

Exploring the Use of a Business Simulation Game in Professional Certification

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Abstract: This paper explores the use of the Startero business simulation game in the context of professional certification. Startero immerses learners in the role of managing a personal sports coaching business, allowing them to develop entrepreneurial and decision-making skills in a risk-free environment. Through analysing participant's feedback in a certification session, this study highlights both the strengths and improvement areas. Learners appreciated the game's immersive and interactive aspects. However, they also pointed out organizational and content challenges. These insights provide valuable directions for optimizing Startero, as well as business simulation games in general, for more effective use in certification programs.

1 INTRODUCTION

Business simulation games (BSGs) have emerged as a transformative tool in experiential learning, enabling learners to manage simulated firms and make strategic decisions in a risk-free, interactive, and realistic environment (Pando-Garcia et al., 2016).

This hands-on approach not only enhances student engagement but also fosters the development of critical skills such as collaboration, decision-making, problem-solving, and critical thinking (Faria et al., 2009; Hernández-Lara et al., 2018; Tao et al., 2015; Vos & Brennan, 2010). Since their inception in the late 1950s, BSGs have evolved significantly, driven by advancements in operations research, war games, computer technology, and educational theory (Keys & Wolfe, 1990). Today, they are widely recognized as a powerful pedagogical tool in business education, providing a dynamic platform that bridges the gap between theoretical knowledge and practical application (Pitic & Irimiaș, 2023). However, while they are effective, some studies suggest that learners' perceptions of how they help develop specific skills are influenced by cultural aspects (Hernández-Lara et al., 2018).

In the context of management training, BSGs have proven to be highly effective in engaging and motivating learners (Pitic & Irimiaș, 2023). Their immersive nature allows participants to take an active

role in decision-making, experiment with strategies, and analyze outcomes in a controlled yet dynamic setting (Ben-Zvi, 2010; Sitzmann, 2011). Research has also consistently demonstrated the positive impact of BSGs on learning outcomes, including improved knowledge retention, enhanced problem-solving abilities, and increased motivation (Beranič & Heričko, 2022; Faisal et al., 2022; Sitzmann, 2011; Vogel et al., 2006).

Technological advancements have played an important role in the evolution of BSGs, with innovations such as interactive features, advanced graphics processing, artificial intelligence, and cloud computing significantly enhancing their realism and accessibility. These advancements have enabled BSGs to become a staple in business courses, particularly at the undergraduate level, where they provide students with active learning experiences that are both engaging and educational (Faria et al., 2009). Beyond fostering engagement, BSGs are instrumental in developing a wide range of soft skills, including teamwork, leadership, and communication, as well as technical skills in areas such as strategic management, marketing, finance, and project management (Lean et al., 2006; Pasin & Giroux, 2011).

Unlike traditional teaching methods, which often rely on passive learning through lectures and tutorials, BSGs offer a dynamic and experiential learning environment that closely mirrors real-world

business challenges (Williams, 2015). By running a simulated company, students can integrate and apply theoretical knowledge, tackle complex problems, engage in active decision-making, and observe the consequences of their actions in real time (Faria & Wellington, 2004). This iterative process of experimentation and reflection allows students to learn from their mistakes and develop managerial and generic skills that are highly valued in the industry (Gosen & Washbush, 2004). As a result, BSGs have become an indispensable pedagogical tool in business education, equipping students with the competencies needed to thrive in a rapidly evolving global business landscape.

In this paper, we explore the use of a BSG for professional certification, a topic that is less represented in literature. In Section 2, we begin by presenting the BG Startero, detailing its pedagogical objectives, and core mechanics. Then, in Section 3, we describe the certification sessions conducted using Startero and discuss the participants' feedback.

2 THE BUSINESS SIMULATION GAME: STARTERO

2.1 Technical Description and Goals

Startero is a business simulation game developed with PHP programming language. This simulation aims to cultivate learners' business management skills by immersing them in the role of managing a personal sports coaching business. Through realistic scenarios and strategic decision-making tasks, Startero enhances skills in business management, financial management, marketing, and operational efficiency.

The simulation revolves around Tess, a passionate fitness enthusiast who decides to transform her passion for sports into a career as a private sports coach. With the support of her childhood friend Antoine, who offers both advice and an initial investment, Tess establishes a Limited Liability Company.

