WHY USE-CENTERED GAME-BASED LEARNING IN HIGHER EDUCATION? THE CASE OF CESIM SIMBRAND

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ABSTRACT

This paper endeavours to research about simulation/serious games exploration within University of Algarve (Portugal), namely *Cesim SimBrand* for Marketing Simulation (course unit). A total amount of 30 learners participated in this study through a mixed survey (open-ended and closed-ended queries). The empirical evidences exhibit interesting outcomes: (i) a response rate of 50 percent; (ii) these tools increase learning engagement, although it is essential to be more realistic; (iii) teamwork seems to be a controversial topic; (iv) learners had a positive experience; however, some feel unprepared before their usage (prior knowledge). Hence, this survey provides a good platform for future research and approaches how to promote a better exploration of simulation/serious games. To conclude, this manuscript will be divided into six sections: (i) the 5W's of game-based learning; (ii) research (statement of the problem, aims/objectives, philosophical approach and data collection/analysis); (iii) diagnosis (game deliver and learners' pre-perception); (iv) findings (learners' profile, awareness, experiences and preparation); (v) limitations and future work (methodological limitations and tools/analysis upgrade); and, (vi) conclusions.

Keywords: Game-Based Learning, Serious Games, *Cesim Simbrand*, University of Algarve

JEL Classification: I23, O33

1. INTRODUCTION

Simulation games are becoming widely accepted in education and explored in curricular units of, for instance, engineering, bio-sciences, aviation, military and healthcare (Jackson, 2004). Business education games seem to be associated with prevalently positive outcomes (Fengfeng, 2009). Although games do not resolve all educational problems, they are one potential technique to engage students in learning (Lin and Tu, 2012).

Many studies denote game-based learning (GBL) exploration to enhance students' learning (Squire, 2011), improve their thinking and educational effectiveness (Eastwood and Sadler, 2013), or enhance engagement (Anderson, 2006). However, critics argue about the value of these contemporary learning environment for students' real learning (Guillén-Nieto and Aleson-Carbonell, 2012), which is challenged by a huge body of research on the effectiveness of computer games. The reasons are simple (Sørensen, 2011): (i) theoretical knowledge that learners acquire in classrooms does not provide a full awareness of business issues; (ii) lecturers' explanations often disregard practical explanations and skill development that are fundamental for a future career.

It is, therefore, important to comprehend how a business simulation game can be a valid solution to engage and prepare learners for real and complex contexts in a contemporary, changing business environment (Findling, 2008). This paper aims to realise students' perceptions and experiences with *Cesim SimBrand* (Marketing simulator).

In summary, the argument will be divided into six sections: (i) game-based learning: 5W's (who, what, where, when and why) ; (ii) research (statement of the problem, aims/objectives, philosophical approach and data collection/analysis); (iii) diagnosis (game deliver and learners' pre-perception); (iv) findings (learners' profile, awareness, experiences and preparation); (v) limitations and future work (methodological limitations and tools/analysis upgrade); and (vi) conclusions.

2. GAME-BASED LEARNING: 5W'S

2.1 Who?

Computer games are becoming an important component for economic, social and political systems (de Castell and Jenson, 2004); as a result, an increased importance over educational strategies is expected. In this case, computer educational games enable several overlaps (Silva et al., 2013): (i) educational content; (ii) design; (iii) learning theories linkage; (iv) assessment standards; and (v) political issues (organisational or national). Thus, these overlaps acknowledge the interaction amongst game developers, lecturers, learners, educational institutions, politicians and society (stakeholders).

2.2 What?
2.2.1 Game-based learning

A simulation game is typically defined as an artificial environment that copies chosen features of real situations, as well as enables participants' observation and reflection upon their decisions (results) (Angelides and Paul, 1999). This definition denotes the long history of computer games for business and, consequently, their advantages and disadvantages.

Simulators offer the benefits of experimental and generative learning while enhancing learning experience (Zantow and Knowlton, 2005) because these: (i) enable participants to explore a complex business scenario without incurring the financial penalties (Mawdesley et al., 2011); (ii) promote participants' engagement, i.e., make them more active and motivated (Salas, Wildman and Piccolo, 2009); (iii) develop strategic, problem-solving and behavioural skills (Salas, Wildman and Piccolo, 2009); and (iv) implement complex decisions, instead of a set of rules and acknowledge the impact of changes over time (Wall and Vian, 2008).

