REVISTA DE EMPREENDEDORISMO E GESTÃO
DE MICRO E PEQUENAS EMPRESAS
EDITORA ENTERPRISING

ANALYSIS FROM THE PERSPECTIVE OF ADMINISTRATION STUDENTS ON THE USE OF BUSINESS GAMES IN TEACHING AND LEARNING

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ABSTRACT: This study aims to build an application that promotes improvement in the teaching and learning process from the perspective of business students as a professional training tool, presenting the relevance of this game as a training and qualification device for both entrepreneurial academics and experienced professionals with formation. To achieve the objective of this study, a company game was developed: Amazônia Beer Game, which simulates a beer industry from the creation of a company, going through the production process until the delivery of the final product to the customer. The ideation and construction process with software engineering is presented. After that, it was validated with academics from the Administration course at the Federal Institute of Amapá (IFAP). It is concluded that the development of the application met what was proposed,
Keywords: business games, gamification, teaching, learning.

1. INTRODUCTION

In Brazil today, business games are used in universities, technical education institutions, market companies, among other institutions. They are developed by several companies, including the commercial gaming industry, universities and freelance developers. Nevertheless, this scenario is still not ideal, since there are few games specialized in creating possible scenarios, that is, there is a need to develop new games to address a problem that is to simulate real situations in different areas.

Nowadays, there are many discussions in universities about business games, but these discussions still need to reach the academic public in a more concrete way, so that it will be possible to validate theories, hypotheses. Therefore, one of the ways to accomplish this is the development of new business games mainly by universities with the collaboration of academics and developers.

In this article, we will discuss the development of a game specialized in simulating the

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Ferreira, RGA, Costa, RAT;Analysis From The Perspective Of Business Students On The Use Of Business Games In Teaching And Learning. Magazine of Entrepreneurship and Management of Micro and Small Enterprises V.6, Nº1, p.23-39, Jan / Abr. 2021. Article received on 1/26/2021. Last version received on 02/21/2021. Approved on 04/15/2021.

operation of a beer industry. Thus we will reach a problem already mentioned in previous paragraphs and try to create an understanding of awareness by new developers and the academic community about the importance of developing new games with different scenarios for other areas in a collaborative way.

The analysis of the problem was national and local, however, in order to specify and bring more concrete results, the academic context of IFAP was analyzed, in which most of the teaching and learning takes place through theoretical means and less practice. Thus, this analysis can be applied to any academic context.

Based on this information, attention will be given to the issues that are: the construction of an application, a business game, which promotes the improvement in the teaching and learning process of students in the administration area and the like as a training, engagement and qualification tool for these futures professionals.

These questions were answered after the development of an experimental Company Game whose name is Amazônia Beer Game (Amz). It simulates the operation of a beer industry since the creation of the company, going through the entire operation, manufacturing process until the delivery of the product to the customer. Therefore, the objective of this work is to build an application that promotes the improvement in the teaching and learning process of students in the administration area that are similar to those experienced in business practice in a beer industry.

The structure of this work is initially organized by a presentation of new technologies and innovation in teaching and learning, in this chapter it will be based on concepts of EAD, E-learning, gamification, business games, then it will be shown in the third chapter of the game methodology developed, that is, the development of Amz, later in the fourth chapter the analysis of the data and the conclusion.

2 THEORETICAL FRAMEWORK

2.1 NEW TECHNOLOGIES AND INNOVATION IN TEACHING AND LEARNING

In this chapter, new technologies and innovation in teaching and learning will be conceptualized and the differences between these technologies will be addressed, as well as their contribution to the state of the art. In the 20th century, innumerable innovative technologies emerged and contributed to the teaching and learning process. From basic

education to higher education, we have these technologies that have been increasingly developed and improved to meet this demand.

Educating is no longer linked only to banking education, where we only have the student as a deposit of information and knowledge, without even knowing for sure how to use it in their day-to-day lives, as it is known that teaching according to the Freirian thought is not to transfer knowledge, but to create possibilities for its own production or its construction.

Soon the education process is constantly changing, so that the educator can follow the changes in the internal and external context of the school where “the permanent formation of the teachers, the fundamental moment is the critical reflection on the practice. It is by thinking critically about today's or yesterday's practice that the next practice can be improved. ” Freire (1996, p. 39). The example is Distance Education - EAD, E-learning, gamification, business games, among others.