The players assume the role of Antoine, tasked with advising Tess and guiding the growth of the business. Users collaborate in groups to make strategic decisions and individually develop their skills. The players mission in the game involves four key points: firstly, they need to establish a robust marketing position by comprehensively understanding and meeting the expectations of target customers to maximize satisfaction. Secondly, they must ensure operational efficiency by effectively

organizing resources to support business activities. Thirdly, they should strive for economic profitability by aiming to achieve a positive annual financial outcome. Lastly, they need to adhere to management constraints, particularly ensuring that their cash flow remains within the limits set by the bank.

The design of this game is based on two key components: a learning management system (LMS) and a simulation platform. The LMS, specifically Moodle in this case, serves as the entry point of the BSG. It contains educational resources, pedagogical activities (primarily quizzes), and relevant information about the simulation session. The simulation constitutes the core interactive element of the game, immersing learners in the business scenario and prompts them to input their decisions.

2.2 Business Scenario

Startero consists in a 12-month simulation scenario designed to provide a comprehensive learning of business skills. Concretely, each month corresponds to a section in the LMS (See Figure 1). It contains a concise introduction to fundamental concepts and the objectives for that month. It also provides educational resources (pdf documents, videos and exercises) related to the month's objectives, along with a quiz activity to assess learners' understanding. Upon completing the quiz, learners are directed to the simulation platform, where they collaborate in teams to make informed decisions aimed at managing the company effectively and achieving the month's objectives.



Month 1 - Discover Accounting



Objectives

- Understand the purposes of accounting as well the principles behind accounts
- Discover the main accounting documents

Program

- Micro-lesson
- Quiz
- Take the decision of month 1 on the simulator
- Evaluation

Figure 1: Presentation of the first month in the LMS.

In the following month, learners delve deeper into the previously introduced concepts, tackle more quiz questions, and face more challenging decisions on the simulation platform. This cycle repeats, with each month building on the prior month's knowledge, introducing intermediate and advanced concepts, and featuring increasingly complex quizzes and decision-making exercises on the simulator. Table 1 gives a detailed description of each month's objectives and concrete tasks. Figure 2 presents the simulator interface for the first month, where the learner teams are invited to choose the sport session's duration and price, as well as the type of drink offered: mineral water or energy drink. Learners discuss in teams and compare their points of view before making a final decision in the simulator.

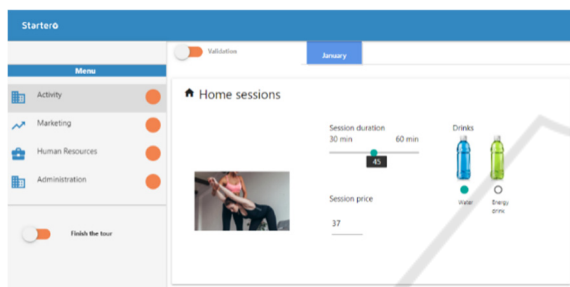


Figure 2: Simulator interface for the first month.

Table 1: Overview of each month's objective and the tasks required from the learners' teams.

Month	Month's objectives	Concrete tasks
1	Company Creation, activity launch, and customer acquisition	Make initial decisions regarding sports session scheduling, including proposing the session duration, the sale price, the drinks offered, and selecting transportation options for traveling to clients' homes.
2	Keep clients' satisfaction and attract new prospects.	Develop the company's reputation using various communication channels, and purchase of a computer.
3	Business development	Recruit a new employee for business development and integrate social media into the company's communication strategy.
4	Expanding the business activity	Invest in new services and seek financial resources, such as a bank loan.
5	Development of the new services	Purchase the necessary equipment for the new services
6	Review of adopted Business strategies	Adapting communication strategies and reviewing supplier proposals.
7	Analysis of Economic performance	Propose a new fitness product and analyse its economic contribution to the company
8	Analysis of human resources	Recruit a new sports coach and select a supplier for the proposed product
9	Functional Analysis of the Company	Analyse financing options and oversee the management of the new employee
10	Budget management of the Company	Renew equipment
11	Management accounting	Cost of production and margin
12	Year-end Financial Summary of the Company	Conduct a retrospective analysis and explore outlook