However, simulation games are fraught with the following difficulties: (i) lecturer's perception about simulators ought to be positive, and they must be well prepared (Lifelong Learning Programme, 2012); (ii) students can consider the simulation unrealistic and ultimately disregard the learning process (lack of motivation to continue) (Wall and Vian, 2008); (iii) lecturer personal and professional background and genre knowledge (lecturing style) (Wall and Vian, 2008); (iv) trade-off between class and home study time, i.e., gaming consumes an excessive amount of time (class), while the home option imposes extra work on the lecturer (answer queries) and provides feedback (Lifelong Learning Programme, 2012).

2.2.2 Cesim SimBrand

Cesim SimBrand (figure 1) immerses students in a virtual marketing environment, through a storyline of a smartphone enterprise, in which these compete with other teams in order to obtain the highest score possible (make a company successful). According to Cesim (2013), this learning tool requires participants' attention to:

actively manage the product portfolio by matching both qualitative and quantitative features of products with the selected target segments' preferences. Moreover, pricing, promotion and channel selection need to be set based on the segments' preferences. In addition, teams manage the after sales and research and development decision.

And, its expected outcome is that:

participants will fully comprehend the different parts of the marketing decision making process, their relationship with each other, and their impact on the company's overall results. In addition, participants will gain invaluable experience in teamwork and problem solving (Cesim, 2013).

In conclusion, *Cesim SimBrand* presents the following theoretical foundations for marketing curriculum: (i) an engaging environment, where situated content permit the understanding of formalized concepts; (ii) a curriculum-based business system, which enables a problem frame and contextualized resources; (iii) incorporation of multiple resources, which produces an effective balance between fullness of context and level of attention; (iv) multiple interactions with a marketing environment; (v) connectivism, i.e., multiple interactions with the lecturer and fellow students (knowledge construction process).

Figure 1. An example of *Cesim SimBrand* **screenshot**

Source: Cesim (2013)

2.3 Where?- Research context
2.3.1 Macro

The process of "gamification" is rapidly entering in several areas of learning in Portuguese universities; however, this process is far from being mature. The main reason for the exploration of simulators/serious games is the positive effect on education, despite a necessary combination with traditional learning methods (blended learning). This context provides a solid and steady background to learners (Lifelong Learning Programme, 2012).

Existing studies ascribing lecturers' expectations are often dashed, as well as those of learners, due to a perception gap between both parties. The reasons for this gap are multiple: aims/objectives for exploring simulation games, each group's perception and even skills/competences. Thus, the overall research project aims to identify the benefits and pitfalls

acknowledged by each group (lecturers and learners) and derive critical success factors for achieving better learning outcomes.

2.3.2 Micro

The University of Algarve (UAlg) is a public university located in the southern region of Portugal with four distributed campuses: three in Faro and one in Portimão. UAlg has around 750 permanent lecturers and 450 researchers with a growing commitment towards R&D and innovation. Research and undergraduate and postgraduate courses vary from Earth/ Marine Sciences and Health to Engineering and Technology, Tourism and Social Sciences/ Humanities (including Management).

2.4 When?- PhD milestones

The first co-author PhD research started in the academic year 2012/2013 (January) which corresponded to year zero (MPhil); so, this date enabled the first milestone for *Cesim SimBrand* only during this academic year (first semester). The explanation acknowledges the Marketing bachelor's overall structure, i.e., Marketing Simulation is a third year, first semester course unit. The following milestones for data collection will be the academic years 2014/2015 and 2015/2016.

2.5 Why?- Statement of the problem

Despite the potential of simulation games for teaching and learning, several barriers have been identified concerning their adoption in educational contexts (Eastwood and Sadler, 2013). Additionally, recent studies on digital games for academic achievement have reported contradictory or ambiguous findings about learning effectiveness or learners' engagement (Yang, 2012; Papastergiou, 2009).