2.2 DISTANCE EDUCATION - EAD

According to Guarezi (2012) EAD can be defined as the family of instructional methods in which teachers 'actions are performed apart from students' actions, including those continuous situations that can be done in the presence of students. However, communication between educating educators must be facilitated by printed, mechanical or other means.

Teaching innovates, renews and moves to various axes and channels of achievement, one of which is computer science, where we have the distance learning modality, where in short what is teaching is in a certain place or platform and what is learning it is in another, but the term appears in Brazil at the beginning of the 20th century through correspondence courses in which people received material for study in their homes, later in the 70s the teaching process begins to reach other levels and other vehicles information, in this case video tapes, television programs, etc.

Distance education will be a natural part of the future of the school and the university. It will still be worth the use of the mail, but it seems definitive that the electronic medium will dominate the scene. To speak of distance education, it is necessary to overcome mere teaching and mere illustration. Perhaps it was the case to distinguish the moments, without a dichotomy. Distance learning is a proposal to socialize information, transmitting it as skilfully as possible. Distance education, in turn, requires learning to learn, elaboration and consequent assessment.

You can even confer a diploma or certificate, providing for face-to-face evaluation moments. In the words of Author Demo (1994, p. 60).

The democratization process of this modality has always proceeded slowly, as there was little priority for the evolution that teaching and the media could cause in education. As Silva (2000, p. 29) states, "the information society emerges with the explosive convergence of the computer and telecommunications", the flow of information and knowledge is constant and the school must walk even in short steps in this process.

> Art. 1 For the purposes of this Decree, distance education is characterized as an educational modality in which didactic-pedagogical mediation in teaching and learning processes occurs with the use of information and communication means and technologies, with students and teachers developing educational activities in different places or times. (Brazil, Decree 5.622, 2005)

The 21st century is gaining a new face and value in the profession market, the school as a field of possibilities to reach and produce knowledge connected with the evolutionary speed of man, has become an increasingly necessary light. Even so, if the educator is not competent and is not in a dynamic of growth and search, the students, the school, the laws of the market or, over time, he will become obsolete.

With the advancement of the technological age in society, the way of educating has changed, the basics that founded compulsory schooling in the 19th century are no longer up to the demands of this time. The communication doors that open up through multimedia, tune into learning possibilities far beyond textbooks and the blackboard.

These changes impact the teaching and learning process in such a way that distance education (EAD) stands out as one of the most important tools in the dissemination of knowledge and education. The use of the computer as a mediator of interactions in the learning environment represents the third generation of the technological evolution of online distance learning.

2.3 E-LEARNING

E-learning will be understood as the use of digital technologies in the teaching and learning process, with the internet as a support point and may occur in person or in the distance

mode. Cruz et al. (2017) explain that e-learning can be characterized as a distance training modality that makes use of the internet as a platform for its viability.

The concept of e-learning will depend on the concept of distance learning in order to be understood, and distance learning will be understood as the teaching and learning process mediated by technologies, whose teachers and students are spatially or temporally separated.

Therefore, e-learning solves the problem of geographical distances, or even the unavailability of time to carry out face-to-face studies. The authors present a concept considered controversial in relation to distance education:

Distance education / teaching is a rational method of sharing knowledge, skills and attitudes, through the application of the division of labor and organizational principles, as well as by the extensive use of means of communication, especially for the purpose of reproducing high-quality technical materials , which make it possible to instruct a large number of students at the same time, while these materials last. It is an industrialized way of teaching and learning in the words of Author Cruz (2017).

According to Gonçalves (2015) e-learning has resources that facilitate interaction between students-students, students-teachers, as it is intrinsically linked to the internet and the World Wide Web service (www). Given the potential that arises from that point, in the sense of ease of access to information regardless of time and physical space, due to the ease of quick publication, distribution and updating of contents, given the diversity of communication and collaboration tools and services among all intervening in the teaching and learning process and also for the possibility of developing “collaborative hypermedia” to support learning.

The author goes on to say that e-learning, in this sense, provides personalized learning, according to the needs, availability and pace of each student, regardless of the location or the moment when they access the internet. It allows for learning without time and physical space limitations, making it ideal for everyone to be able to access learning.

The digital learning tools can be dynamic or not, the teacher needs to be aware, as he may be using them in a very mechanical way, but the idea is to open up to the proper use and to walk along paths that allow using these tools for sharing of ideas, co-authorship, publication and dissemination of the different narratives.

Since, all these activities can take place on a virtual platform, in which teachers and tutors must mediate the activities explaining them, solving doubts and possible difficulties of the students.