2.3 Score Calculation and Ranking

Each month, group performance is evaluated based on four axes: financial, commercial, responsible, and efficient. Each axis comprises several indicators (see Table 2). For example, customer satisfaction is an indicator of commercial performance. Each month, customers evaluate the services according to their expectations. Their satisfaction is summarized in an indicator that reflects their review, focusing on elements such as the ratio of session duration to price and the type of drinks offered. Another example of an indicator is the carbon footprint. Some decisions impact the environment, and their results are an indicator of Responsible performance. The global performance score is calculated using a weighted sum of the performance of each axe. Learner teams can achieve the maximum points each month only by finding the best balance among all these indicators. A score below 100 points indicates that the team is below the expected performance, a score of 100 points means that the expected value is met, and a score above 100 points indicates that the team has surpassed the expected performance.

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Table 2: Indicators for performance evaluation.

Axes	Indicator
Financial	Monthly result
	Monthly revenue
	Profitability rate
Commercial	Customers satisfaction
	Number of clients
	Average basket
Responsible	Corporate Social Responsibility index
	Employees engagement
	Carbon footprint
	Service rate
Efficient	Occupancy rate
	Employee's productivity

3 EVALUATION

Startero is generally used in two ways: first, in learning sessions to help learners acquire business management skills, and second, in certification sessions to assess those skills. The certification sessions enable students to earn a certification from the National Register of Professional Certifications. In this paper, we present and discuss the data collected during a certification session that utilized

Startero to obtain the "Commercial Development Manager" certification.

3.1 Conduct of the Session

The last Startero certification session was organized to certify the title of "Commercial Development Manager" of The National Register of Professional Certifications, bringing together 1,862 candidates from 16 institutions. Over five days, the candidates worked both in teams and individually across 12 simulation cycles of Startero. Before the session, students were organized into teams by instructors (typically groups of 4 or 5), and each student received two codes: an individual code for authentication during individual activities, and a group code used to authenticate in the simulator for group decision-making activities.

On the first day, session animators introduced the session and presented the simulator and the expectations for the session. Technical checks were then conducted to ensure all groups were ready to begin. Once prepared, all groups commenced the Business Game Simulation. Each simulation cycle corresponds to a month in Startero. Initially, only the Moodle section for the first month was accessible. There was a designated time limit to complete the tasks required for that month. Once all groups completed their tasks or the time limit expired, session's animators initiated score calculation, and a leaderboard was displayed to participants. Following this, the animators revealed the previously hidden Moodle section for the second month, and participants commenced the following cycle (month), continuing in this manner for subsequent months. At the end of the session, the final ranking was displayed, and a comprehensive final debriefing was conducted. Simultaneously, the learners completed individual case studies throughout the certification week. Domain experts evaluated the conclusions of these case studies to determine the individual performance of each learner.

Finally, participants were invited to respond to a questionnaire to provide their opinions on several aspects of the simulation. They were asked to evaluate their overall experience, the playful and immersive aspect, and the rhythm of the simulation. There were also open-ended questions asking participants to describe which aspects of the simulation they appreciated the most, which aspects they appreciated the least, and to provide a general comment about the certification session. Table 3 lists some of the questionnaire items and the expected answers.

Table 3: Main items of the questionnaire.

Questionnaire items	Expected answers
Did you enjoy this evaluation experience?	<ul style="list-style-type: none"> - I did not like it at all - This isn't exactly what I like. - I really liked it - It was nice.
Globally, you're finishing this certification week ...	A number from 1 (very dissatisfied) to 10 (very satisfied)
What did you think of the playful aspect?	<ul style="list-style-type: none"> - Too elaborate - Suitable - Not developed enough
To what extent did you find the simulator context motivating (immersion into Antoine and Tess's roles)?	<ul style="list-style-type: none"> - Not motivating at all - Slightly motivating - Motivating - Very motivating

4 RESULTS AND FEEDBACK

At the end of the session, we analysed the learners' answers and comments from the post-session questionnaire. Overall, 59% of the participants liked this evaluation experience, which differed from what they are used to, while 41% did not like it for various reasons discussed later. Responses about the immersive aspect of the BG showed the following distribution: 79% found this aspect particularly motivating, while 21% did not share this view (Figure 3) Regarding the playful aspect of the simulation, 69% felt it was well integrated, a small minority 5% thought it was overly developed, and 26% said this aspect was not developed enough. Regarding overall satisfaction after these five days of certification, opinions were more divided. 35% were dissatisfied, 34% were satisfied, and 31% of the participants were neutral (Figure 4).