Apparently, and following Gibson et al. (2014), the lack of significant findings acknowledges an interesting trade-off: an increasing recommendation to explore serious games in educational contexts versus a poor implementation/integration within course units. From a qualitative meta-analysis perspective, further research on the effectiveness of games in higher education is essential, namely in longitudinal (e.g., Fengfeng, 2009) and qualitative (Connolly et al., 2012) formats. As a result, this study attempts to comprehend students' experiences within simulation games (*Cesim SimBrand*) in educational contexts; it is a worthwhile contribution to the literature.

3. RESEARCH

3.1 Aims/objectives

This study highlights a sub-research query of the first co-author PhD research on GBL exploration: how effective is an integrative approach, by enabling a business simulator (*Cesim SimBrand*), on learner's engagement and learning outcomes (skills and competences). The author's option, including only learners' behaviour, acknowledges three analytical assumptions: (i) empirical evidence demonstrates richness from lecturers and students (e.g., Kikot et al., 2013); (ii) publication strategy (see Kikot et al., in press); and, (iii) the longitudinal remarks (further details on the philosophical approach).

Hence, the main PhD research question is: can GBL (*Cesim Global Challenge, Cesim SimBrand* and *Cesim SimFirm*) be a useful and productive tool to support Management learners for effective learning towards complex contexts while enhancing engagement? The choice of these three business simulators is explained through two analytical dimensions: (i) University of Algarve strategy for Business Studies (adoption and implementation of these

games); and (ii) rich explanation (bond to interpretive research), since it will be possible to obtain insights from a wider group of lecturers and learners (Management, Economics and Marketing Bachelors).

3.2 Philosophical approach

To understand students' experiences, a qualitative longitudinal and interpretive case study is provided because "qualitative researchers aim not to limit a phenomenon—make it neat, tidy, and comfortable—but to break it (...) so that a description of the phenomenon, in all of its contradictions, messiness, and depth, is (re)presented" (Mayan, 2009, pp. 11). While interpretive philosophy captures information on more exploratory queries to highlight insights and subjectivity of people's opinions, as well as context (Walsham, 2011), the longitudinal option enables a comparison in multiple milestones (Bryman and Bell, 2011). In addition, their bond with the chosen methodology is well-documented in literature since case studies can be used to explain, describe and explore events within their milieu (Yin, 2009).

3.3 Data collection and analysis
3.3.1 Overview

Data collection acknowledges a mixed survey, including close and open-ended queries, which is a traditional and important way to collect data about values or opinions (Burns, 2000). Their analysis acknowledges: (i) a numerical approach for the close-ended queries, despite potential criticism (Alaranta, 2006); and (ii) a hermeneutical approach, i.e., relate the parts and the whole (Geanellos, 2000) for the open-ended queries.

Data analysis invokes a hermeneutical model in order to identify textual data because its basic question is: what is the meaning of such text? (Radnitzky, 1970) Besides, Tan, Wilson and Olver (2009) advocate that a systematic and continuous process (feedback amongst the parts and the whole) enables an interpretive and detailed analysis. For this achievement, the authors enabled seven analytical procedures (Mayring, 2003): (i) proper communication model (empirical results); (ii) systematic and rule-based analysis (content units); (iii) interpretive categories reviewed through feedback loops (two reviews); (iv) reference to subject instead of technique (open-code structure); (v) verification of instruments (pilot analysis—Kikot et al., 2013); (vi) theory-guided analysis (GBL literature); and (vii) trustworthiness (authors' procedures). The open-code structure was ID section_ID query_ID subject_code body. As a final note, translation was avoided to minimise the loss of sensitive meanings.

3.3.2 Survey design protocol

The students' questionnaire (24 questions) was structured as follows:
- section one (participant profiling - 8 queries): biographical information, such as gender, age, working experience, prior experience in playing serious games or simulators and frequency of computer gaming;
- section two (game-based learning - 8 queries): includes students' GBL awareness, as well as assessment of GBL basic features and lecturer role during the game;
- section three (*Cesim SimBrand* assessment of the game - 4 queries): learners' experience with simulation/serious games, their perception of usefulness in learning and willingness to try out such games in other course units;
- section four (background assessment - 4 queries): learners' preparation to play *Cesim SimBrand* and satisfaction of their expectations.

The survey encompasses a blend between open-ended and close-ended queries. To close-ended questions, participants were provided with a list of options and asked to justify their choices. However, even simple "yes-no" responses were followed up by an open-ended query

to explain their choice. A final note regarding the completion time: authors had reminded learners 3 times during a period of 45 days.

