Entrepreneurship and Game-Based Learning in Higher Education: A Systematic Review

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Abstract: Game based learning and entrepreneurship education are two topics that have been gaining attention in recent years. This is due to the importance of entrepreneurship for economic growth, employment, and innovation. As such, researchers have begun exploring how game-based learning may be used to foster entrepreneurial skills, both in students and young graduates. Entrepreneurship education has become increasingly important in higher education as it equips students with the skills necessary to become successful in the business world. Even though many entrepreneurship education programs still use traditional teaching methods, it is now known that game-based learning can be a very effective way to develop entrepreneurship competences. In addition, research has shown there may exist potential benefits beyond just improving entrepreneurial knowledge. In fact, studies suggest that playing certain types of games may improve problem solving abilities by teaching players how to break down complex problems into smaller component parts as well as helping them to develop better communication skills needed when working with others on projects or collaborations outside one's own venture. All these findings make it even more important for us to understand why people enjoy playing different kinds of games so that educators can create experiences that will not only help grow businesses and to develop entrepreneur's mindset in youngsters but also provide enjoyable experiences along the way too. This systematic review aims to examine the current literature on the use of game-based learning approaches in higher education to develop entrepreneurship competences.

Keywords: Entrepreneurship; Game-based learning; Higher Education

1. Introduction

As highlighted by Hessels & Naudé (2019) there is not yet consensus about the word entrepreneurship, although they propose a 'synthesis definition', according to which, entrepreneurship is "the resource, process and state of being, through which individuals with ability and agency utilize positive opportunities in the market for generating individual and/or social value" (Hessels & Naudé, 2019, p. 397). On the other hand, the definition adopted by the EntreComp, a framework for entrepreneurship education and training developed by the European Commission – originally proposed by the Danish Foundation for Entrepreneurship & Young Enterprise - is as follows: "entrepreneurship is when you act upon opportunities and ideas and transform them into value for others. The value that is created can be financial, cultural, or social" (Bacigalupo et al., 2016, p. 10).

Despite the lack of consensus about a definition of entrepreneurship, in today's global market, characterized by the reliance on knowledge, entrepreneurship is seen as essential for countries looking to remain competitive. This is because entrepreneurship is often associated with promoting economic growth, fostering creativity, and encouraging innovation. As a result, there has been a growing interest in creating educational programs that support and enhance entrepreneurial skills (Boldureanu et al., 2020). In fact, entrepreneurship is considered as a key skill of the 21st century, alongside other abilities that are necessary for achieving success in the knowledge society, such as learning and working (Antonaci et al., 2015).

Entrepreneurship Education (EE) has become an essential component of higher education as it contributes to equip students with the skills necessary to become successful in the business world, but it also provide graduates with the tools to approach their work in a dynamic, innovative, and adaptable manner (Tony, 2016). Entrepreneurship education is a process of teaching and learning about the knowledge, skills, values, and attitudes needed to start, manage, and grow a business. It includes recognizing opportunities, managing resources in the presence of risk, and building a business venture. It also involves developing entrepreneurial attitudes and skills, not just training for business start-ups. Additionally, it aims to develop enterprise capacity and prepare students to integrate the workforce with an entrepreneurial and innovative attitude. It is seen as an effective way to prepare graduates for the workforce by focusing on skill and competency development. Overall, entrepreneurship education is considered to be a key component in equipping students with the knowledge and skills needed to exploit opportunities in the current knowledge environment (Hynes and Richardson, 2007).

The increasing interest in EE has led to various objectives for the field, as well as a variety of pedagogical approaches used to deliver it (van Ewijk, Oikkonen and Belghiti-Mahut, 2020). The techniques and strategies employed in entrepreneurship education tend to vary widely across different programs, classes, and geographical regions (Neck and Corbett, 2018).

It is important to note that gamification and game-based learning are related concepts, but they are not the same thing (Kapp, 2012). Gamification refers to the use of game design elements and mechanics in non-game contexts, such as business, education, or health care, in order to engage and motivate people to achieve their goals (Hessels and Naudé, 2019). Game-based learning, on the other hand, refers to the use of games as a tool for teaching and learning (Hessels and Naudé, 2019).

