Learning environment and Business games: the perception of the students

Ambiente de aprendizagem e Jogos de empresas: a percepção dos discentes

Tatiani Schmitt
Anete Alberton
Marco Aurélio Butzke
Francine Simas Neves

ABSTRACT

The business game is an active teaching strategy that gives the students an experience close to the organizational reality developed in learning environments. This research aims to analyze students' perceptions when using the strategy of teaching business games in a virtual learning environment at two universities in Santa Catarina. The research is considered mixed, with a quantitative and qualitative approach, with data from 2 questionnaires and two focus groups applied to undergraduate and graduate students from two universities in Santa Catarina. In the data analysis, we used descriptive statistics, factor analysis, and content analysis. The results show that the students had a positive perception of using the Business Games teaching strategy and pointed out difficulties in the learning environment while using the digital games platform. The main contribution is providing subsidies to teachers to improve the teaching-learning process and a stimulus for teachers to use business games and other teaching strategies in the classroom, taking into account important issues for the application's success.

Keywords: Learning environment; Teaching strategies; Business games; Management.

RESUMO

O jogo de empresas é uma estratégia de ensino ativa que oportuniza aos discentes uma experiência vivencial mais próxima da realidade organizacional, o qual é desenvolvido em ambientes de aprendizagem. O objetivo da presente pesquisa é analisar a percepção dos discentes ao utilizar a estratégia de ensino jogos de empresas em um ambiente virtual de aprendizagem em duas universidades de Santa Catarina. A pesquisa é considerada mista, de abordagem quantitativa e qualitativa, com dados oriundos de 2 questionários e de 2 *focus group* aplicados com discentes de graduação e pós-graduação de duas

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Tatiani Schmitt
tatiani.schmitt@hotmail.com
Masters Degree in Business Administration – Universidade do Vale do Itajai
Mestre em Administração – Universidade do Vale do Itajai
Biguaçu / SC – Brazil

Anete Alberton
anete@univali.br
PhD in Production Engineering – Universidade Federal de Santa Catarina
Doutora e Mestra em Engenharia de Produção – Universidade Federal de Santa Catarina
Biguaçu / SC – Brazil

Marco Aurélio Butzke
marcobutzke@gmail.com
PhD in Business Administration – Universidade do Vale do Itajai
Doutor em Administração – Universidade do Vale do Itajai
Rio do Sul / SC – Brazil

Francine Simas Neves
fneves@univali.br
Masters Degree in Business Administration – Universidade do Vale do Itajai
Mestra em Administração – Universidade do Vale do Itajaí
Itajai / SC – Brazil

RESUMO

universidades de Santa Catarina. Na análise dos dados foram utilizadas a estatística descritiva, a análise fatorial e a análise de conteúdo. Os resultados mostram que os discentes tiveram uma percepção positiva sobre o uso da estratégia de ensino Jogos de empresas e no ambiente de aprendizagem apontaram dificuldades ao utilizar a plataforma digital dos jogos. A principal contribuição é o fornecimento de subsídios aos docentes para aperfeiçoar o processo de ensino-aprendizagem, bem como um estímulo para docentes utilização de jogos de empresas e de outras estratégias de ensino em sala de aula, levando em consideração questões importantes para o sucesso na aplicação.
Palavras-chave: Ambiente de aprendizagem; Estratégias de ensino; Jogos de empresas; Gestão.

Introduction

Changes in the profile of students and the presence of new technologies have meant that teachers in the classroom increasingly adopt active teaching strategies to bring the student closer to the experience with the corporate environment and provide developing skills to deal with the changes that occur in this environment. The business game, in the conception of Motta, Melo, and Paixão (2012), is one of the strategies that has been increasingly used by higher education institutions in Brazil, mainly in undergraduate courses in Administration, with a focus on work environments (SILVA; SAUAIA, 2018). This study area is most subject to pressure in the current situation, whether due to profound changes in the market or the technology itself (CARVALHO et al., 2020).

The game usually takes place on a computer platform, through a virtual environment or *software*, which allows the student to interact, mediated by the teacher, in a corporate setting. With the adoption of this strategy, the professor will collaborate with the teaching process by creating a virtual learning environment, which will help students simulate the complex situations that arise in the daily lives of organizations (BUTZKE; ALBERTON, 2017). Thus, with new teaching and technology strategies in education, the student will face a virtual learning environment with a dynamic process that will encourage their reflection (CALIARI; ZILBER; PEREZ, 2017).

Most studies on this strategy at the national level have investigated the development of simulators and the dynamics of games themselves (MRTVI et al., 2017).

Motta, Melo, and Paixão (2012) affirm the need for more in-depth studies on the contribution of the business game in students' education to provide subsidies for reflection on the use of this strategy in management education. Thus, it becomes relevant to study students' perceptions regarding business games as a teaching strategy and learning environment.

In this sense, this research aims to analyze the perception of undergraduate and graduate students in the management of two universities in Santa Catarina when using the teaching strategy of business games in a virtual learning environment.

Theoretical foundation

This section will address the central themes that support this research – Business Games and Virtual Learning Environment.

BUSINESS GAMES

In Brazil, Business Games began to be disseminated in the 1970s with the study by Tanabe (1973). The author was one of the pioneers of this methodology in the country. They gained strength in the 1980s when more researchers began to contribute to this field. Academic, including the Graduate Program in Production Engineering at the Federal University of Santa Catarina (UFSC), was created to develop educational games by its members and deal with research in engineering (LOPES, 2001). The first games were imported from the USA and translated for use in Brazil (LOPES, 2001; SAUAIA; ZERRENNER, 2009). Since then, this active teaching strategy has been present in several undergraduate and graduate courses in Administration and related areas.