4. DIAGNOSIS

4.1 Game delivery

Marketing Simulation is an optional course unit that explores *Cesim SimBrand* for leveraging learners' skills and knowledge. During this academic year, 31 students are enrolled, and the scenario is to run a selling company for smartphones in Asia and Europe. Learners are playing the game during 10 rounds (each round is equal to one year of the company) outside the classroom environment in order to avoid extra time constraints (lecturer decision); the classroom time period is devoted to debating results and analysing decisions (differences).

The most notable pattern in implementing *Cesim SimBrand* is the explicit connection among various subjects (curriculum) to reinforce concepts and improve knowledge sharing. After each round, the lecturer conducts a mini-quiz within the classroom which fosters participants' understanding of their decisions and activates their pre-knowledge. For example, while learners choose their advertising and communication channels options, as well as the investment, the lecturer asks them to describe procedures and estimate the cost per product. Throughout the discussion, the lecturer relates concepts to procedures within the simulator.

The lecturer pointed out some game strengths; however, the most important strength is the real experience that is typically not available. In the informal conversations with the lecturer, other benefits and drawbacks concerning game delivery and curriculum support were analysed.

4.2 Learners' pre-perceptions

At the beginning of the course unit, participants felt uncertainty about their potential experiences with the simulator because none had tried serious games before. After 2 practice rounds, informal conversations were conducted to understand participants' beliefs and expectations about game playing.

Primarily, they expressed high interest and enthusiasm in this novel learning tool and pointed out engagement and learning support as key features. This enthusiasm and confidence about their knowledge can be explained by the game environment (similar to a real company), as one German Erasmus student comment denotes: "I would like my parents see me, how I wake up in the morning and with what enjoy and enthusiasm I am visiting these classes, usually happens absolutely different."

5. FINDINGS

5.1 Learners' profile

The survey was designed through LimeService to gauge students' perceptions of the business simulation game *Cesim SimBrand*, and it was made available to learners via link distribution by the lecturer. To ensure a non-biased feedback from respondents, no incentive was provided to complete the survey and no additional effort was promoted; the exception was three reminders via emails to students. The survey was kept completely anonymous in spite of requiring participants to provide their gender and age, and it abided by UAlg's Research Ethics Board policies for research involving human participants. From 30 invitations sent to enrolled students, a 50 percent response rate for completed ones was verified.

The profile of participants regarding age and gender were: (i) about 25% were between 23-25 years old, and, as expected, the majority (53%) ranged between the ages of 21-22; (ii) 5 respondents (or 33%) were female and 10 (67%) were male. When asked about video game playing, the common answer from all participants was yes; however, as shown in figure 2, 7 (or 46%) reported less than 1 hour per day doing it. Five participants (or 33%) responded between 1 and 2 hours daily and, finally, two learners (or 13%) acknowledged 2 to 3 hours daily.

Figure 2. Video games- hours of playing

Source: Own elaboration

The graphical summary for game categories played by the participants is in figure 3. Participants were provided with a list based on GameSpot website categories, and they could choose more than one category. However, as previously stated, none had prior experiences in simulation/serious games within educational environments.

Figure 3. Video games- categories
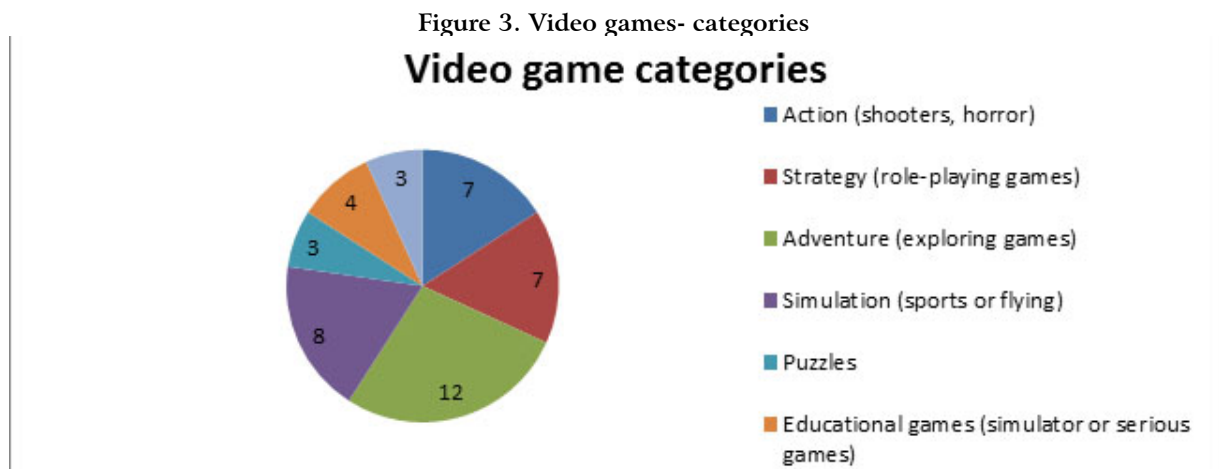
Source: Own elaboration

