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Students' perception of the impact of competences on learning: An analysis with business simulations

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Abstract

Digital technology and information and communication technologies (ICTs) have provided new methods for teaching and learning that help students reap valuable benefits; however, they are not exempt from criticism regarding their effectiveness for learning. This study aims to analyse the contribution of one of these e-learning methods—business simulation games—to enhancing students' learning outcomes, and will try to determine which competences are perceived by students to contribute most to improving learning. The study was conducted through the use of questionnaires, which were given to 115 students who were participating in business simulation games within official management courses as part of bachelor's and master's degrees. The findings reveal that generic competences exert a positive influence on learning outcomes. In the case of specific managerial competences, however, the effect was found to be insignificant. The findings also reveal better learning outcomes of younger students participating in business simulation games compared to older students. This study has pedagogical implications for deciding the best way to enhance students' learning outcomes when using business simulation tools.

Keywords: educational research, technology-enhanced learning, e-learning, business simulation games, computer-mediated learning, higher education.

1. Introduction

During the last few decades a new educational paradigm has emerged that shifts the educational focus onto learners and competences (Hernández & Serradell, 2018). This new paradigm provides opportunities for students to maximize their learning experience, and has facilitated the emergence of new methods for teaching, training and learning, which have enabled students to acquire numerous competences that could prove beneficial to their professional development (John & Wheeler, 2012). The transition to alternative learner-centred teaching methods has transformed the perception of how learning achievements are considered and evaluated, focusing not only on knowledge transfer but rather on learning construction by learners (Kent, Laslo, & Rafaeli, 2016; Sánchez, Campa, & Hernández, 2011).

This new educational scenario has been fostered by digital technology and information and communication technologies (ICTs), which have given rise to the notion of technology-enhanced learning (TEL), referring to contributions to learning made by technology. The educational value of technology has been highlighted by the European Higher Education Area (EHEA), which requires European universities to make relevant efforts to implement ICTs and e-learning methods and establish a competence-based learning model that fosters constructivist learning, thereby shifting the focus of learning from teachers to students (Cheng & Chau, 2014).

Different methodologies exist to facilitate this change in educational paradigm. Some good examples are problem-based learning, project-based learning and other kinds of experiential learning that present different scenarios in which students need to generate ideas, think and acquire the knowledge and skills required to solve the problems posed or obtain the expected outcomes. These educational methodologies allow students to adopt a more active role and lead their own learning processes through a constructivist approach (Hernández, Perera, & Serradell, 2019; Kent et al., 2016).

In the specific field of business and administration, and given the potentialities offered by TEL, business simulation games have emerged as a good example of an e-learning method for management training (Siddiqui, Khan, & Akhtar, 2008). This method allows students to drive their own learning processes, develop an active role in building their own learning (Romero, Castejón, López, & Fraile, 2017), and improve their experiential learning by simulating on-the-job situations (Bruce, 1988; Fu, Su, & Yu, 2009; Gilgeous & D'Cruz, 1996; Jones, 2005). Taking advantage of the nature of simulations, games allow students to practise what they learnt, while avoiding the risks involved with taking real decisions and the fear of failure or reprisal (Zantow, Knowlton, & Sharp, 2005).

However, despite all the advantages associated with business games, some critical voices have questioned their effectiveness in enhancing students' learning outcomes, claiming that more empirical evidence needs to be gathered on the educational impact of and enhanced learning fostered by these methodologies (Connolly, Boyle, MacArthur, Hainey, & Boyle, 2012; Tao, Yeh, & Hung, 2015). This controversy emphasizes the different roles that teachers should assume in this new ICT-dominated educational paradigm, which should be less centred on transmitting knowledge and more on acting as facilitators, collaborators, advisors, moderators and coaches in the teaching-learning process (Hernández, Gorjup, & Cascón, 2010). The debate on the real benefits of business games for enhancing learning also stresses the relevance of considering students' voices and perception of their self-assessment of their learning processes (Kent et al., 2016). In the new educational learner-centred scenario facilitated by ICTs, students' opinions and perceptions are crucial for understanding their learning processes and outcomes because teachers are frequently left out of learning processes constructed by students alone or through interactions with their peers (Hernández et al.,

2019). This phenomenon makes it especially relevant to consider students' points of view and have more comprehensive information that can be used to assess the educational value and effectiveness of e-learning methodologies (Hernández & Serradell, 2018).

Given the aforementioned criticism regarding the educational impact of business simulation games, this study seeks to provide new empirical evidence on the learning outcomes fostered by this e-learning method. To do so, a quantitative approach was used to analyse, from the students' point of view, the overall influence that competences acquired through business simulation games exert on their learning outcomes. A distinction between generic and specific managerial competences was applied; the latter has been somewhat neglected in previous research (Chang, Lee, Ng, & Moon, 2003; Fitó, Hernández, & Serradell, 2014).