Through e-learning, it is noticed that there are possibilities to act actively, providing the student to learn in a more interesting way and, with this, use these means so that they become more participative, critical and reflective in the process educational.

Ratifying these teaching models, on interactive teaching, Lima and Moura (2015, p. 78) recommend making a planning and, for the use of the learning environment, it is necessary: [...] the instruction, the teacher must select or create a suitable video; if the goal is interactivity, he can choose a game or a simulator; and if the goal is to evaluate, he must choose an efficient data collection tool to transform feedback into educational guidance. In an efficient lesson planning, the tools and the way to use them must be chosen, as well as the role of the student and the teacher. When the teacher instructs an activity, he can use the time to get in touch with students who have more difficulties and help them in a personalized way.

2.4 GAMIFICATION

In parallel to this evolution of EAD and e-learning in teaching and learning, the term gamification appears, which according to Çeker & Özdamh (2017), the term has been defined in the literature as being: (a) the use of game mechanisms in applications non-games, (b) the use of game thinking to solve problems, (c) the use of game elements applied to non-game contexts and, more related to teaching-learning (d) student involvement during the learning activity of a pedagogical content. In the latter case, and according to the same authors, it is still common to have confusion between the term gamification and game-based learning.

Learning based on games / games simply corresponds to learning by playing and playing games according to Çeker & Özdamh (2017) Kingsley & Grabner-Hager (2017). According to the Turkish Language Association (2017), the game is defined as a fun activity with certain rules that need to be followed - which also helps to improve the user's intelligence and talents, in addition to having pleasant moments.

With the application of gamification strategies in teaching learning, learning occurs differently from what happens in a game-based activity, as it is necessary to consider the mechanisms that provide and support learning, and mutual interactions must be evaluated in gamification. In gamification, students do not need to have games or electronic devices, and they do not always play games to learn. In the words of the authors Çeker & Özdamh (2017).

The process of developing gamification strategies is quite complex, and is not limited to just using the 'points, medals and ratings' triad in applications and / or activities according to Çeker & Özdamh (2017); Hitchens & Tulloch (2018). This is because gamification strategies require, in addition to the elements of the game, an effort to merge principles of teaching and learning in the performance of complex tasks. In the words of the Authors Brunvand & Hill (2019).

According to Nicholson (2012 apud Hitchens & Tulloch, 2018) a significant gamification strategy takes into account the background that the student brings to the activity and the context in which the specific activity is placed. Thus, a challenge in the elaboration of gamification is the development of strategies to cover a variety of experiences, desires and skills of Nicholson students (2012 apud Hitchens & Tulloch, 2018; Kingsley & Grabner-Hager, 2017; Magro et al., 2019) .

In this context, among the three main approaches to the development of gamification strategies presented by Mora et al. (2017) - namely: (a) user-centered approach; (b) game-centered approach; and (c) technology-centered approach - the one that most closely matches meaningful gamification, recorded in more than half of the publications reviewed by the authors, is the user-centered approach, where the user and his objectives are the central focus of the development of gamification strategies. This does not imply a restriction on the use of game design principles and / or technology, but it does mean that the user is the center of the gamification process.

However, still citing the same study, the participation of interested parties in the process of developing strategies is considered necessary in less than half of the works; which contrasts with the widespread use of the fundamentals of interaction, emphasizing gamification as a user experience in itself. Now, if the gamification process for teaching-learning should prioritize the focus on the student, according to Botha & Herselman (2015; Hung, 2018), then the involvement of stakeholders in the development of gamification strategies cannot be neglected, especially the of demanding teachers.

Educational games manage to attract the student's attention, since they have elements for him to interact and communicate, facing different challenges, consequently making decisions and checking what happens at each stage. In the words of Author Pereira (2017, p.51).

2.5 COMPANY GAMES

Among the educational games, there are the company games that are directed to the managerial and business areas allowing the participants to be able to apply the available and learned techniques to put into practice and eventually verify the consequences of their actions. “Business games are created with the aim of transmitting technical and scientific knowledge, capable of continuously expanding the cognitive base of university students and executives in general.” In the words of the Authors Tavares & Pastana (2015, p. 07)

Historically based on war games, where they aimed to simulate the military structure and concepts, recreating war confrontations. When creating different strategies, a managerial simulation is promoted in a safe training environment, since if carried out in the companies themselves, it could generate losses depending on the action taken. These games were created based on the military games used by the American Air Force, later adapted for business games, with the University of Washington as a precursor to the use of these games. In the words of Author Silva (2013).