Adventure games were the most popular category, since 12 participants had chosen it including 5 females. The next most popular category was simulation games in sports or flying, which was acknowledged by 7 participants (4 of them were females).

5.2 Learners' awareness

Within section 2, participants shared their awareness about simulations/serious games; the majority (58%) declared their awareness concerning GBL and its features (see table 1).

Table 1. GBL awareness

			Section 2- Query 10- Give your definition about GBL	
ID	**Gender**	**Age**	**Remark**	**Analysis**
9	Male	25	*[1]Simulação de um mercado real*	[1]GBL features (simulated environment)
10	Male	21	*[1]Jogos que procuram ensinar algo, jogos educativos por exemplo*	[1]Educational games
17	Female	21	*Na disciplina de Simulação de Marketing aprendemos várias componentes relacionadas com gestão de produto e publicidade por exemplo e a importancia que cada uma delas tem no sucesso de uma empresa por exemplo*	[1]GBL features (simulated environment)
22	Male	39	*Aplicação de teoria em cenário de jogo. Estimulando a aprendizagem através da competição.*	[1]GBL features (simulated environment) [2]Competition
25	Female	23	*[1]Utilizarmos um jogo com o intuito de interiorizar conceitos :-)*	[1]GBL features (simulated environment) [2]GBL features (decision making)
32	Male	22	*Jogar, atraves de um simulador ou de um jogo, com fins a aprender conteudos educacionais*	[1]GBL features (simulated environment) [2]GBL features (simulated environment)
2	Male	36	*Game-based learning é uma forma de apredizagem em cenários virtuais*	[1]GBL features (simulated environment)"

Source: Own elaboration

The most common answer was real environment *stimuli*; although, when asked about their advantages and disadvantages, 90% pointed out "learning engagement" and "illustrative presentations" (advantages) since they bring real competition to the game. This was a key issue to challenge them to succeed and, consequently, gain a better understanding of business major areas. The characteristic "teamwork" is very controversial because some deemed it as an advantage (decision expansion) while others revealed dissatisfaction with their performance in the game as a result of their partners' lack of responsibility or poor capability to negotiate.

Interestingly, a third of learners mentioned difficulties about the description of rules and delivery of results, as well as the "problem-solving" process (improvement for the lecturer); the elder group denoted some errors in the *Cesim SimBrand* structure. This makes it less real, and participants lost interest in playing.

Figure 4. *Game-based learning- features*
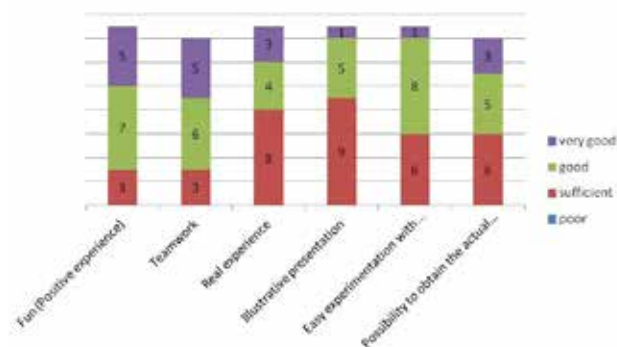
Source: Own elaboration

Primarily, the lecturer role denoted guidance throughout the process and motivation (continuous usage); these answers revealed similarities with other learning tools (e.g., e-learning).