2. State of the art: Business simulation games and learning outcomes

The past two decades have witnessed a boom in literature on TEL, which has sought to explain the ways in which new technologies contribute to learning, mostly from a constructivist view (Wang & Hannafin, 2005). However, no uniform description of TEL has been produced (Latif, 2017). One description could be that it comprises technology-based learning and instructional systems through which students acquire skills and knowledge, usually with the mediation of teachers and technological resources (Aleven, Stahl, Schworm, Fisher, & Wallace, 2003; Wang & Hannafin, 2005). The Higher Education Academy (HEA) describes TEL as a synonym for e-learning, referring also to technology-enhanced classrooms and learning with technology, which would include mobile resources, smartphone technology and other dynamic modes of information delivery (Dimond, Bullock, Lovatt, & Stacey, 2016; Latif, 2017). Another well recognized definition of TEL incorporates the aspect of integrating the use of digital technology into the learning and teaching process to improve the quality of learning (Lee & Choi, 2017).

TEL purports to offer several advantages, including ease of access, flexibility in the time and place for learning, avoiding the problem of time as a limiting factor (Brooks et al., 2016), promoting active and ubiquitous learning, location-based learning and the generation of learning communities (Barak & Levenberg, 2016). However, despite the advantages of TEL, it also has some shortcomings that raise doubts about its unequivocal learning value; for example, it may lead students to display inappropriate learning behaviour such as not completing the courses in the way recommended and may also facilitate superficial rather than in-depth learning (Brooks et al., 2016). These limitations suggest the need to ensure that technology is designed and implemented in such a way as to create learning environments that truly enhance learning (Lee & Choi, 2017). This design and implementation will depend on the specific technology used in each case.

Among the various TEL alternatives, digital game-based learning has been recognized as an excellent tool for improving skills, knowledge and competences in different disciplines and fields (Hwang, Sung, & Yen, 2014), such as medicine, nursing, engineering, mathematics, linguistics, management, etc. (Sung, Hwang, Lin, & Hong, 2017). In the specific case of management training, practitioners and academics have emphasized the value of business simulation games for learning (Fitó, Hernández, & Serradell, 2015). This excellence is seen in several different pedagogical approaches, including learning by doing, learning from mistakes, goal-oriented learning and role-playing (Tao et al., 2015). It has also been analysed by applying several different learning theories, such as experiential learning, based on the relevance of self-experience in knowledge creation; and constructivism, centred on the process of knowledge construction and the influence of reflexive awareness of that process (Siewiorek, Gegenfurtner, Lainema, Saarinen, & Lehtinen, 2013) at both the individual and social level (social constructivism) (Kent et al., 2016).

A growing amount of literature has highlighted the effectiveness and usefulness of this e-learning method, mostly analysing the learning motivation and competences that can be developed by students and then put into practice when participating in a business simulation game. The effectiveness and benefits of business simulation games have been confirmed in terms of enhancing the interest, motivation and engagement of students of different ages, achieving a balance between academic contents and gaming elements to create enjoyable learning contexts (Sung et al., 2017). Business simulation games also allow students to acquire competences that are mostly generic or transferable and are described as shared attributes that could be a general part of any academic degree (ANECA, 2005). Previous research has identified the most relevant generic competences fostered by business simulation games, which include analytical abilities, teamwork and decision-making, among others (Fitó et al., 2014, 2015; Jensen, 2003). Other research (Pando, Periañez, & Charterina, 2016) has also found business simulation games to improve specific managerial competences, which are more closely related to specific skills and knowledge in the field of business and management (ANECA, 2005), for example, developing managerial roles, establishing company goals and designing, planning and implementing business strategies (Chang et al., 2003; Fitó et al., 2014). However, less attention has been paid to examining how business games enhance specific managerial competences compared to the attention paid to generic competences. One possible reason may be the lack of consensus and the level of discretion regarding the most relevant specific managerial competences when designing study programmes in business and management disciplines.

The educational potential of business simulation games may have its advocates but these methods also have their shortcomings and detractors. Despite the affordances and opportunities that exist, some drawbacks have also been identified to the adopting of this technology (Latif, 2017), which raise doubts over the huge investments made by higher education institutions to apply TEL methods. The main criticisms emerge from the fact that business simulation games as a learning tool do not determine in themselves whether learning happens; as with other ICT-based methodologies, the success of learning depends on the design of the tool and how it is used by students and teachers (Lonn, Teasley, & Krumm, 2011; Remesal, Colomina, Mauri, & Rochera, 2017) as well as on how learning is conceptualized in the new educational paradigm.