According to Tavares (2015), business games present training and entrepreneurship tools with an environment close to the professional, focusing on decisions and their eventual reflexes, in a simpler way than reality. However, it is expected as a result to understand the functioning in the broad sense of an organization with all the productive sectors.

In practically any game of companies there is the establishment of a competitive environment between the teams / companies, which produces a competitive scenario, which, in principle, is seen as a motivating factor for the participants, as the characteristic playful and disputed games tends to increase the intensity of student involvement. In the words of Author Johnsson (2006, p. 35)

In this sense, for Tutida (2017) in addition to attracting the attention of university students, company games have also attracted the attention of several companies, using this tool in the training of employees. In view, this type of game puts the employee facing the reality that they may face in future situations in the company.

However, it is important to note regarding the use of games from companies where it resides in the fact that, from the point of view of learning, the effectiveness is not related to the sophistication of the software or the interface, but rather in the exploration of the basic concepts

and the results of each simulation, imputing to the teacher the real and responsibility for building learning during business games. In the words of Author Johnsson (2006)

3 METHODOLOGY

In the first moment, exploratory research was carried out on scientific articles, master's dissertations and doctoral theses, on business games, employability and entrepreneurship, aiming at greater familiarity with the proposed problem.

Then some games of companies were analyzed, among them: Simulare, Beer Game, LDP, Jogodeempresas, among others. Some of them are paid, others are not. All with different usage strategies and with a wide variety of scenarios. It was from this analysis that the gap was discovered to create a new scenario, strategies and production flows to achieve the objective of this research, which is to bring to the academic world a scenario that simulates the functioning of companies and that generates better decision making on the part of their. In addition, gamification resources were used to try to improve the engagement of the target audience.

In addition to these games, other tools with gamified resources such as Duolingo, Foursquare and others were analyzed. With this analysis, the authors identified several important game resources, that is, the game mechanics, which enable greater engagement and, consequently, better academic learning.

After this research, the business analysis was carried out and after that it was possible to establish the scope of the project, estimate costs, time (schedule), risks, create the main operational scenarios, architecture option for some basic scenarios. Soon afterwards, the software development plan was obtained, along with business modeling and requirements.

Right after this step, the system architecture was developed, that is, the project containing information such as the technologies that would be used are: Django 2.0 Framework, Django Jet, Css3, Html5, Sqlite3 Database, Bootstrap 4, Python programming language 3.7.

The Django Framework is a Python web framework. It is free and open source. All programming like Python, Css, Html, Bootstrap are inserted in it and it connects to the database in a simple and practical way, generating every application for the Web.

The choice of these technologies by the developer was based on being free technologies with a large collection of libraries and documentation, guides, great use in the worldwide development community, support in solving problems, etc. However, this choice was not easy, since there are several tools available for the same purpose, two of which are Unity and Unreal Engine, which are tools for the development of various applications such as 3D games. Thus it

was analyzed that the technologies chosen would meet what was being proposed to be developed as the mechanics of games.

The construction of the software was carried out in the later phase, in which the delivery was made, in compliance with the tests, and then the registration was made before the National Institute of Industrial Property (INPI) and training material (operation manuals) was made available. in video format, images and pdfs.

Registration with the INPI took place through an internal procedure of the Innovation and Technology Transfer Center (NITT) at Unifap. The result of this was the protection of the intellectual property of the game. In addition, the authors' copyright was assigned to this Nitt. Thus, in the future, the university will be able to commercialize or make available to the academic community free of charge or not, with legal support.

After this phase, the qualitative characteristics of the investigated object were observed through validation using the qualitative research procedure. Another procedure that was used for validation was the quantitative one, which is characterized by the quantification process, both in the information collection process and in the treatment of these by means of statistical techniques and mathematical procedures. Both the qualitative and the quantitative were results of data collection and analysis that were applied through an electronic form of google docs sent to thirty-six students of the Administration course at the Federal Institute of Amapá through a link after using the game Amz.

3.1 Why was it thought of?

The development of Amazônia Beer Game resulted from the idealization of providing a tool that would assist in teaching and learning from the academic community in situations that are similar to those experienced in business practice and increase its understanding of the problems of the functional areas of a company, expanding the understanding of problems related to the internal relations of an industry in the brewing sector, as well as proving some practical training in problems of political organization and decision-making processes.

To achieve this goal, it was necessary to analyze a real-world company and create one based on this analysis in the virtual world. For this purpose, a local company whose purpose is to produce beer was analyzed. In this way, who was responsible for the products, inputs, machinery, products produced, how much each one cost, how long it took to produce a certain amount of beer by a person using machinery with a specific input, how the order was done until

the delivery of the product was identified. product to the final customer, that is, the entire production process.