The business game is a dynamic method that allows students to experience actual practice in organizations. They learn from experience, through their mistakes and successes, when making their own decisions during the game cycle. Characterized by virtual representations of actual business situations, games allow students to manage a business in a risk-free environment (BUIL; CATALÁN; MARTÍNEZ, 2019). Zulfiqar et al. (2018) stated that the student could learn more practically through this strategy, considering the game as a realistic scenario. It is possible to prove different

strategies and experience specific circumstances. Motta and Quintella (2012) also emphasize that this strategy provides students with a meaningful and recreational learning experience.

In Sauaia and Zerrenner (2009) conception, the Business Game provides experiential learning to students, integrating the various practical areas present in the curriculum, which provides a suitable environment for using the theories discussed in class in decision-making. This teaching strategy allows students to learn business skills while managing a team (Löffler et al., 2018).

Liao, Huang, and Wang (2015) encourage the use of games in management courses to present various complicated business situations to students in order to establish a bridge between theory and practice and reduce the existing gap, enabling students active involvement in the learning process (BERGAMASCHI FILHO; ALBURQUERQUE, 2010; SIGNORI et al., 2018). Through games, students can create and manage different businesses, face their challenges and obstacles in a risk-free environment and, finally, achieve the reward (ZULFIQAR et al., 2018).

In the perception of students and coordinators, teamwork and the integration of content from different areas of knowledge are beneficial aspects of adopting Business Games in the classroom (MOTTA; QUINTELLA, 2012; NEVES; ALBERTON, 2017). In the study by Chang et al. (2014), the complexity of managing a company and integrating knowledge was perceived by students as favorable elements to this strategy. Gundala and Singh (2016) state that this strategy allows students to practice the knowledge acquired in theory and the integral view of the operation of a company. Oliveira and Melo (2020) found, in a quasi-experiment, greater assimilation of knowledge by the students who received all the theoretical content before participating in the game than the part they received during the game. As pointed out in previous studies, the Business Games provide several benefits for the student's learning process, making this strategy relevant for a higher education that is meaningful to the individual.

In this sense, this research identifies the student's perception regarding the factors that facilitate learning in using this teaching strategy, which is one of the propositions of this study. As subsidies for the delimitation of facilitating factors for learning (Skill Acquisition), the studies by Miles, Biggs and Schubert (1986), Jennings (2002), Chang (2003), Chang et al. (2005), Adobor and Daneshfar (2006),

Neves and Alberton (2017), Butzke and Alberton (2017) and Farashahi and Tajeddin (2018) which are shown in Figure 1.

The studies in Figure 1 were based on the model *skill acquisition questionnaire* created by Miles, Biggs, and Schubert (1986) with 28 items and later adapted by Jennings (2002) to 22 and later 20 items, in order to identify the perception of students regarding the acquisition of skills when using Business Games and teaching cases. In Brazil, this instrument was adapted by Pereira (2012), who analyzed students' opinions regarding the use of the Case for Teaching method. Later, it was used by Butzke and Alberton (2017) and Neves and Alberton (2017), who adapted it for Business Games.

Figure 1 Studies on factors that facilitate learning when using Business Games

Authors	Study proposal	Methodology	Results
Miles, Biggs and Schubert (1986)	Compare the perception of students in the acquisition of skills through the use of teaching cases and business simulations.	• Quantitative study • 64 students of the Commercial Policy course (EUA).	• Students perceived both strategies as viable and valuable in acquiring skills. • Teaching cases were perceived as superior to simulations.
Jennings (2002)	Compare the perception of students when using cases for teaching, business simulations and consulting projects.	• Quantitative study. • 46 students from the Master's course in Strategic Management (United Kingdom).	• The three strategies are effective, but the cases for teaching were considered superior.
Chang (2003)	Compare the perception of students when using cases for teaching, business simulations and consulting projects.	• Quantitative study. • 28 students from the Master's course in Strategic Management (China).	• The use of different teaching strategies provides the development of more skills. • Business simulation has greater acceptance.
Chang et al. (2005)	Compare the perception of students when using cases for teaching, business simulations and consulting projects.	• Quantitative study • 36 students from the Master's course in Strategic Management (China).	• The business simulation strategy has greater significance as it provides more learning for the student.

Adoborn and Daneshfar (2006)	Increase understanding of the factors that promote the effective use of simulations in management education.	• Quantitative study. • 49 students from the Strategic Management course (USA).	• Learning was positively associated with simulation realism, ease of use and task conflict. But negative to emotional conflict. • Ease of use and task conflict positively affected performance, but emotional conflict negatively affected performance.
Butzke and Alberton (2017)	Analyze the relationship between learning styles and the perception of students in the application of business games and the learning environment.	• Quantitative study • 143 students from undergraduate courses in Administration, Foreign Trade and Production Engineering (Brazil).	• Students recognized the contribution of the game of companies to improve learning. They highlighted some aspects: integrating learning in different areas; providing new knowledge about the company's operation; increasing the ability to identify management issues; helping to get to know the activities relevant to professional practice; and stimulating creativity.
Neves and Alberton (2017)	Analyze the perception of management students using simulation-based business games	• Quantitative study • 210 students from the undergraduate and postgraduate courses at the University of Vale do Itajaí (Brazil).	• Business games in the perception of students favor learning, with emphasis on some aspects: integrating learning in different areas, broadening the vision of the operation of a company; and increasing the student's ability to communicate with their peers.

Farashahi and Tajeddin (2018)	Compare and test the effectiveness of lecture methods, case for teaching and simulation	• Quantitative study • 29 undergraduate and MBA students from a business school in Canada.	• In the perception of undergraduate and graduate students, business games are considered the most effective teaching method. • It was also noticed that MBA and undergraduate students have different perceptions, as MBA students perceive the case study method as more effective in developing their interpersonal skills and undergraduate students perceive the lecture (class) as more effective.