The first challenge concerns the students themselves. They play a dual role, as players and also as learners, when participating in business simulation games. Depending on the relevance that they give to each role, their interaction with the game and the benefits derived from it may vary (Gros-Salvat, 2009). There are also situations where the students are more focused on the recreational and technological aspects of the game than on its learning dimension (Brooks et al., 2016). This happens when students feel that they are not in control of what happens in the game and when they perceive a lack of transparency about how the method contributes to their learning (Connolly et al., 2012; Tobias & Fletcher, 2012). For example, students may conceive the game as a black box, where decisions and results have no explicit cause-effect relationship (Lainema & Nurmi, 2005). In this situation, students can react in a way similar to that of a trial-and-error process, where all the options and decisions can be tested, but where they do not really understand the consequences of their actions or the reasons behind them. Furthermore, students may perceive the game as being unrealistic and based on lessons that do not apply in the real world (Siewiorek et al., 2013), and thus they lose engagement and motivation to play and learn (Eseryel, Law, Ifenthaler, Ge, & Miller, 2014), or they play but apply an approach in order to win, without paying attention to the associated lessons. Other individual factors with detrimental effects on learning could include a perceived lack of time, resistance to change, lack of rewards and recognition, resistance to new technologies, lack of skills and lack of confidence (Latif, 2017).

Another challenge relates to the instructors. The role of instructors, teachers and trainers has caught the attention of research because ICTs and digital technologies could, totally or partially, substitute some functions traditionally carried out by them (Worley & Tesdell, 2009). This scenario presents interesting research questions, such as what the optimal level of instructor supervision and interaction with students should be, which functions and roles instructors should play, or what the best way to administer the game is. This latter and prolific research line has been centred on comparative studies between business simulation games administered face-to-face and online (Hernández et al., 2010; Pando et al., 2016; Worley & Tesdell, 2009). Business simulation game instructors play a crucial role in overcoming the potential flaws of this learning method. Instructors exert an influence over students' attitudes and engagement because they take part in understanding the technology of and logic behind the game (Pando et al., 2016). Thus, the attitudinal problems of students who may see the games as a less worthy learning experience may be solved and corrected with proper management and administration of the games by instructors (Hernández et al., 2010; Pando et al., 2016), which explains the relevance of instructors being aware of all the circumstances under which the game is administered and which may affect students. However, instructors themselves can experience some pedagogical barriers with detrimental effects on the learning effectiveness of business simulation games, which can include scepticism or the inability of teaching staff to see the value of the technology for learning and contextualize the role it plays, and a lack of confidence in tools and methodologies that do not involve traditional teaching methods (Latif, 2017).

Another interesting challenge in regard to the educational potential of business simulations is how to evaluate the learning results. Traditional teaching-centred approaches consider the instructor's evaluation, in the form of marks or grades obtained by students, as an indicator of learning achievement and outcomes (Cheng & Chau, 2014; Kent et al., 2016). Another relevant indicator of students' achievement is game performance in the form of different key performance indicators (KPIs), such as turnover, profit, shareholders' earnings, etc., determined previously by instructors as targets of the game and used as proxies of the students' learning outcomes (Worley & Tesdell, 2009). However, given the shift in the focus of the learning process from teacher to student in the new learner-centred paradigm, there has been a change in the way that learning achievement is assessed (Kent et al., 2016), whereby learners' opinions are now considered to be a powerful source for determining how successful business simulations have been in contributing to students' learning outcomes (Pando et al., 2016). Moreover, according to Brooks et al. (2016), it is important to evaluate learning behaviours to identify those that may be suboptimal and detect any lack of engagement and design problems that may be associated with poor learning performance. This is especially relevant in unmonitored TEL environments, such as online business simulation games, to ensure that appropriate learning is undertaken. To do so, the whole learning process should be analysed, not just the potential positive effects of technology, simulations and games on competence acquisition but also how students finally perceive that these competences can be translated into enhanced learning results.

The critical voices that question business simulation games as an effective learning tool have generated a debate about their real contribution to learning outcomes, since the competences acquired as a result of a game cannot be immediately translated into an improvement in the students' learning outcomes. More in-depth knowledge is necessary regarding the relationship that may exist between the benefits of business games in terms of competences and students' learning outcomes, especially considering the students' perception of being the main builders of their own learning.

The main aim of this study is therefore to answer the following research question: *What is the influence, if any, of competences fostered by business simulation games on students' learning outcomes?* The purpose of the research is to provide new insights into the

contribution of business simulations to students' learning, covering any relevant gaps in previous research.