Game-based learning has gained popularity as an effective approach in teaching entrepreneurship in higher education (Vandercruysse, Vandewaetere and Clarebout, 2012), since it is an interactive and engaging approach to teaching that utilizes games and simulations to provide students with hands-on experience in a simulated business environment (Nadolny and Halabi, 2016). This approach allows students to apply theoretical concepts in a realistic setting, which can make learning more meaningful and relevant. Game-based learning also promotes active learning, which is beneficial for students as it increases their participation and engagement in the learning process (Pesare et al., 2016).

Research has supported the idea that game-based learning is an effective approach to teach entrepreneurship. Studies have found that game-based learning improves students' ability to understand entrepreneurship concepts, increases their motivation to learn, and enhances their problem-solving skills. Additionally, game-based learning has been shown to improve students' attitudes towards entrepreneurship, which is important as a positive attitude towards entrepreneurship is associated with a greater likelihood of becoming an entrepreneur in the future (Carenys and Moya, 2016).

Despite the potential benefits of game-based learning, there are also limitations to this approach. One limitation is the cost of developing and implementing game-based learning programs (Whitton, 2012). Another limitation is that game-based learning may not be suitable for all students. Some students may not be comfortable with technology, if the games used are digital (Carenys and Moya, 2016), or may prefer traditional methods of learning (Greipl, Moeller and Ninaus, 2020). This systematic review aims to examine the current literature on the use of game-based learning in higher education to teach entrepreneurship.

2. Methodology

This study builds on a systematic review that aims to examine the existing literature on the relationship between entrepreneurship education and game-based learning in Higher Education. A comprehensive search was conducted in Scopus and Web of Science platforms, using keywords (within title, abstract and keywords of the documents) related to entrepreneurship education, game-based learning, and higher education. We used two databases, Web of Science and Scopus, that stand as the forefront citation databases, both globally acclaimed and engaged in fierce competition (Zhu and Liu, 2020). We applied some restrictions to our search: only articles and reviews were included, since they are peer-reviewed, which guarantees a greater degree of rigor when compared to other types of publications (Kelly, Sadeghieh and Adeli, 2014). The other restriction was on the language: only English documents were selected.

The number of documents per group of keywords, before and after the restrictions were applied is represented in table 1. The data was retrieved on the 14th of February of 2023. After removing the duplicates within each database, a total of 74 documents and 45 documents were retrieved from Scopus and Web of Science, respectively. These documents were retrieved to a single database, 33 duplicates were removed, leaving a total of 88 documents.

Table 1: Number of documents per group of keywords in the respective databases, before and after restrictions were applied. Scopus and Web of Science accessed on February 6, 2023. Source: own elaboration

Keywords	Scopus		Web of Science	
	Before restrictions	After restrictions	Before restrictions	After restrictions
Game based learning AND entrepreneurship	124	51	87	28

Keywords	Scopus		Web of Science	
	Before restrictions	After restrictions	Before restrictions	After restrictions
Gamification AND entrepreneurship	76	28	53	20

The titles and abstracts of the articles were screened for relevance. Eligible articles met the following criteria: (a) focused on entrepreneurship education and game-based learning in higher education, (b) had full-text available for review. A total of 28 documents were selected for full review. Although the search was not confined to a specific period, the oldest one was from 2009, highlighting the recent emergence of this topic in the scientific literature.

3. Results – Literature Review

Experiences with game-based approaches in entrepreneurship education

Serious games, which combine instruction and gameplay to create engaging learning contexts, have been recognized as potential effective tools for developing entrepreneurship and management competencies to university students. In a study by Bellotti et al. (2014), the authors conducted a comprehensive overview of serious games (SGs) available on the market and identified key benefits and issues concerning their adoption for teaching entrepreneurship. This approach may support "learning by doing", where students may practice and apply what they have learned in a hands-on way. Antonaci et al. (2015) propose a theoretical model that considers usability, pedagogy, and entrepreneurship skills expressed by state-of-the-art models to identify the most appropriate mix of serious games for use in entrepreneurship courses. This suggests that serious games may be carefully selected and integrated into entrepreneurship curricula to create engaging learning experiences.