Note: Own authorship based on the literature review (2020).

In the study by Neves and Alberton (2017), factors that favor games and three topics stood out: (1) integrating learning in different areas; (2) expanding the view on how a company works; and (3) increasing the student's ability to communicate with their peers. Butzke and Alberton (2017) also examined the learning facilitators, but they found five significant aspects: (1) integrating learning in different areas; (2) providing new knowledge about the company's operation; (3) increasing the ability to identify management issues; (4) helping to get to know the activities relevant to professional practice; and (5) stimulating creativity. Aspect 1 - (integrating learning in different areas) obtained good indicators in most studies, especially in Chang (2003), Chang et al. (2005), Neves and Alberton (2017), and Butzke and Alberton (2017); while aspect 3 (increasing the ability to identify management problems) was highlighted with good results only in the studies by Miles, Biggs and Schubert (1986) and Butzke and Alberton (2017).

VIRTUAL LEARNING ENVIRONMENT

The teaching strategy for Business Games usually takes place on a computer platform, through a virtual environment or software, which allows the student to interact, mediated by the teacher, in a corporate setting. By adopting this method, the teacher will collaborate with the teaching process by creating a virtual learning environment, which will help students simulate the complex situations that arise in the daily lives of organizations (BUTZKE; ALBERTON, 2017). In the area of Admin-

istration, et al. (2012) claim that several strategies benefit from the learning environment in addition to the Business Games, thanks to the possibility that teachers and students have, among themselves, to exchange experiences and experience practical business situations.

The Virtual Learning Environment, also known as VLE, is conceptualized as an information and communication system (software) that has educational tools, through the web, capable of measuring the student's evolution (CARVALHO NETO; TAKAOKA, 2010; MULBERT; BRAZ JUNIOR, 2016). Caliari, Zilber, and Perez (2017) add that these environments enable the development of students according to their time, space and rhythm. The VLE is present in on-site, blended, and distance courses, with instruments and features capable of assisting in the teaching and learning process (RAMOS; SILVA; CARVALHO, 2013). After all, more and more students have technological skills, enabling the *web* to increase education in the academic environment (MONDINI et al., 2016). With digital tools, educational activities become more attractive, creative, and easily accessible (BHATTARAI; MAHARJAM, 2020).

In addition, the use of this environment allows teachers to expand their role in the learning process, when they move from being a mere informant, who only presents the content, to a learning advisor, which makes them responsible for managing communication and the research of students inside and outside the classroom environment (CARVALHO NETO; TAKAOKA, 2009). The virtual learning environment transforms traditional teaching practice with technology and innovation (BHATTARAI; MAHARJAM, 2020).

In face-to-face teaching, the AVA is used by teachers as a virtual support environment, in which they provide *online* functions to expand classroom teaching (PEREIRA; SCHMITT; DIAS, 2007; CARVALHO NETO; TAKAOKA, 2009; CALIARI; ZILBER; PEREZ, 2017). However, Pereira, Schmitt, and Dias (2007) claim that regardless of the modality adopted by the course, it is essential to be careful when selecting the features that will be offered on the web, taking into account the needs of the target audience and the pedagogical proposal determined by the educational institution. In this sense, the educational institution and the teacher must offer a virtual learning environment that is simple to use and conducive to the teaching and learning process.

Regarding the research that verifies individuals' perception in using the virtual

learning environment, Pereira, Oliveira, and Momo (2013) and Teixeira, Stefano, and Campos (2015) verified how students perceive the factors that influence the distance training offered in an AVA. Pereira et al. (2013) pointed out that the dimension efficiency and reliability has a more significant proportion of the quality of the VLE in the perception of students. Teixeira et al. (2015), when analyzing the perception of employees of a financial institution with the AVA at a Corporate University, they found a high degree of acceptance in the aspects of ease of interaction, absorption of new knowledge, use of tools, skills in using the AVA and applicability of the knowledge obtained. These authors recognize the environment as also conducive to professional education.

Studies by Seddon and Kiew (1996), Carvalho Neto and Takaoka (2010), and Mondini et al. (2016) dealt with the quality dimension in the AVA. In their studies, Carvalho Neto and Takaoka (2010) used the *Information Systems Success Model* (IS) of DeLone and McLean (2003). When analyzing the direct relationships existing between the dimensions, the authors found the inexistence of a relationship between the quality of information and the system's quality. In contrast, the other relationships were statistically significant. In their research, Seddon and Kiew (1996) also addressed the model by DeLone and McLean. They were showing that the dimensions of information quality, system quality, and utility represent 70% of system user satisfaction, and Mondini et al. (2016) confirmed the influence of the dimensions of information quality and system quality on user satisfaction its perceived benefits.

In contrast, the studies by Ferreira et al. (2013), Ramos et al. (2013), Freitas et al. (2015), Pereira, Ramos, and Chagas (2015), Butzke and Alberton (2017), and Huang et al. (2020) were based on the *Technology Acceptance Model* (TAM) developed by Davis (1989). This model seeks to clarify why the individual accepts or rejects using a specific technology, in this case, the virtual learning environment, regardless of its requirement (PEREIRA et al., 2015; YAKUBU; MUHAMMADOU, 2020). The authors also claim that the TAM and IS models are the most adopted in the literature, with good acceptance.

The *Technology Acceptance Model* (TAM), developed by Davis (1989), is formed by two constructs: ease of use and perceived usefulness. Later, Venkatesh and Davis (2000) complemented the model with social influence and cognitive

instrumental constructs, resulting in the TAM2. However, the TAM model has still been the best accepted and most adopted in national surveys. Another model that has been highlighted in national studies is the *Information Systems* Success Model (IS) developed by DeLone and McLean (2003), which consists of five dimensions: information quality, system quality, satisfaction, usage, and benefits, in order to measure the satisfaction of the individual users of a web system.