In part, this study analyses not just the acquisition of competences and the improvement of the competence profile of students when participating in business simulation games but also the influence, if any, of the competences acquired on learning outcomes and results. It then also seeks to analyse the influence of different types of competences—generic and specific managerial ones—because the influence of these different categories on learning outcomes may vary.

3. Methodology

3.1 Data

Data were collected through a questionnaire to capture the students' point of view on the competences acquired through the game and their learning outcomes.

In order to control the potential effects on students' learning caused by the game used and the instructors administering them, the questionnaire was distributed among a purposive sample of students who played the same game and had the support of the same instructor. All of them were taking a non-compulsory subject named "Business Game: Business Simulation", worth 6 ECTS (European Credit Transfer System) credits, which represents an average of 60 hours spread over 15 weeks. The players were following different management studies courses, three of which were part of a bachelor's degree and two of which were part of a master's degree, at the Universitat Oberta de Catalunya[1], during the academic years 2011/2012 and 2012/2013. The length of the course, its distribution in terms of rounds (simulated economic periods), the game used, and the instructor were the same in all the courses and for all the academic years.

A total of 182 students participated in the five courses, but the questionnaire was completed by 115 players, resulting in a response rate of 63.2%. Table 1 summarizes the demographic profile of the respondents. The participants were mostly men, 62.61%, while 37.39% were female. The mean age of the respondents was 36 years old, with slightly more than 50% between 31 and 40 years old, and more than 20% between 41 and 50 years old. Most of the respondents, almost 67%, were taking bachelor's degrees and nearly 90% did not have any previous experience with business games.

INSERT Table 1. Characteristics of the sample

As mentioned above, all the students had the same instructor and also played the same business simulation game—Cesim Global Challenge (www.cesim.com). This strategic game simulates an international mobile telecommunications company, producing and selling mobile phones in the USA, Asia and Europe. Its focus is centred on strategic management, international business, global operations and business policy, integrating different functional areas.

The expected learning outcomes of this game involved a better understanding of the complexity and management of global business and a comprehension of each of the management-related disciplines through participation in a virtual business game where the students participate in teams (always composed of 4 or 5 students), competing against each other while simulating the functioning of a real enterprise over 8 rounds (each round representing an economic period). Each team player assumed the role of the director of a

[1] The Universitat Oberta de Catalunya (Open University of Catalonia, UOC) is an innovative university based in Catalonia and open to the world through e-learning and the internet, offering online courses in Arts and Humanities; Economics and Business; Health Sciences; Information and Communication Sciences; Computer Science, Multimedia and Telecommunications; Law and Political Science; and Psychology and Education Sciences.

functional area or department, with rotating positions throughout the duration of the game.

Among the learning objectives of the course, the teaching plan highlights both generic and specific managerial competences, with the most notable generic ones being processing and analysing information, teamwork, communication and technology skills, innovation and creativity. The most relevant specific managerial competences involved were business planning and management competences as well as knowledge and understanding of managerial concepts, theories and roles.

The simulation was incorporated as a course that allows students to consolidate and push the knowledge and skills previously acquired during their studies in other subjects, allowing students to interrelate their previous knowledge and skills, specifically in strategic management and finance and accounting, using a more practical orientation. The students were graded on their performance and achievements while participating in the business simulation game.

This performance and their achievements were assessed by considering various aspects, consisting of three reports and the competitive position of the team at the end of the game. The reports asked the students about their strategic and operational objectives, the main decisions made and the reasons why they made them, the main adjustments in their decision-making during the game, and the contribution of their decisions to their strategic goals. The competitive position of each team in the game determined their success and was assessed by comparing both the operational and financial key performance indicators of each team. These indicators included the following: the total cumulative shareholder return, earnings per share at the end of the game and the competitive position of the teams at the end of the game.

3.2. Measurement of variables

The questionnaire distributed among the students comprised three parts. The first part aimed to measure the competences acquired by students when participating in the business simulation game and used the items described by Fitó et al. (2014, 2015). These authors used a questionnaire based on the competences contemplated in the Tuning project, which included 23 items for capturing generic competences (GC) and 14 items for specific managerial competences (SC). Likewise, in the questionnaire the students were asked to think only of the contribution made by business simulation games to acquiring these competences, excluding other learning experiences and methodologies which could also be involved.