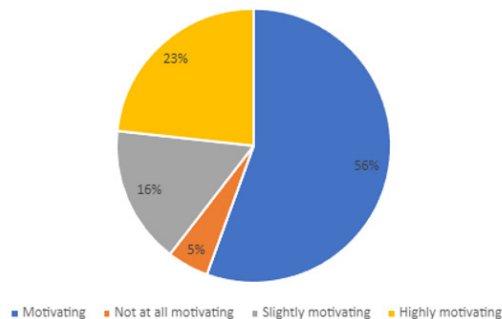


Figure 3: Answers to the question "To what extent did you find the simulator context motivating (immersion into Antoine and Tess's roles)?"

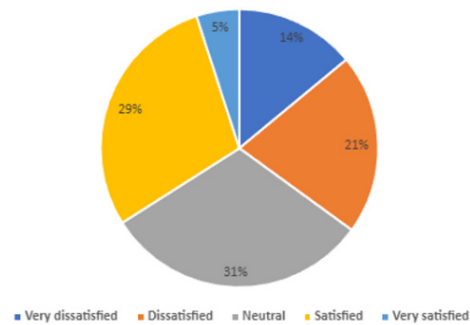


Figure 4: Answers to the question "Globally, you're finishing this certification week ..."

To understand these results, we have analysed the learner's comments to identify clearly what they liked or not about this experience. The results revealed that the overall experience was satisfactory and interesting. Participants particularly appreciated the collective decision-making moments, even those who stated that their overall experience was not good. They found it stimulating and interesting to discuss their ideas with others before making collective decisions. Additionally, they valued the competitive aspect and the role-playing elements of the simulation.

On the other hand, participants noted excessive downtime between decision-making phases and a lack of clarity in some questions, instructions, and grading criteria. Many participants felt that the amount of information and data they needed to process within the allocated time was excessive, particularly during the individual case studies. Additionally, technical issues and bugs occasionally disrupted the overall experience, which led to frustration among participants during their activities. Participants also stated that tasks related to communication and financial aspects were overemphasized, while other aspects were underrepresented in this certification. Finally, some learners felt that success required thinking like the algorithm rather than applying their own judgment.

We also analysed the learners' comments about the instructors during the session. Overall, the learners were satisfied and felt well-supported, even though the instructors were managing many teams. However, the learners identified gaps in their financial knowledge that the instructors were unable to address. Additionally, some learners reported receiving contradictory information from different instructors.

Finally, we analysed the learners' suggestions for improving the business simulation game. They expressed a desire to have a team member with a

finance background or to reduce the emphasis on financial aspects. Additionally, learners felt the need for more time and highlighted the imbalance and heterogeneity of the groups in terms of the represented disciplines. Fields such as supply chain, logistics, wealth management, and HR were either underrepresented or not represented at all, according to the learners. There was also a notable demand for more freedom in decision-making. Learners found the choices to be overly guided and not necessarily realistic (e.g., an energy bar priced at €8), which should encourage deeper reflection. Regarding the display of the month's results, learners preferred that they be accessible to all group members individually rather than just one person in the team.

5 CONCLUSIONS

In this paper, we explored the use of the Business Simulation Game, Startero, in a certification context for the "Commercial Development Manager" certification. Feedback from 1862 participants was encouraging, with many appreciating the team-based, playful, and immersive nature of the simulation. Some negative feedback highlighted areas for improvement, particularly regarding organizational and technical issues. These issues, while not directly related to the design or educational value of the business game itself, impacted the overall user experience and satisfaction. Addressing these logistical and technical challenges will be crucial for maximizing the effectiveness of Startero in future implementations.

One major limitation of this study is the use of an ad hoc questionnaire instead of a standardized instrument for evaluating the business game. While the ad hoc questionnaire provided valuable insights, the lack of standardization may limit the generalizability and comparability of the results. Despite this limitation, the large sample size strengthens the reliability of the findings and provides a robust foundation for further research.

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