Ramos et al.'s (2013) research highlight that the use of VLE increases as students consider the perceived usefulness dimension, as it positively impacts its use. Therefore, with the increase in student performance, the use of VLE is more intense. Freitas et al. (2015) concluded that the dimensions usefulness, ease of use, and attitude are relevant predictors for those who have the idea of using the VLE. In the study by Butzke and Alberton (2017), the quality of information dimension had the best agreement rates, followed by the perceived usefulness dimension and the ease of use dimension that had the lowest score due to the difficulty is exposed in the Games of Companies. The study by Huang et al. (2020) found that students are more likely to use mobile technologies in learning when they consider them useful, as their results show that perceived usefulness significantly influenced behavioral intention.

It is noteworthy that Ramos et al. (2013), Pereira et al. (2015), Butzke and Alberton (2017) also used the information quality dimension, which belongs to the DeLone and McLean (2003) model, in addition to using the TAM model. Ramos et al. (2013) confirmed the positive influence that the perception of information quality plays on the individual's perceived usefulness. In their study, Pereira et al. (2015) found a strong association between the dimensions of the TAM model and the quality of information (IS), corroborating the research by Ramos et al. (2013).

Both business games and the virtual learning environment have provided a context conducive to errors and failures of students during the performance of their activities by enabling them to take risks and try new practices, favoring their experiential and active learning (SILVA, 2016; CALVO; REIO, 2018). Therefore, the student is considered an active member of their learning process, making it relevant to understand and capture their understanding of the use of the teaching strategy of business games in a virtual learning environment. Since educational institutions have increasingly encouraged its adoption, empirical studies that address business education are scarce in management, according to Lin, Huang, and Ko (2020).

Methodological Procedures

This research is mixed with a quantitative and qualitative approach, which encompasses data collection and analysis in two different ways in the research (CRESWELL, 2007). It will analyze the perception of undergraduate and graduate students in the management of two universities in Santa Catarina by using the teaching strategy of business games in a virtual learning environment.

Therefore, the research is considered a mixed approach with sequential procedures. According to Creswell (2007), since the first quantitative approach, research was carried out through a *survey* applying questionnaires to students who used the business games and later, the qualitative approach through a *focus group*, which was carried out at the end of the application of the questionnaire.

The sample comprises 177 students from undergraduate courses (Administration, Foreign Trade, Logistics, Port Management) and postgraduate courses (Tax Management) from two universities in Santa Catarina. We used the active teaching strategy of Business games in an environment of virtual learning. Initially, the students used the Business Games simulator in their respective subjects, accompanied by the responsible teachers, in which they experienced the dynamics of this teaching strategy. After a period of using the strategy, data collection instruments were applied.

For data collection, a survey was first applied with: the *Skill acquisition* instrument (Appendix A) based on Butzke (2015), translated and adapted from Miles, Biggs, and Schubert (1986) and Jennings (2002); the Learning Environment questionnaire (Appendix A) based on Ramos et al. (2013), translated and adapted from Davis, (1989); Delone and Mclean (2003), and on reflective practice adapted from Araújo (2014). The scale used for measurement in the *Skill acquisition*, Learning Environment, and Reflective Practice instruments is the 7-point *Likert* type. Values are attributed from 1 (which is equivalent to **little help**) to 7 (which represents **much help**). In addition to these inventories, specific information about the participant was included.

Focus groups were also held with two undergraduate classes after the questionnaires' application to complement the results obtained by applying the

instruments on students' perception when using Business Games as a teaching strategy and the virtual learning environment. Data were recorded using an audio recorder and then transcribed in full to facilitate the analysis of the collected information. The analysis of these data was developed according to Bardin's method of content analysis (2016).

As for quantitative data analysis, descriptive analysis and factor analysis were applied, using Microsoft Excel ® and Software for Statistics and Data Science – STATA. In the descriptive analysis of the variables identified in the instruments, descriptive statistics were used to analyze frequencies, average impact, and area of impact of the data. Furthermore, these results are presented through the percentages of the impact areas, which were calculated based on Pereira (2004). Colors were included to facilitate the understanding of the tables with the impact area. Green represents more significant agreement than others, and red refers to less agreement in the perception of the surveyed students.

Factor analysis was used to verify the students' perception of Skill acquisition, virtual learning environment, and reflective practice in business games to point out the factors generated from the correlated variables.

Presentation and analysis of results

Table 1 shows the perception of students, compared to the results of research by Miles, Biggs and Schubert (1986), Jennings (2002), Chang (2003), Chang et al. (2005), Butzke (2015), and Neves and Alberton (2017) referring to Skill Acquisition when using the teaching strategy of Business Games.

In general, 16 of the 30 variables evaluated had an agreement greater than or equal to 50% in the students' perception. Of the 15 variables with the best scores, the variable "Helps to integrate learning in several areas: Accounting, Finance, Marketing, etc." stands out. (SKA05: 60.80%), the only one with an impact area greater than 60%. This result was confirmed during the *Focus Group* interviews with the perception of some undergraduate participants:

> *[...] it interconnects all areas of how a company works, we have to be dealing with all the*

> *designers, it was stipulated [...] (Participant GC/2);*
> *I think the game helps to observe other points that before the agent would not have this perception, you know it could influence the company [...] (Participant SL/2)*
> *[...] doing in practice, even not being the owner of an agent company, you begin to see the company where we work with different eyes, such as HR, the financial part, and how all this has to work in order to have a result, in the end. It is no use focusing on one area and paying attention only because the rest does not work independently of it, even being something different. (AF/2 participant)*

Participants understood that there are several areas responsible for the excellent functioning of the organization. This result of variable SKA05 corroborates the studies by Chang et al. (2005), Butzke (2015), and Neves and Alberton (2017), who identified an impact area of 75%, 63%, and 62%, respectively, but it differs from the study by Miles, Biggs, and Schubert (1986). They identified an area of 20 %. Graduate students also pointed out this variable (SKA05: 51.11%) as a bit of a learning process facilitator. The other variables mentioned keeping the scores between 50% and 60% of agreement in the impact area.