Regarding the learning outcomes (LO), previous research has traditionally used a quantitative approach, measuring these outcomes by the scores, marks or grades provided by instructors or independent experts (Kent et al., 2016; Picciano, 2002; Song & McNary, 2011). However, this measurement of learning outcomes neglects the students' opinions about how they build their own learning and knowledge, which is also a useful indicator of student performance, especially from the perspective of the constructivism learning theory (Romero et al., 2013). As we are interested in the students' perception of their learning, we decided to include a second part in the questionnaire to gather students' opinions on learning outcomes. Given the scant research that uses this approach, we decided to hold a focus group to create the list of items. Sixteen master's degree students who were studying for a Rovira i Virgili University MBA in 2010/2011 participated in the focus group and were chosen because they had taken part in a similar business simulation game. The purpose of the focus group was to obtain the opinions of these students as former players regarding the most relevant aspects for ascertaining learning achievements when participating in a business simulation game. From the focus group, 7 items were suggested as ways of measuring learning outcomes and these centred on assessing the contribution of the business simulation game to the learning process and objectives, as well as the value, satisfaction and expectations of the students regarding this specific learning experience. To help improve their reliability and content validity, the items included in the learning outcome scale were checked by two expert business game

instructors, whose suggestions were taken into account when drawing up the final version of this part of the questionnaire. We also examined the reliability of the scale for measuring learning outcomes against the responses to the items obtained from a different group of 14 MBA students at Rovira i Virgili University. We tested and accepted the hypothesis that one factor was enough to ascertain learning outcomes (χ^2 = 14.3, p-value = 0.428), with the reliability of this factor being Cronbach's α = 0.79.

The questionnaire used a 5-point Likert scale (where 1 means "Strongly disagree" and 5 means "Strongly agree") for all its items.

Most of the items included in each part of the questionnaire were in some way related to each other, which suggests the utility of using factorial analyses for detecting the latent construct under the multiple items to measure all generic and specific managerial competences as well as learning outcomes.

To compute the exploratory factor analysis, we used FACTOR software v. 9.3 (Lorenzo & Ferrando, 2006). We analysed the correlation matrix using parallel analysis based on minimum rank factor analysis (PA-MRFA) (Timmerman & Lorenzo, 2011), followed by an oblique rotation, as we expected the factors concerning competence categories not to be totally independent and some possible correlation between them. We used Promin (Lorenzo, 1999) because it is a recommended method among the oblique methods (Ferrando & Anguiano, 2010).

Parallel analysis indicated the presence of one factor for generic competences, one factor for specific managerial competences and one factor for learning outcomes, as shown in Table 2.

INSERT Table 2. Oblique exploratory factor solution

We also decided to consider some control variables related to the demographic information of players due to their potential influence on the success of e-learning (Sun, Tsai, Finger, Chen, & Yeh, 2008). Thus, the questionnaire included a third part asking students for demographic information and profile data. Specifically, we considered gender (G) because, as previous research has stated, gender can exert some kind of influence on attitudes towards the use of ICTs, and since business simulation games are based on the use of technology, the learning results after participating in this kind of educational experience could be affected by gender issues. Most previous research on this topic has seen a common pattern where women are more negative towards technology than men (Ardies, De Maeyer, Gijbels, & van Keulen, 2015; de Vries, 2005; Mawson, 2010), and where male students show particularly positive attitudes towards technology (Rees & Noyes, 2007). We measure gender as a dichotomous variable with a value of 0 for men and 1 for women.

We also included age (A) as a control variable, as it is a characteristic that can influence abilities and attitudes in regard to new technologies and games. Previous research has found a negative correlation between age and technology acceptance and that the upcoming younger generations are completely immersed in new technologies and have higher expectations and enjoy being challenged more than older generations; they also like exploring, being entertained and competing while learning (de Vries, 2005; Neill, 2009). We have measured age using two different metrics, numerically by just indicating the age of each student, and also by forming four different categories: 21 to 30 years old, 31 to 40 years old, 41 to 50 years old, and over 50.

Finally, we considered the participants' previous experience with business games (PE), coded as 0 when no previous experience existed and 1 otherwise, because previous experience could affect the students' perception of abilities in and attitudes towards the game as well as their performance. Players with previous experience were expected to outperform players with no experience at all (Faria, 2001; Faria & Wellington, 2004).

4. Data analysis

Table 3 presents the means, standard deviation and bivariate correlations of the variables included in the model.

INSERT Table 3. Descriptive statistics and correlation matrix

Collinearity indicates a high correlation between certain variables. To address any potential problem of collinearity between explanatory variables, the variance inflation factor (VIF) was computed (Table 5), showing a maximum value below the upper threshold of 5.

Some additional descriptive analyses were also conducted to exhibit the potential differences in competences and learning outcomes of different types of students, considering the demographic variables included in this study: gender, previous experience with business games, age and study level. When the comparison was made between two groups of students, as in the case of gender, previous experience with business games, and study level, t Student tests were conducted, while F tests in one-way ANOVA were calculated to compare mean values of more than two groups of students, for example in the case of age. The results are displayed in Table 4.