Table 2. Lecturer role

Section 2- Query 15 Which is the lecturer role in a course unit which applies game-based learning?				
ID	**Gender**	**Age**	**Remark**	**Analysis**
9	Male	25	*Explicar como o jogo funciona*	[1]Guidance
10	Male	21	*Ajudar-nos no início e ensinar-nos as técnicas*	[1]Guidance
11	Male		*Explicação, motivação e esclarecimento de dúvidas.*	[1]Guidance [2]Motivation
12	Male	22	*Ajudar, explicar, orientar*	[1]Guidance
14	Female	21	*Para nos ir guiando e orientando durante o jogo*	[1]Guidance
16	Male	24	*Orientar*	[1]Guidance
17	Female	21	*Orientar os alunos*	[1]Guidance
22	Male	39	*Estimular o uso do jogo*	[1]Motivation
24	Male	25	*Dar orientações/dicas do que pode ser feito*	[1]Guidance
25	Female	23	*Auxiliar com o seu conhecimento e estimular a competitividade*	[1]Motivation [2]Guidance
32	Male	22	*Orientar, motivar, explicar e educar*	[1]Motivation [2]Guidance
2	Male	36	*O docente explica e orienta os alunos para o sucesso na execução das tarefas em simulação*	[1]Guidance

Source: Own elaboration

5.3 Learners' experiences

The analysis of game-based learning promoted the following empirical results (see table 3):

Table 3. Game-based learning- Benefits and pitfalls

Section 3- Query 14- Which characteristics from the previous question do you consider advantages or disadvantages? Please justify that.				
ID	**Gender**	**Age**	**Remark**	**Analysis**
10	Male	21	*[1]Talvez seja divertido para quem [2]tenha mais tempo para usufruir de tal programa.*	[1]GBL features (Learning engagement) [2]Lack of time
11	Male		*[1]A experiência próxima da real que se consegue ter, no entanto apesar do esforça para se assemelhar (to make alike, to compare) [2]à realidade tem grandes gafes na sua estrutura*	[1]GBL features(real experience) [2]Errors in game structure
14	Female	21	*[1]vantagem- proporciona uma experiencia real, é um ótimo simulador da realidade e [2]muito divertido, desperta um sentido de [3]competição entre os alunos saudável.*	[1]GBL features(real experience) [2]GBL features (Learning engagement) [3]Competition
17	Female	21	*[1]O facto de proporcionar uma experiência real e obter resultados reais são para mim as principais vantagens, [2]pois motiva-nos a fazer mais e melhor para garantir o sucesso da nossa empresa*	[1]GBL features(real experience) [2]Motivation to succeed
23	Male	21	*fomenta o trabalho de equipa devido a sua competição ser realizada em equipas*	[1]Competition

25	Female	23	*As diferentes materias podem ser uma desvantagem visto não termos bases suficientes de outras disciplinas para o fazer*	[1]Not knowledgeable to play
32	Male	22	*Tudo o que envolve resultados ou experiencias reais são desvantagens porque não é o que acontece, é um jogo, mas não se aproxima assim tanto da realidade*	[2]Errors in game structure
2	Male	36	[1]*"Trabalho em equipa" é uma vantagem, porque mediante (thanks to, by means) as matérias dadas em aula, as ideias são debatidas com o obetivo de alcançar a melhor decisão.* [2]*"Fácil experimentação com diferentes matérias" considero uma desvantagem, não é fácil experimentar e perceber os resultados obtidos. requer muita prática*	[1]GBL features (teamwork) [2]Require improvement in rules and results description

Source: Own elaboration

As noted, the main concern of learners was game performance: the level of reality and diversity concerning decisional scenarios. Another important empirical finding is autonomy, i.e., a declared preference for decision making within the classroom. Learners also pointed out changes in their work procedures, namely novel business scenarios, "real" experience and comprehension of new topics (figure 5).