Another variable emphasized is "It motivates teamwork" (SKA21: 58.86%), also mentioned in the *Focus Group*, in which students agreed that Business Games provide the exchange of ideas in groups, as shown in the speeches as mentioned above.

> *[...] all decisions were taken by consensus. At least in our group, the agent would dialogue until reaching a common consensus and deciding. I think that this added much dialogue. (Participant MR/1)*
> *[...] everyone had to agree, right, so we sometimes had to agree with each other, but we had to reach a consensus together, I think this helped a lot to have this team census, to think of the whole company [...] we had to learn to experience it like that. (PM/2 participant)*

Thinking alike shows that games help students to work in teams and deal with different views, understanding that each individual starts from a perspective, corroborating the study of Madkur, Mirtvi, and Lopes (2008), Motta and Quintella (2012). Furthermore, Neves and Alberton (2017) pointed out that teamwork is beneficial to students. Furthermore, Madkur, Mirtvi, and Lopes (2008) claim that students participate more in the decision-making process when the teams formed are heterogeneous. Among graduate students, this variable (SKA21: 77.78%) facilitated the

learning process the most when using Business Games.

Table 1 Comparison of studies between the areas of impact of *Skill Acquisition*

Variables	Miles, Biggs and Schubert (1986)	Jennings (2002)	Chang (2003)	Chang et al. (2005)	Butzke (2015)	Neves and Alberton (2017)	Research Data
SKA05	20,33%	52,33%	58,00%	75,00%	63,67%	62,72%	60,80%
SKA30					64,00%	52,67%	59,66%
SKA07					52,00%	45,67%	59,51%
SKA21	1,67%	34,67%	19,00%	31,67%	51,67%	43,67%	58,86%
SKA25	16,00%	23,67%	24,00%	38,33%	56,33%	61,67%	57,66%
SKA20	20,67%	18,00%	31,00%	43,33%	51,33%	38,00%	57,39%
SKA06	17,67%	41,00%	30,67%	43,33%	62,00%	47,16%	56,63%
SKA23	6,67%	42,67%	34,33%	50,00%	58,00%	51,93%	56,25%
SKA26	7,33%	43,33%	42,67%	56,67%	53,33%	50,54%	56,25%
SKA18	17,33%	51,33%	41,00%	46,67%	49,00%	56,00%	55,68%
SKA27					62,33%	54,33%	55,68%
SKA16		52,67%	56,67%	66,67%	50,67%	46,89%	55,43%
SKA15	6,33%	38,33%	33,33%	41,67%	58,00%	47,93%	54,29%
SKA19	13,00%	26,33%	41,00%	50,00%	50,67%	52,33%	53,79%
SKA01	12,00%	44,33%	46,00%	50,00%	63,67%	52,71%	53,48%
SKA08	15,00%	43,33%	46,67%	51,67%	54,33%	42,20%	51,22%
SKA29	-23,67%	19,33%	4,33%	23,33%	64,00%	48,46%	49,81%
SKA24	0,67%	44,33%	27,67%	50,00%	57,33%	51,44%	49,81%
SKA11	23,33%	42,00%	46,00%	51,67%	56,33%	46,35%	48,30%
SKA28	13,67%	59,00%	55,67%	78,33%	59,00%	46,91%	47,83%
SKA12	19,33%	38,33%	39,00%	51,67%	58,33%	43,62%	45,79%
SKA03					62,00%	40,33%	45,76%
SKA10	19,33%	38,33%	27,67%	41,67%	57,33%	41,86%	44,44%
SKA13					38,00%	41,67%	42,86%
SKA02					57,00%	42,33%	40,87%
SKA04					47,00%	45,00%	40,15%
SKA09	27,67%	42,00%	50,67%	72,00%	37,00%	33,32%	39,77%
SKA22	1,00%	35,33%	19,00%	31,67%	45,00%	49,67%	38,70%
SKA14	7,33%	37,67%	34,33%	45,00%	40,00%	28,70%	35,42%
SKA17					44,00%	30,00%	29,17%

Note: Research Data (2021).

The variables with the worst scores in the survey had percentages between 30% and 40%. The variable "Increases your confidence in the ability to work independently" stands out (SKA14: 35.42%), "Helps in conflict resolution" (SKA22: 38.70%), "Helps to make decisions based on incomplete information" (SKA09: 39.77%). However, the variable "Helps to deal with insecurity" (SKA17: 30.02%) was the only one with a score below 30%, and corroborates the study by Neves and Alberton (2017) when identifying this variable as one of the aspects that do little to facilitate the students' learning when using Business Games.

The low value presented by the SKA14 variable was proven during the *Focus Group*:

> *Independent not because we had to make all decisions in groups, right, so we could not work with the independent idea, and the issue of working in groups was good because we can discuss strategies [...] (Participant AN/ 1)*
> *[...] I think there was a lack of a defined role for each manager of a president. Everyone would sit together and do it together as an equal [...] (Participant GB/2)*

These speeches reflect the aspect mentioned above that Business Games have contributed to joint exercise, showing that this strategy discourages students' performance.