INSERT Table 4. Comparisons of competences and learning outcomes in the different types of students

Table 4 shows that there are no significant differences in the learning outcomes and the competences acquired (generic or specific managerial ones) in terms of gender, previous experience with business games or study level (bachelor's degrees vs master's degrees). The only significant differences observed related to age. These differences were detected in the three variables: in the learning outcomes as well as in the generic and specific managerial competences. In regard to learning outcomes, it can be observed that the highest learning outcomes were exhibited by the group of students between 31 and 40 years old, followed by students between 21 and 30, while the poorest learning results were detected in the older students. Regarding the generic competences, the highest values were exhibited by older students (over 50 years old) and by younger students (between 21 and 30). Finally, the specific managerial competences had the highest values in the case of older students. These findings underline the observation that the effects of age are not homogenous over all the learning-related variables, but in the specific case of learning outcomes (which is the dependent variable of this study) these results were better for younger than for older students.

To analyse the overall influence that competences acquired through the game exert on students' learning outcomes, the following model was proposed:

$$LO^{2} = \alpha_1 G^{3} + \alpha_2 A^{4} + \alpha_3 PE^{5} + \alpha_4 GC^{6} + \alpha_5 SC^{7} + \varepsilon$$

Table 5 shows the results of the linear regression analysis carried out following the backward stepwise regression procedure. It was conducted because this method aims to obtain the explanatory variables that offer the best model for explaining the dependent variable.

[2] Learning outcomes (LO)
[3] Gender (G)
[4] Age (A)
[5] Previous experience with business game (PE)
[6] Generic competences (GC)
[7] Specific managerial competences (SC)

INSERT Table 5. Influence of generic and specific managerial competences on learning outcomes

Table 5 shows that only generic competences have an effect on learning outcomes. This effect is positive and significant (β = .652, p-value < 0.001). This finding is in line with contributions from previous research about the relevance of generic competences (Faria & Dickinson, 1994; Jensen, 2003) regardless of how the game is administered (Pando et al., 2016). However, these previous studies are centred on evaluating the relevance of the generic competences acquired by students when participating in a business simulation game; they do not confirm the positive influence of this typology of competences on learning outcomes. According to previous research, specific managerial competences should also positively affect learning outcomes (Fitó et al., 2015; Hernández & Serradell, 2018), but this effect was not shown to be significant in our sample. Regarding the control variables, only age was found to be significant and its effect on learning outcomes was negative (β = -.250, p-value < 0.1), indicating that younger players outperform older ones in terms of their learning outcomes when participating in business simulation games. The rest of the control variables were not proven to be statistically significant.

5. Discussion and conclusions

This study aspires to contribute to the open debate on the educational effectiveness of business simulation games based on students' opinions, to better understand the contribution of competences fostered by this methodology on students' learning outcomes. It also aims to demonstrate which competences exert a greater impact on the learning results and takes into account both generic and specific managerial competences.

The findings confirm that, from the students' perspective, the most relevant competences affecting their learning outcomes were generic ones, such as information processing, decision-making, teamwork, dealing with uncertainty and reaching agreements. This result is in line with the contributions of previous research, mostly centred on identifying the improvement of certain generic competences as a relevant benefit of business simulation games (Fitó et al., 2014; Jensen, 2003). However, the findings go a step further. While previous research only confirmed the improvement of generic competences of students when participating in business simulations games, this study has proven the positive influence of these competences on students' learning outcomes, making a relevant contribution to the analysis of the effectiveness of this method for learning purposes. This result makes a relevant contribution to the non-conclusive previous evidence on the educational effectiveness of TEL methodologies because, although it has been proved that TEL helps to overcome limitations in learning caused by time and space (Brooks et al., 2016), its learning values have also received criticism, due to the potential inappropriate learning behaviours of students, which could result in superficial learning (Brooks et al., 2016). Our results regarding one specific TEL method in management training—business simulation games—support the thesis of the learning effectiveness of TEL, at least in regard to the contribution of generic competences.

This finding emerges from the students' perceptions. As mentioned above, students' opinions are crucial for detecting any TEL problems. In the new educational learner-centred scenario facilitated by ICTs, students' learning processes and outcomes cannot be completely understood if their perceptions and opinions are neglected, because teachers and instructors are frequently left out of learning processes constructed by students alone or through interactions with their peers (Hernández et al., 2019).