Analyzing this information from this company, a scenario was designed to simulate this functioning within the system. In addition, it was thought to bring other game mechanisms such as ranking, points gained (XP) and losses (HP), character, rules etc.

3.1 Amazon Beer Game scenario:

To represent the fictional scenario in which a customer will hold a local event in the city where the company that is run by the player resides. This customer placed an order for a large quantity of beer in which the company managed by the player does not have in stock. In this order there are several requirements, one of which is if the product is not delivered within the established period, it will generate a contract termination and a fine for the industry, which may lead to bankruptcy. Another restriction is that if the company delivers less beer than expected, the discount will be greater than the initial one percent established.

This request is received by the company administrator (player) and will become a demand. This demand is a 'start' for the brewing company to produce the final product and deliver it to the customer. Thus, to complete the challenge the player must meet this demand as efficiently and effectively as possible. Bearing in mind that the main objective is to achieve a positive financial result when delivering the product to the customer.

For this, in the period in which the player is using the game he will have to analyze several factors that are: financial, human resources, inputs and machinery. And from that analysis make the decision to make acquisitions or contracts to produce the necessary amount of beer. He will always have more than one hiring and acquisition option, for example: when hiring an employee he will have the option of choosing one with specialization or not, so there are different salaries for each one and the same goes for machinery and inputs.

The main role of the company manager (player) is always to analyze the best cost-benefit option of making an acquisition and to verify that it meets what is necessary to produce. Since, for each employee, machinery and input there is a number called a factor of production. This factor is a calculation for each employee operating a particular machine using a specific input that results in the production of a quantity x of beer, that is, different possible results can happen according to the player's choice. Thus, depending on his decision, the quantity to be produced may vary for each acquisition / contract.

With each acquisition, the financial value decreases or increases if it is sold. However, with each sale, the value of input, machinery or the dismissal of an employee is considered to be depreciation, that is, they suffer commercial devaluation due to natural wear and tear throughout the period. time.

4 ANALYSIS AND DISCUSSION OF RESULTS

The following analysis was obtained through a questionnaire applied to students of the Administration course at the Federal Institute of Amapá - IFAP. The graphs below represent the students who used the application and based on that, the answers were obtained.

In the graph below, it was analyzed that 69.4% of the students consider the use of the application to be excellent. Based on the Amz Game syllabus applicable to business management theories. For Tavares and Pastana (2015), in the paragraph already cited "Business games arise with the aim of transmitting technical and scientific knowledge, capable of continuously expanding the cognitive base of university students and executives in general." Thus, it is understood that the game developed helped students to apply the theory in practice.

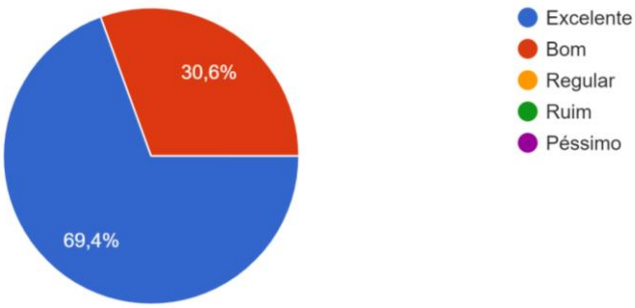

Figure 1. Graph on application to business management theories
Source: own elaboration (2021).

The graph below shows that 72.2% of the students found the applicability of the content to the professional reality excellent and 27.8% good, that is, for most the application is in agreement with what Johnsson (2006) thinks, which is important to observe how much to the use of games from companies where it resides in the fact that, from the point of view of learning,

the effectiveness is not related to the sophistication of the software or the interface, but in the exploration of the basic concepts and the results of each simulation, imputing to the teacher the real and responsibility for the construction of apprenticeships during the games of companies.

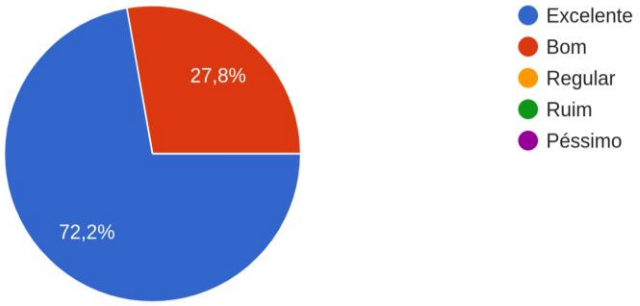

Figure 2. Graphic on the applicability of the content to the professional reality
Source: own elaboration (2021).