Table 1 emphasizes the variable "It helps to integrate learning in different areas: Accounting, Finance, Marketing, etc." (SKA05: 60.80%), which corroborates the studies by Jennings (2002), Chang (2003), Chang et al. (2005), Butzke (2015) and Neves and Alberton (2017) who pointed out this variable as one of the aspects that most facilitate the learning of students when using the active teaching strategy in Business Games. Two other variables that stood out in this research were: "It stimulates creativity" (SKA30: 59.66%) and "It favors the analysis of a problem from different points of view, in the group discussion" (SKA07: 59.51%). These results support the study by Butzke (2015) and Neves and Alberton (2017), but these variables were not part of the studies by Miles, Biggs, and Schubert (1986), Jennings (2002), Chang (2003), and Chang et al. (2005).

When comparing the variables that have an agreement greater than or equal to 50%, this research corroborates the studies by Neves and Alberton (2017) in nine variables, Butzke (2015) in 15 variables, Chang et al. (2005) in seven variables, Chang (2003) in two variables and Jennings (2002) in three variables. In this sense, it is clear that the variable SKA05, already mentioned above, stood out in all studies.

The results demonstrated that the students consider the teaching strategy of Business Games as a learning facilitator. Maintaining the average impacts more incredible than the average point (4) of the *Likert* scale applied in this research and also corroborating the studies by Miles, Biggs, and Schubert (1986), Jennings (2002), Chang (2003), and Chang et al. (2005). The authors evaluated active teaching strategies as effective in acquiring skills through learning and the studies by Butzke (2015) and Neves and Alberton (2017). They pointed out this strategy as a learning facilitator.

Table 2 shows the perception of students, accompanied by the result of the study by Butzke (2015), which was also based on Davis (1989) and Ramos et al. (2013), referring to the virtual learning environment in the perception of students when using Business Games.

When examining the results shown in Table 3, nine of the 20 variables evaluated had an agreement greater than or equal to 50%. Of the variables with the best scores, four stand out that show an impact area greater than 60%: "The teacher provides continuous support in clarifying content doubts" (QAV14: 67.42%), "The teacher constantly encourages the use of the platform" (QAV13: 66.29%), "The teacher systematically provides information on the activities of the Business Game" (QAV15: 64.03%), "I noticed the existence of different views on the decisions to be taken during the game" (QAV17: 62.90%). These results confirmed with the speech of the *Focus Group* participants:

> *All the doubts we had, the teacher removed [...] (Participant AN/1)*
> *I think he always gave the necessary support when we had doubts [...] (Participant SL/2)*
> *I realized that as the moves emerged, the teacher was advancing more information, which encouraged us to want to know more about how the platform worked just in case he gave us the instruction, but he released this information to encourage us to have more creativity we have our own decision not to decide for it [...] (Participant KT/2)*

When observing the students' discourse, the professor's attention to clarifying doubts is remarkable, but dynamically, to help students with their learning process throughout the Business Games strategy.

Table 2 Comparison of studies between the impact areas of the virtual learning environment

	Variables	Butzke (2015)	Research Data
QAV14	The teacher provides continuous support in answering content questions	-	67,42%
QAV13	The teacher constantly encourages the use of the platform	-	66,29%
QAV15	The teacher systematically provides information on the activities of the business game	-	64,03%
QAV17	I noticed the existence of different views on the decisions to be made during the game	-	62,90%
QAV12	The instructions provided during the Business Game application were updated	52,73%	59,66%
QAV20	By exposing my decision, I realized that I could change my position in order to improve it	-	58,95%
QAV16	I noticed opportunities to change my view of the decisions to be made during the game	-	57,20%
QAV19	I realized that my decision could have impacts I hadn't realized, and so I changed my view about the decisions to be made during the game	-	53,67%
QAV18	I understood that my experiences could favor understanding about the problem and improve the decisions to be made during the game	-	53,30%
QAV07	I thought the Business Game was useful for my learning.	50,00%	50,67%
QAV06	Using Business Games Improves My Learning Effectiveness	50,00%	47,73%
QAV10	The instructions provided during the application of the Business Game were relevant	39,89%	46,21%
QAV05	Using Business Games makes my learning more productive	49,45%	46,14%
QAV08	The instructions provided during the Business Game application were complete	36,61%	40,53%
QAV11	The instructions provided during the Business Game application were accurate.	35,79%	37,10%
QAV04	Using Business Games improves my academic performance	46,45%	36,35%
QAV02	My interaction with the Business Game was clear and understandable	17,76%	25,99%
QAV09	The instructions provided during the application of the Business Game were easy to understand.	24,59%	25,19%
QAV01	I found the Business Game easy to use.	10,11%	20,53%
QAV03	Interacting with Business Games did not require much mental effort	-14,21%	-21,21%

Note: Research Data.

The variables with the worst scores in the survey had a percentage in the range of 20% to 30% of agreement: “I found the Business Game easy to use” (QAV01: 20.53%), “The instructions provided during the application of the Business Game Companies were easy to understand” (QAV09: 25.19%); “My interaction with the Business Game was clear and understandable” (QAV02: 25.99%). However, the variable “Interacting with the Business Game did not require much mental effort” (QAV03: -18.63%) had a negative score. The low impact area on these variables (QAV01, QAV02, and QAV03) proves the study by Butzke (2015), who observed the lowest score of these variables with the complexity portrayed in the games. This

trend in the results is also confirmed in the discourse of students participating in the *Focus Group:*

> *I thought that at the beginning it was very complex about the system [...] (Participant LF/2)*
> *I also found it a little difficult so I even talked to the teacherat the beginning [...] (Participant IN/2)*
> *I think the software could be a little complex at first, but it exposes us to what is reality today when you go to work in a company you have to learn everything from scratch and the material was also complex [...] (Participant AF/2)*
> *I found that the layout itself was easy and intuitive but how the game's theme works was hard to get [...] (SM/1 Participant)*

These statements emphasize the difficulty felt by the students participating in the research when using the Business Games as a learning environment. According to his perceptions, the virtual platform on which the games are hosted was not favorable for use at first.