Another relevant conclusion of this research refers to the non-significant influence of specific managerial competences. Although this influence also seems to be positive, this effect

was not proved to be statistically significant. The objective of this study does not include trying to explain the reasons behind the relationship between competences and learning outcomes, but the lack of results in regard to the influence of specific managerial competences is certainly challenging, and something to explore further in future research. One possible explanation for this result could be related to the profile of the students in the sample. Their experience with business simulation games was very low, as was their exposure to experiential learning in general. Until recent times, educational approaches have typically been more centred on traditional lectures and a teaching-based paradigm, as in the Spanish case. This result is in line with previous findings that suggest that students from different cultural backgrounds assess differently how business simulations foster the acquisition of specific managerial competences but not the ability of this methodology to promote the most general competences (Hernández, Serradell, & Fitó, 2018). Most of the generic competences are in the very essence and purpose of business simulations, such as decision-making, reaching agreements, dealing with uncertainty and analytical skills, so students clearly saw the contribution made by this learning methodology to their learning achievement. Other competences, which are more specific and often content related, are valued differently by students depending on their previous level of exposure to experiential learning tools, with these competences being more highly valued when this exposure is higher (Hernández et al., 2018).

Therefore, teachers and instructors must be aware of the difficulties that students face in certain educational contexts, and adapt their roles to take full advantage of all the potentialities of business simulations and overcome any obstacles that they may pose for learning. For example, teachers/instructors must stress to the students the relevance of integrating and applying their previous management knowledge when participating in business simulations so that students get a clearer picture of how their participation in these simulations is an opportunity to apply their previous specific managerial knowledge and competences and push forward what they have learnt in other disciplines such as accounting, strategic management or finance, using other methodologies. Also, it would be beneficial for students to reflect more on the specific type of knowledge they are applying and consider that in addition to the game's key performance indicators, the managerial concepts involved form a relevant part of the students' marks and grades.

Regarding the variables used in this study as controls, the findings indicate that younger players outperform older ones in business simulation games. This result is in line with the findings of previous research that found a negative correlation between age and technology acceptance, with the younger generations more immersed in and better adapted to new technologies (de Vries, 2005; Neill, 2009). When the different groups of students were compared in terms of age, the best learning results were obtained by students in the lower age ranges, specifically between 31 and 40 and between 21 and 30 years old. When these comparisons were conducted for the competences acquired using the game, the results were different as they did not indicate that these competences were higher among the younger students. For the rest of the demographic variables, however, the results did not prove any relationship with learning outcomes. Therefore, the data do not show any influence of gender and previous experience with business simulations on learning results. Also, the data collected in this study did not show any differences in the learning outcomes and competences acquired when groups of students were compared in terms of gender, previous experience with business games or study level.

Our findings related to the lack of impact of gender on learning outcomes are in line with the results of other recent studies that also reveal an absence of differences (Romero et al., 2017), although some studies have pointed out that men and women do not display the same behaviour and performance with ICTs (Ardies et al., 2015; de Vries, 2005; Mawson, 2010).

Regarding the lack of evidence of the impact of previous experience with business games on learning results, this result is related to one important limitation of this study, which is the homogeneous profile of the students in the sample in terms of their lack of exposure to previous experiential learning. Obtaining more data from students from different cultural and educational contexts who have had more exposure to this kind of learning methodology could contribute to improving the understanding of the influence of competences on learning outcomes, and also provide instructors with clues for detecting any flaws in how the game is used and identifying potential solutions.

Another important limitation is the low number of master's students in the sample. Another interesting future aim would therefore be to obtain more data from this kind of student to analyse if any differences in terms of educational level exist in relation to the impact that competence acquisition through business simulations has on learning results.

Finally, the questionnaire used did not allow us to gather information about the previous business experience of students or what kind of business experience they had, but this information could be useful for analysing the utility of business simulation games in terms of enhancing learning when students already have previous practical business experience. The inclusion of this additional information would be useful for taking full advantage of learning-driven business simulations, and would open up an interesting future research line.

Funding
This research did not receive any special grants from funding agencies in the public, commercial or not-for-profit sectors.

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Acknowledgement

We accknowledge that the journal has a Double Blind Peer Review policy. According to that the author's name has not been disclosed to the reviewer.