Furthermore, gamified and collaborative courses for entrepreneurship education have been developed to help students become familiar with basic concepts of entrepreneurship and management and stimulate the emergence of their entrepreneurial attitudes. These courses incorporate game mechanics such as leaderboards and badges to enhance students' experience, engagement, and entrepreneurial self-efficacy. In a study conducted by Isabelle (2020), the course, with a 12-week format, involved the creation and operation of online ventures by 269 undergraduate students, who experienced the entire entrepreneurship process from ideation to launch of a real business and beyond. The findings suggests that gamification may be an effective approach to promote active learning and enhance students' entrepreneurial skills and attitudes.

In addition, simulation-based approaches have been used in entrepreneurship education to provide students with experiential learning opportunities. For example, a study by Arias-Aranda & Bustinza-Sánchez (2009) investigated the impact of a simulation experience on entrepreneurial attitude through conflict management learning. The study was conducted on a sample of 427 advanced undergraduate students majoring in Business Management and Administration, Economics, Tourism, and Marketing at the University of Granada (Spain). The selected simulation program, Praxis MMT v.10, tasked the students with managing a manufacturing company in the automotive industry. The study found that students who participated in the simulation experience scored significantly higher in conflict management handling modes that reinforce internal relationships within the team, such as collaboration and compromise, compared to non-participants. The simulation experience also positively affected personal control and self-esteem, improving the perception of control and conflict management approaches. The study concludes that incorporating simulation tools into educational programs related to entrepreneurship can improve conflict management capabilities and foster motivation and the development of cooperative attitudes.

Memar et al. (2021) investigates the effectiveness of gamification in large classroom settings for teaching causation and effectuation behaviors in entrepreneurship education, using an experiential learning exercise called the Strategic Business Game. The authors found that the Strategic Business Game prompts students' causation and effectuation behaviors, fosters better student interaction, and enhances the quality of learning. Aries et al. (2020), conducted a study in Entrepreneurship or Business Plan courses in BINUS online learning, a higher education institution in Indonesia that provides e-learning degree programs. The results obtained from a sample of 400 students indicate that gamification can positively influence attitude, perceived behavior control, and subjective norms, with perceived behavior control being the dominant factor, leading to increased entrepreneurial intentions among students.

Evidence on the impacts of game-based approaches in education

A study on the long-term effects of gaming simulation to teach entrepreneurship to German university students, particularly related to the business processes of startups, found that participants showed an overall increase in their knowledge of business administration and business plan preparation skills, as well as an increase in their desire to create a startup (Kriz and Auchter, 2016).

Likewise, the concept of flow experience, defined as a mental state of complete absorption in an activity, emerges in the literature related to game-based learning, in the context of entrepreneurship education. This concept is found to be critical in enhancing learning performance and entrepreneurial self-efficacy (Yen and Lin, 2022). The challenge-skill balance and playability of the game are identified as key antecedents of flow experience, and designing game-based learning environments that promote flow experience can lead to improved learning outcomes in the context of entrepreneurship education. This finding is supported by Grivokostopoulou et al. (2019), which demonstrates that gamified learning activities, particularly those implemented in 3D virtual reality environments, can significantly improve students' knowledge and skills in entrepreneurship, management, and finance, as well as increase their self-efficacy and intentions to engage in entrepreneurial activities.

Another important finding in the literature is the experiential nature of game-based learning. Williams (2015) focuses on SimVenture, a business simulation game, and demonstrates that it not only develops business and management skills but also entrepreneurial attitude and values in management students, highlighting the value of experiential learning through games in developing entrepreneurial skills and attitudes

Game-based learning has gained increasing attention as an innovative approach to teaching entrepreneurship and business management concepts in higher education. Several studies have explored the impact of various games on student engagement, skill development, and learning outcomes. For instance, the study by Beltrão & Barçante (2016) investigated the use of the "Industrial Administration Game" (JOGAI), which simulates a supply chain of jewelry production for export, covering the entire process from mining of raw materials to sale to the final exporter, to teach Business Excellence and Total Quality Management to undergraduate students. The findings indicated that the hands-on approach of the game was well-received by students and fostered entrepreneurship, increased class participation, teamwork awareness, and discussions on business ethics.

Yang et al. (2022) further examined the influence mechanism of virtual simulation game learning experience on student engagement and entrepreneurial skill development. The study found that game design, teamwork, and self-efficacy had significant effects on entrepreneurial skill development and learning engagement. This suggests that the design of the game and the collaborative nature of gameplay can influence student engagement and skill development in entrepreneurship education.