Through the results shown in table 3, it was verified that the students evaluated the virtual learning environment as favorable to learning, keeping the average impacts higher than the average point (4) of the *Likert* scale applied in this research. However, when analyzing the data in the table, no variable reaches 60% of agreement among the students surveyed. The variable "The instructions provided during the application of the Business Game were updated" (QAV12) is the only one that obtained more remarkable agreement in the two studies, in this research, with 59.66%, and in Butzke (2015), with 52.73 %.

The worst results corroborate the study by Butzke (2015), obtaining a percentage below 30% in the variables. "My interaction with the Business Game was clear and understandable" (QAV02), "The instructions provided during the application of the Business Game were easy to understand" (QAV09), "I found the Business Game easy to use" (QAV01), and "Interacting with the Business Game did not require much mental effort" (QAV03). However, the study by Butzke (2015) presented the percentages of the impact area lower than this study. Butzke (2015) applied the game as a specific experiment in his study. Games that existed on the market for over 25 years were used. This result shows that although this game presents greater clarity in the information, the students did not realize this quality when using it.

In the students' perception, the teaching strategy of business games was considered beneficial to their learning, while the learning environment was pointed out as a bit complex. For students, the virtual platform on which the games are hosted was not favorable to use at first. Thus, it is necessary to consider the aspects that may have discouraged students in the environment during their learning process and rethink how to use the virtual platform in company games.

In the factor analysis (Table 4), to indicate the factors resulting from the perception of students about *Skill acquisition* in company games, eleven variables (SKA01, SKA05, SKA06, SKA07, SKA11, SKA12, SKA13, SKA15, SKA16, SKA22, SKA30) were excluded during the process for presenting a factor loading of less than 0.55. Five factors were generated in the analysis: Factor 1- Perspective on management (F1PG), Factor 2- Teamwork (F2TE), Factor 3- Knowledge acquisition (F3OC), Factor 4- Problem-solving (F4RP), Factor 5- Attitudes and skills (F5AH). All five factors had eigenvalues above 1, Cronbach's alp

As for the learning environment (Table 4), the result of the factor analysis confirmed the categories of the research instrument elaborated in the studies by Davis (1989), Delone and Mclean (2003), Ramos et al. (2013), and Butzke (2015). Therefore, the factors were defined as follows: Factor 1- Quality of information (F1QI); Factor 2- Perceived usefulness (F2UP); and Factor 3- Ease of use (F3FU). These three factors had an eigenvalue above 1, Cronbach's alpha above 0.06, and the total explained variance of 76.33%.

Table 3 Factor Analysis.

Skill Acquisition in business games						Learning Environment				Reflective practice and teacher performance		
Variables	Factors					Var.	Factors			Var.	Factors	
	F1PG	F2TE	F3OC	F4RP	F5AH		F1QI	F2UP	F3FU		F1RP	F2AP
SKA25	0,832					QAV11	0,838			QAV19	0,829	
SKA26	0,775					QAV09	0,816			QAV18	0,816	
SKA24	0,760					QAV10	0,807			QAV20	0,797	
SKA27	0,747					QAV08	0,748			QAV17	0,660	
SKA28	0,714					QAV12	0,694			QAV16	0,634	
SKA29	0,697					QAV05		0,919		QAV14		0,901
SKA23	0,620					QAV06		0,904		QAV15		0,866
SKA19		0,825				QAV04		0,850		QAV13		0,835
SKA18		0,813				QAV07		0,797				
SKA20		0,691				QAV03			0,824			
SKA21		0,591				QAV01			0,658			
SKA03			0,792			QAV02			0,544			
SKA04			0,788									
SKA02			0,707									
SKA09				0,805								
SKA10				0,718								
SKA08				0,687								
SKA17					0,750							
SKA14					0,696							
Cronbach's Alpha	0,9116	0,8256	0,8153	0,7718	0,6896		0,8906	0,9330	0,6979		0,8584	0,8708
AutoValue	8,7184	1,4874	1,3802	1,1269	1,0352		6,5352	1,4217	1,2021		4,3483	1,3691
% Var.	45,89	7,83	7,26	5,93	5,45		54,46	11,85	10,02		36,79	34,68
% Acum.	45,89	53,72	60,98	66,91	72,36		54,46	63,31	76,33		36,79	71,47

Source: Research Data (2021).

With the result of the factor analysis of reflective practice and teacher performance, the categories of the research instrument were carried out in the studies by Ramos et al. (2013) and Araújo (2014). Factor 1 - Reflection in practice (F1RP) and Factor 2 - Teacher performance (F2AP) presented eigenvalues above 1, Cronbach's alpha above 0.8, and the total explained variance of 71.47%. There was no need to exclude variables during this analysis process, as they all had a factor loading greater than 0.55.

Final Considerations

This article contributes to research in teaching in Administration, especially with the adoption of Business Games as an active teaching strategy in a virtual learning environment.

By analyzing students' perceptions when using the teaching strategy for business games in a virtual learning environment, the results show that students had a positive perception of using the teaching strategy for business games. In the learning environment, they felt a few difficulties when using the digital gaming platform. Students perceive the use of the Business Games strategy as beneficial to their learning in the following aspects: (1) Integrating learning in different areas; (2) Stimulating creativity; (3) Contributing to the analysis of a problem from different points of view with group discussion; (4) Motivating teamwork and (5) Broadening the vision of how a company works. The first aspect was also highlighted in studies by Chang (2003), Chang et al. (2005), Neves and Alberton (2017), and Butzke and Alberton (2017), as the second and fifth aspects stood out in the study by Butzke and Alberton (2017).