Tables

Table 1. Characteristics of the sample

Profile of the students	Total number	%
Male	72	62.61
Female	43	37.39
Previous experience with business games	14	12.2
No previous experience with business games	101	87.8
Age		
21-30	24	20.87
31-40	61	53.04
41-50	27	23.48
>50	3	2.61
Bachelor's degree level	77	66.96
Master's degree level	38	33.04

Table 2. Oblique exploratory factor solution

Items	Generic skills (GS)	Specific managerial skills (SS)	Learning outcomes (LO)
GS.01. Processing global information	.683		
GS.02. Processing partial information	.622		
GS.03. Decision-making	.680		
GS.04. Reaching conclusions	.618		
GS.05. Relating information	.643		
GS.06. Applying theoretical decision-making concepts	.654		
GS.07. Time management	.691		
GS.08. Solving deadline-related problems	.694		
GS.09. Using new technologies	.666		
GS.10. Using communication platforms	.631		
GS.11. Solving software-related technical problems	.612		
GS.12. Solving conflicts between groups	.594		
GS.13. Resolving conflicts within groups	.697		
GS.14. Reaching agreements	.717		
GS.15. Creativity	.701		
GS.16. Entrepreneurship	.685		
GS.17. Innovation	.709		
GS.18. Dealing with uncertainty	.606		
GS.19. Influencing other people	.740		
GS.20. Accepting other people's influence	.725		
GS.21. Delegating	.695		
GS.22. Trusting	.719		
GS.23. Helping to create a good working environment	.749		
SS.01. Contributing to reaching the goals of a company		.794	
SS.02. Managing a company		.751	

SS.03. Improving the competitive position of a company			.722
SS.04. Designing and implementing strategies for a company			.782
SS.05. Providing managerial advice			.690
SS.06. Managing managerial risks			.748
SS.07. Adopting different managerial/business roles			.663
SS.08. Planning management projects			.801
SS.09. Understanding management concepts			.796
SS.10. Understanding management theories			.763
SS.11. Processing and analysing financial information and data			.807
SS.12. Understanding the role of different economic agents			.760
SS.13. Dealing with relevant economic information sources			.707
SS.14. Integrating ethics in organisational decisions			.619
LO.01. Do you think that your individual participation in the game has been valuable?			.789
LO.02. Do you think that your participation as part of your team has been valuable?			.739
LO.03. Do you think that you have reached your objectives and goals by participating in this game?			.798
LO.04. Do you think that the business game truly contributes to the learning process of students?			.829
LO.05. Are you satisfied with this learning experience?			.875
LO.06. Have your expectations been met?			.872
LO.07. Have your expectations been surpassed?			.782
Cronbach's alpha	.9473	.9418	.9249
Cumulative proportion of variance	55.1%	73.2%	83.6%
Bartlett's statistic	2231.9***	1168.6***	781.2***
KMO test	.91	.92	.86

***p<0.001; **p<0.01; *p<0.5; +p<0.1

Table 3. Descriptive statistics and correlation matrix

Variables	mean	sd	LO	G	PE	A	GS	SS
Learning outcomes (LO)	0	1	1					
Gender (G)			-.025	1				
Previous experience with business games (PE)			-.026	-.109	1			
Age (A)	36.89	7.68	-.246*	.042	-.140	1		
Generic skills (GS)	0	1	.734**	.052	-.133	-.118	1	
Specific managerial skills (SS)	0	1	.742**	.062	-.041	-.209	.872**	1

** Correlation is significant at 0.01 (bilateral); * Correlation is significant at 0.05 (bilateral)

Table 4. Comparisons of competences and learning outcomes in the different types of students

Students' types	Categories	GC			SC			LO		
		mean	sd	t/F	mean	sd	t/F	mean	sd	t/F
Gender (G)	Male	-0.011	1.055	-0.561	0.009	0.995	-0.249	0.1383	0.929	-0.141
	Female	-0.120	0.971		-0.038	0.997		0.1139	0.869	
Previous experience with business games (PE)	Yes	0.241	0.952	-1.218	0.202	0.851	-0.963	0.0185	0.806	0.538
	No	-0.092	1.028		-0.037	1.010		0.1445	0.918	
Age	21-30	0.102	1.08	2.47+	0.004	0.953	2.721*	0.168	0.944	2.96*
	31-40	-0.221	0.984		-0.153	1.017		0.252	0.852	
	41-50	0.052	0.978		0.153	0.823		-0.037	0.859	
	>50	1.217	0.816		1.369	1.398		-1.186	1.217	
Level	Bachelor	-0.185	1.102	-0.948	-0.100	1.123	-0.653	0.1925	0.947	0.514
	Master	0.0137	0.980		0.036	0.925		0.0979	0.885	

***p<0.001; **p<0.01; *p<0.5; +p<0.1

Table 5. Influence of generic and specific managerial skills on learning outcomes

Variables	Antecedents of learning outcomes (LO)	
	Standardised β	t
Age (A)	-.250	-1.742+
Generic skills (GS)	.652	4.534***
Maximum variance inflation factor (VIF)	1.142	
Adjusted R^2	.566	
F	16.662***	

***p<0.001; **p<0.01; *p<0.5; +p<0.1