Rosli et al. (2019) investigated the use of a board game in teaching entrepreneurship and accounting to non-accounting students (N=49). Pre- and post-game experiment surveys found that game-based accounting education aids in generating an interesting teaching and learning environment on business accounting course that focuses on student-centered learning, and most of the respondents agreed that using games helped them to comprehend the business accounting knowledge better.

Moreover, the use of game-based learning approaches in teacher training programs has been explored as a way to enhance students' competences and provide better evaluation of outcomes. Canaleta et al. (2014) argue that traditional lecture-based approaches often result in student passivity, and active learning methodologies, including serious games and project-based learning, can promote pro-activity and improve the effectiveness of learning. The authors evaluate the results obtained in the Master in Teacher Training (MTT) program, which is a professional Master program for teachers who teach in Secondary Education, Baccalaureate and Vocational Training in Spain, in its first three academic years of implementation (2009-2010, 2010-2011 and 2011-2012). The authors also emphasize the need for a more profound use of Information and Communications Technology (ICT) to create a learning system adapted to the digital world that the new generations of students are integrated into. This suggests that game-based learning can be beneficial not only for entrepreneurship education but also for other domains, such as teacher training, to enhance student learning outcomes.

Insights about the importance of context for game-based learning

The social context of game-based learning is highlighted in several references. For example, Fonseca et al. (2012) describes a game that was designed as a Facebook application that guides users to develop a business idea in the form of a business plan allowing users to learn entrepreneurial skills in a social context. A consortium of

eight European partners from seven distinct countries (Portugal, Spain, Italy, Slovenia, Serbia, United Kingdom, and Belgium) developed the project, entitled “PLAYER-a”. The authors of this study found that the social fabric of the game positively impacted the participants, increasing their propensity towards self-employment and the large volume of participants in the competition (N=2706) demonstrated a strong interest and demand for entrepreneurship education.

Similarly, Musteen et al. (2018) evaluate the effectiveness of the Global Board Game Project (GBGP), which aims to promote interactions between students in different countries. They collaborate online in a semi-structured manner to generate ideas, develop, and market a board game product to another country. The qualitative analysis of student essays indicated that the project was effective in helping students achieve learning outcomes, including defining, recognizing, and evaluating international business opportunities, designing and validating a business model based on such opportunities, and creating a plan for pursuing these opportunities.

Another common theme across the studies is the importance of motivation and engagement in game-based learning. Several studies (Mayer et al., 2014; Patricio, 2017; Kauppinen and Choudhary, 2021) show that motivation, personality traits, and previous gaming experience can significantly influence the perceived effects of entrepreneurship training. Mayer et al. (2014) focuses on the use of serious games in a Master's level entrepreneurship course at Delft University of Technology (TU Delft) in the Netherlands (N=27), finding that personality traits, motivation, and gaming experience can significantly influence the perceived effects on entrepreneurship after the training. The use of gamified tools, such as ideaChef® (Patricio, 2017) and Kahoot! (Kauppinen and Choudhary, 2021), is shown to enhance team engagement and participation in class activities.

The use of video games in developing innovation skills in the context of entrepreneurship and innovation education was also investigated. Tobar-Muñoz et al. (2020) conducted a study using the Innovator's DNA framework of skills and observed participants interacting with a game specifically tailored for fostering these skills. The study found that participants enacted actions involving observing, associating, and experimenting, which are skills related to innovation. On the other hand, Costin et al. (2019) and Manshoven & Gillabel (2021) highlight the benefits of using simulation games for enhancing entrepreneurial competencies and business model innovation. Costin et al. (2019) utilizes a simulation game called 'SimVenture' to investigate the development of cognitive and non-cognitive entrepreneurial competencies in a master's degree in international entrepreneurship at the University of Limerick, Ireland, emphasizing the transferability of these competencies to diverse business contexts. Manshoven & Gillabel (2021) presents the development and testing of a simulation board game called Risk&RACE aimed at bridging the gap between theory and business practice in implementing circular economy business models. The game was tested with 120 users, and results showed improved awareness, understanding, and insights in circular economy principles and business models. Players praised the engaging and realistic nature of the game, and debriefing discussions further deepened their learning experience.