The students found the learning environment a bit complex. The virtual platform proved unfavorable for use at first in the students' perception. Given this, it is necessary to consider the aspects that may have demotivated students in the environment during their learning process and rethink how to use the virtual platform in company games. Interestingly, the game and the environment used in this study have been in the market for over 25 years.

Therefore, the results presented allow us to conclude that business games have contributed to the development of the joint exercise of students, through their ability to develop teamwork, by offering students the experience of dealing with different views on an issue. The students were involved in transforming themselves into a creator of knowledge (SIGNORI et al., 2018). However, to adopt the teaching strategy, teachers need to know whether it meets their lesson plans.

The study presents relevant contributions to the field. One of them refers to the presentation of evidence supporting that the adoption of business games in the learning process provides the integration of content from different areas of knowledge (SAUAIA; ZERRENNER, 2009; MOTTA; QUINTELLA, 2012; CHANG et al., 2014; NEVES; ALBERTON, 2017). Another theoretical contribution is that games have favored joint exercise and dealing with different views, understanding that each individual starts from a perspective (MADKUR; MIRTVI; LOPES, 2008; MOTTA; QUINTELLA, 2012; NEVES; ALBERTON, 2017). As for the practical implication of the study, the active teaching strategy in the business game needs to continue to

be applied to teams of students by teachers to provide students with knowledge sharing and teamwork.

In this sense, the article contributed by providing subsidies to teachers to improve the teaching-learning process by addressing students' perception about the use of the active teaching strategy Business games and their learning environment. With the aspects "contributing to the analysis of a problem from different points of view with group discussion" and "motivating teamwork," teachers can work with forming the most heterogeneous teams possible, as this will promote more great debates and the understanding of others perspectives by the students. However, in the current context of higher education, shared by COVID-19, where most students are taking small classes, it is questioned how teachers are adopting business games and other active teaching strategies through the virtual learning environment.

The difficulty of accessing classes using this active teaching strategy should be considered a limitation of this research. A few classes were using the active teaching strategy Business Games. Even on one of the university campuses, there is still no appropriate space for applying the strategy with the students. In addition, the lack of attention of the participants also made it difficult to research since many students left some research questions blank, and even those who answered wrongly, which contributed to the decrease in the expected sample size initially in the study. This study also showed that it is necessary to deepen the investigation on the virtual learning environment to understand better why students considered its use a little complex. We propose to expand the sample size with students from courses in the management area. Future research is also encouraged to continue this study, with the application of the instruments in other regions of the country, with other samples of students, to see if they share this perception concerning the Corporate Games teaching strategy.

The application of research experiments in this context can also be a way to collect data by approaching the topics under discussion. Studies can deepen the knowledge to check the educational validity of the strategy and the environment to the students' learning process using learning and decision styles and the student experience. Future studies can also address teaching strategies, especially business games in remote education and distance education, investigating how teachers have adapted these strategies to the current moment experienced by teaching.

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Appendix A

Figure with *Skill acquisition* and Virtual Learning Environment and Reflective Practice Instruments

***Skill Acquisition* Instrument:** SKA01:Provides new knowledge about the operation of a company; SKA02: Provides more significant depth of content in relation to other teaching methodologies; SKA03: Assists in acquiring information; SKA04: Helps to retain information for the long term; SKA05: Helps to integrate learning in different areas: Accounting, Finance, Marketing etc; SKA06: Increases the ability to identify management problems; SKA07: Favors the analysis of a problem from different points of view, in the group discussion; SKA08:Increases comprehension to use information in problem solving; SKA09: Helps you make decisions based on incomplete information; SKA10: Increases confidence in practical problem solving skills; SKA11: Increases competence for planning business operations; SKA12: Increases capacity to implement your ideas and plans; SKA13: Assists in reviewing organizational policies and practices; SKA14: Increases your confidence in the ability to work independently; SKA15: Raises awareness about your administrative attitudes; SKA16: Raises awareness of peer attitudes; SKA17:Helps to deal with insecurity; SKA18: Increases the ability to communicate with your peers; SKA19: Increases ability to provide information to peers; SKA20: Increases your effectiveness as a participant in group problem solving; SKA21:Motivates group work; SKA22:Helps in conflict resolution; SKA23: Provides to experience a behavior that I knew and had not yet experienced; SKA24: It encourages the adoption of new administrative behaviors; SKA25: Expands your manager's vision of how a company works; SKA26: Allows you to learn something about yourself as a manager; SKA27: Helps to link theory to managerial practice; SKA28: Adds organizational realism to teaching; SKA29: Helps to clarify activities relevant to professional practice; SKA30: Stimulates creativity.

Virtual Learning Environment Instruments and Reflective Practice: QAV01: I found the companies game easy to use; QAV02:My interaction with the companies game was clear and understandable; QAV03:Interacting with corporate game didn't require a lot of mental effort; QAV04:Using company games improves my academic performance; QAV05:Using company games makes my learning more productive; QAV06:Using company games improves my learning effectiveness; QAV07:I found the company game helpful for my learning; QAV08:The instructions provided during the companies game application were complete; QAV09:The instructions provided during the companies game application were easy to understand; QAV10:The instructions provided during the companies game application were relevant; QAV11:The instructions provided during the companies game application were accurate; QAV12:The instructions provided during the companies game application were updated; QAV13: The teacher constantly encourages the use of the platform; QAV14: The teacher provides continuous support in clarifying content questions; QAV15:The teacher systematically provides information on the business game activities; QAV16:I noticed opportunities to change my view about the decisions to be made during the game; QAV17:I noticed the existence of different views about the decisions to be taken during the game; QAV18:I understood that my experiences could favor understanding about the problem and improve the decisions to be made during the game; QAV19:I realized that my decision could have impacts that I hadn't realized, so I changed my view about the decisions to be made during the game; QAV20:By explaining my decision, I realized that I could change my position in order to improve it.