Figure 5. *Game-based learning- features*
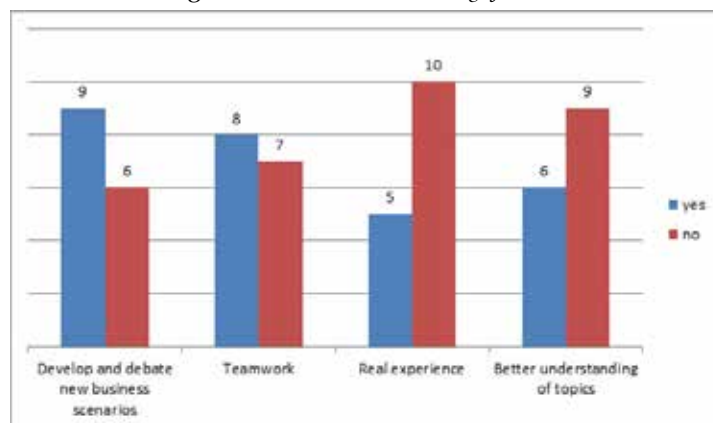
Source: Own elaboration

Even so, the overall positive experiences induced respondents to express their willingness to explore GBL in course units such as strategy or business analysis (table 4).

Table 4. Course units- future exploration

Section 3- Query 14- Would you like to explore game-based learning in other course units? Why? In which ones?				
ID	**Gender**	**Age**	**Remark**	**Analysis**
10	Male	21	*Cadeiras mais estratégicas*	[1]Strategy
12	Male	22	*A competitividade e a variante "jogo" desperta muito interesse por parte dos discentes*	
23	Male	21	*Economia*	[1]Economics
32	Male	22	*Análise de investimentos, entre outros*	[1]Investment Analysis [2]Strategy
2	Male	36	*Análise financeiras/Business analysis*	[1]Business Analysis

Source: Own elaboration

5.4 Learners' preparation

In addition, students have been asked about their sense of preparation (prior acquired skills) to explore *Cesim SimBrand*. 53% felt prepared, and some (a third) declared that two practice rounds and previous knowledge acquired during the bachelor helped them greatly. However, the remaining ones felt unprepared, and these results require a more extensive analysis. Overall, participants expressed their satisfaction after playing *Cesim SimBrand*, despite early suspicion that "we were expecting the worse" (survey participant 32). In fact, throughout the process, students felt that they had learned more than anticipated and considered it very positive.

6. LIMITATIONS AND FUTURE WORK

6.1 Methodological limitations

A trustworthy qualitative research recognises an effort for meaning or validity about data collection (Huxham and Vangen, 2003), so literature acknowledges four quality standards: (i) credibility, results' accuracy through member checking; (ii) transferability, "thick description"; (iii) dependability, record of the research process and documentation; and (iv) conformability, data audit. Hence, a systematic approach through interpretative flexibility to open-ended queries (content analysis) is rigorous despite potential subjectivity.

The survey protocol response rate (50%) can be criticised; however, the interesting insights from empirical evidence verifies the author's option. Besides, its design does not promote a negative influence over a qualitative numerical approach and interpretive flexibility (Doherty et al., 2006; Šuc, Vladušič and Bratko, 2004). Additionally, the authors are aware of the challenges of a "non-main stream" data analysis (for example, see Bowen, 2005).

6.2 Tools and data analysis upgrade

With a well-designed survey, the following step for data collection tools is with either individual or focus group interviews. While individual, semi-structured interviews will allow comprehension about peoples or opinions, focus groups enable the expression of feelings or perceptions not expressed individually (Gall, Gall & Borg, 2003). This option can be particular useful for sensitive issues on learners' opinions (lecturer's role during the game). Some keen examples are related with a data analysis upgrade, i.e., to figure out why cooperation or team work can be a controversial topic.

7. CONCLUSIONS

This research aims to understand a simulation game's advantages and disadvantages within Marketing courses, namely the business simulator *Cesim SimBrand*. Despite some pitfalls, such as the stage development of games, learners revealed positive experiences and better learning engagement.

Since traditional educational environments are often not flexible (Santos et al., 2013), experimentation with a blended approach (traditional and novel learning practices) can occur to minimize educational issues (Duarte and Martins, 2013). Beyond the advantages for learning, when a game is well established, it is a cost effective method; however, these require proper planning and technological/social structures that enable their integration into a formal program. Finally, this research exhibits a need for the development of curriculum materials in order to support a lecturer's efforts to teach and assess while exploring the game.

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