Experiences with game-based approaches for students with different backgrounds

Several authors focused on the impact of teamwork and prior experience on student performance in business games (Alas et al., 2018; Almeida and Simões, 2019). Alas et al. (2018) discusses a study conducted in Estonia that explored the relationship between teams' characteristics and their performance in the business game Dynama, as well as the effect of market research information on their performance (N=713). In the game, students form teams representing the management of five competing companies in a business game. The authors concluded that success in the business game Dynama is influenced by factors such as acquiring adequate information (market research), quality of homework, and team discipline. Moreover, high academic achievement and prior work experience positively impact the achievement of a favorable result. On the other hand, Almeida & Simões (2019) highlighted the advantages and limitations of using serious games in entrepreneurship education, particularly for simulating challenges in start-up launch and management. Their study identified accessibility, interoperability, usability, and evaluation of student performance as global concerns in using serious games for entrepreneurship education.

The perception of students towards game-based entrepreneurship learning has also been explored. Ahsan & Faletehan (2021) conducted a qualitative study in Indonesia using the "Start and Improve Your Business (SIYB)" game. Data was collected from 441 participants through a nine-year survey. The authors found that participants liked the game for its positive impact on entrepreneurial spirit, skills, insights, and mindsets. However, some participants expressed concerns about the characteristics of the game, personal issues, and teamwork. This suggests that while game-based learning can have positive impacts, it is important to consider the concerns and preferences of students in the design and implementation of such games.

Other studies focused on the development of gamified software applications for business simulation and entrepreneurship learning. TIȚA et al. (2019) proposed the use of Unified Model Language (UML) and Business Process Model (BPM) tools to study business processes and develop a theoretical model for a gamified software application. The study aimed to provide a virtual simulation environment for understanding business principles in formal university education. Pratikto et al. (2021) explored the use of educational entrepreneurship game apps as a medium for online classes to improve students' analytical skills regarding business processes. The study found increased entrepreneurial analysis skills among students who engaged with the game-based mobile apps.

In addition to skill development, Zichella & Reichstein (2022) highlight the importance of entrepreneurship curricula that increase awareness of the cognitive mechanisms involved in biased decision-making with financial risk. Drawing on data from a money games experiment with undergraduate students (N=45), the article highlights specific biases relevant to high-risk environments, such as the prior gain effect and the degree-of-risk effect.

4. Conclusion

This literature review on game-based learning for entrepreneurship education in Higher Education Institutions reveals several key findings and trends. Overall, the studies highlight the positive impact of gamification on various aspects of entrepreneurship education, including entrepreneurial competencies, intentions, engagement, and innovation capabilities. The studies included in this systematic literature review suggest that game-based approaches may be effective in enhancing entrepreneurship education by improving students' innovation skills, changing perceptions of entrepreneurship and industry-related aspects, and increasing learning motivation and performance.

Although, many games primarily emphasize company management, with limited focus on fostering a specific entrepreneurial mindset, motivation, and skills such as innovation and the ability to identify and meet emerging needs of people. This gap is particularly relevant for technology students who need to be motivated and educated on starting a business based on new technology-supported ideas and products/services. However, the current market lacks complex "real-world" simulations that incorporate human factors, making it challenging to provide comprehensive training in this area. Furthermore, a notable limitation in many of the studies reviewed is the absence of a control group, which represents a significant shortcoming in the research design.

Overall, the literature indicates that games and simulations may be effective tools for teaching and enhancing entrepreneurial skills and attitudes in students. These tools may provide a social context for learning, allow students to face challenges, and develop their analytical skills and business knowledge.

One important direction for future research in entrepreneurship education is the examination of gender-related aspects within the learning environment. This could involve analyzing the behaviors and attitudes of individuals from different genders towards entrepreneurship activities and frameworks, with the goal of understanding potential differences and identifying areas for improvement. Additionally, future research could explore the efficiency of collaborative learning activities, where students work in teams and engage in cooperative learning, communication, and soft skill development. Further research can also explore the long-term effects of game-based learning on entrepreneurship outcomes, including evaluating the sustained impact of gamified interventions on students' entrepreneurial skills and behaviors beyond the immediate learning context.

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