It can be seen in the graph below that most of the participants were stimulated with the use of it, thus consistent with the thought of Pereira (2017), who mentions how educational games manage to attract the student's attention, since they have elements so that it interacts and communicates, facing different challenges, consequently making decisions and verifying what happens at each stage. In the same line of reasoning, the authors Çeker & Özdamh (2017), treat gamification as being: (a) the use of game mechanisms in non-game applications, (b) the use of game thinking to solve problems, (c) the use of game elements applied to non-game contexts and, more related to teaching-learning (d) the involvement of students during the learning activity of pedagogical content. In the latter case, and according to the same authors, it is still common to have confusion between the term gamification and game-based learning.

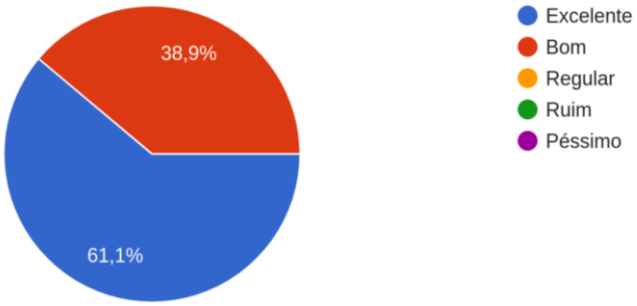

Figure 3. Graph about the stimulation of the participants
Source: own elaboration (2021).

In the next graph, the performance of the participants on which they had an easy understanding of the subjects covered is clearly seen. Most of them stated that they had ease and is in line with the thought of the author Gonçalves (2015) in which he comments that e-learning has resources that facilitate the interaction between students-students, students-teachers, as it is intrinsically linked to the internet and the service of World Wide Web (www). Already the author Çeker & Özdamh (2017). mentions that the application of gamification strategies in teaching learning, learning occurs differently from what happens in a game-based activity, as it is necessary to consider the mechanisms that provide and support learning, and mutual interactions must be evaluated in gamification. In gamification, students do not need to have games or electronic devices,

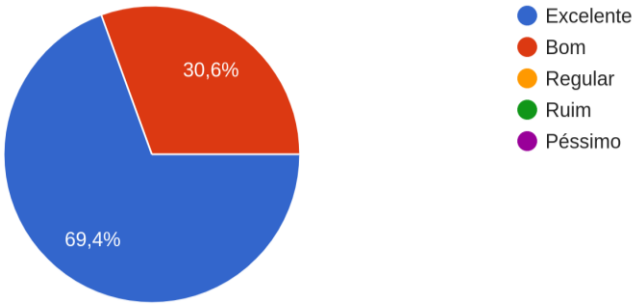

Figure 4. Graphic about the ease of understanding of the subjects covered
Source: own elaboration (2021).

In addition to these questions addressed, answers were also obtained in the question Balance the theory and practice 58.3% answered that it was excellent. In terms of obtaining new knowledge, 72.2% answered excellent. Thus, it can be seen that the tool provided assistance in their teaching and learning.

In the question that refers to the Simulator Designer, the following question was addressed: Does it hold the attention of the participants? 58.3% of the participants reported that it was excellent. on the question of Ease and objectivity in the rounds, only 52.8% answered

good. and in the question if it facilitates the understanding of the participants. 2.8% responded that regular.

In the group of questions about Applicability of the Corporate Game. The questions addressed were: Use of the software in the classroom: 58.3% answered that it was excellent. In the question on Interaction between theory and practice, the answers were 55.6% excellent, while 2.8% answered that it was bad.

5 FINAL CONSIDERATIONS

It is concluded that the development of the application met what was proposed, as it helped in the teaching and learning process of the students who used it during classes.

When analyzing the theses, articles and games in the context of corporate games and after that developing the game Amazonia Beer Game it was possible to observe that there are still many ways to explore this subject and create new applications that provide administration students with ways to apply the theory in practice through games developed for this purpose, that is, company games. However, there is still a lack of better ways to analyze and create them in an interactive and collaborative way between different departments of an institution, for example, involving different areas. In this way, more complex applications can be developed with different scenarios and it is possible to create applications in new technologies such as virtual reality,

As future work to pursue this, it is possible to create a game in virtual reality or even use artificial intelligence using concepts of neural networks and machine learning in a collaborative and multidisciplinary way.

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