspects of communication, interaction, dialogue, and discussion between people favor respect and empathy, which are necessary as a strategy to support the advancement of the 4th SDG, and more specifically to target 4.7, which aims to ensure that all learners acquire the knowledge and skills necessary to promote sustainable development, including through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity, and the contribution of culture to sustainable development.

Some authors refer to the fact that the students were not graded based on their performance in the simulation, so they did not obtain an extrinsic reward. So, the participants have the ability to experiment freely and concentrate on achieving new knowledge [17],

promoting the level of competence that defends the self-determination theory. In only two investigations are the students formally evaluated, with their the grade being taken into account in the final official evaluation of the studies [10,24]; however, in one case, the weight of this simulator evaluation was minimal at 2% [24]. Regarding the advisability of making the BSGs evaluable or not, there is no uniformity in other studies [12], given that the BSGs may have objectives other than the promotion of IM. In this regard, if the aim is to measure knowledge acquisition, it would be essential for the BSGs to be evaluable, whereas, if the aim is to promote IM, for example, it would be counterproductive.

The interventions have shown that both board games [20,21,23] and digital games [10,11,17–19,22–25,33] promote IM, offering different advantages. Thus, digital games allow more complex simulations of different areas of the company in detail, and also allow the simulation to be more complete by having a mathematical algorithm that generates multiple results [29]. On the other hand, in board games, students can visualize and manipulate physical objects, thus feeling involved and concentrated in the action of the task. In addition, if resources are limited, board games need little economic investment, they do not depend on a computer or being connected to the network, so they can be used anywhere, and it is not necessary to buy new licenses. Then, technology is not a determining factor in achieving greater IM, and there is no need to use augmented reality or other very complex tools since simple board games in business are very useful [29]. This is in line with the 4th SDG, which states that only through access to education for the entire population can sustainable economic and social growth be guaranteed since it allows access to simulations with little or no investment.

The teacher's role is crucial, as they must take care of the integration of BSGs in the existing curriculum [12], plan the game, give instructions correctly before the game, solve doubts, and comment on the results in a group. All this requires effort, time, and commitment, regardless of the BSGs used [10]. In addition, it is essential to offer personalized attention since not all students learn the same way [25].

In summary, there are numerous studies that analyze the use of BSGs in education and find very positive results in IM, affirming that students' commitment to the task is greater [10]. Furthermore, it is important to note that interventions carried out to foster IM must accomplish the following aspects:

- Have a well-defined structure and be realistic.
- Must be user-friendly and clearly arranged.
- Must allow competition against other students.
- Promote feedback and interaction throughout the process with other students and with the instructor.
- Must not give a grade which counts for the degree.

Finally, in congruence with other studies on game-based learning [35,36], in recent years, BSGs have gained popularity as teaching and learning techniques in higher education. They serve as a link between theory and practice, giving students the chance to participate and gain experience, and they promote learning by the decisions they make and the results they encounter. In order to raise the IM of the students, both universities and instructors should work to promote the use of BSGs.

5. Conclusions and Future Directions

5.1. Conclusions

Higher education must provide society with quality education, where IM plays a fundamental role because it allows students to be deeply engaged in their learning. In this regard, pedagogical interventions like BSGs can help students to develop their IM and, furthermore, to learn about, experiment with, and perform various activities that will be required of them in their future employment. All this is congruent with and helpful for the development of the 4th SDG since the 2030 Agenda promotes quality education and skills development to help people obtain decent employment. In this systematic review, the two research objectives derived from the research questions related to the promotion

of IM through the use of BSGs in higher education have been met: (1) "to analyze the relationship between the use of BSGs and the IM of students in higher education" and (2) "to identify the aspects that can be promoted by the BSGs to develop IM that contribute to quality education and thus to the development of the 4th SDG". To the best of the authors' knowledge, there was no systematic review that has analyzed the two research objectives of this article, given that other reviews on BSGs have other objectives [12,29]. Therefore, the most relevant theoretical contributions of this review are to respond to the objectives explained below.

In reference to the first research objective, it can be said that the analyzed articles using BSGs as a tool have promoted IM by fostering the three pillars of SDT theory. The BSGs encourage autonomous work by providing all the key information and game instructions, as well as fostering student competence by providing them with the theoretical and practical knowledge required in the area of business administration; finally, they foster relatedness by allowing interaction with other students and teachers. Following with the second research objective, different aspects have been identified that encourage BSGs to be successful in fostering IM. It is worth noting the importance of the well-defined structure of the BSGs and the fact of being realistic. In addition, BSGs must be user-friendly, clearly arranged, and allow competition against other students. It has also been seen that it is essential to promote feedback and interaction throughout the process with other students and with the instructor as well as not being evaluable for the official studies. Likewise, board games can also be successful, and, even if digitization brings greater possibilities for more complex and realistic simulations, anyone with a little investment can make a BSG that fosters IM.

This review also provides practical implications for instructors or teachers that can serve as a reference for their classes. BSGs are a very useful tool for student learning as long as the aspects identified in the second research objective for fostering IM are taken into account. Furthermore, board games in business are useful interventions to promote IM since they allow students to physically visualize the simulation by manipulating objects and investing few resources. However, it is important to emphasize the importance of incorporating new technology into the classroom because it enables the teacher to maximize the resources available. For example, computer-based BSGs that allow flexible scheduling of the tasks to be performed or that offer the possibility for the teacher to remotely access any simulation of each student at any time are factors that would help the teacher to better control the whole process.

To ensure high-quality education, BSGs that support IM must be implemented. Thus, the 4th SDG of the 2030 Agenda can be promoted as a result of the aforementioned interventions. This objective highlights the need to provide all students with access to high-quality education and promote opportunities for lifelong learning [4].

5.2. Limitations and Future Directions

Although the most pertinent databases have been included, it is likely that some additional papers can be found in other databases, which could be a limitation of the present study. In addition, articles that have not been published in English or Spanish have been excluded, so it is possible that some articles can be found in other languages. Considering that the scientific community has demonstrated that the improvement of IM through BSGs is a very important topic that is still growing and has many development possibilities, this systematic review can serve as the basis for future investigations and for students since they can have access to practical and real learning of the work environment. Lastly, as the work involved in encouraging IM by BSGs and the interventions is very diverse, it is an ideal field for innovation and creation in accordance with the suggestions given in this review. In future research, it would be interesting to analyze in detail other benefits that BSGs interventions can foster, such as learning, teamwork, and decision making. It is also possible to investigate how BSGs focused on specific new technologies (e.g., neuroscience research devices and virtual reality) can foster IM. Thanks to technological breakthroughs that promote the students' full potential development and high-quality education, as

stipulated by the United Nations in its 4th SDG, it is possible to accomplish a far more engaging future education using new tools.

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