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The future of 'serious games' in accounting education: A Delphi study

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ABSTRACT

Previous literature on Serious Games (SGs) has focused on the possible impacts of these educational tools on learning effectiveness. However, the empirical evidence is still scarce, and these learning-based games are rarely used in general undergraduate courses and even less so in accounting courses compared with other business areas. Using an existing digital game and a sample of accounting lecturers, this paper uses the Delphi methodology to examine accounting academicś perceptions of the usefulness and the potential barriers to implementing SGs in the classroom. Our results show that the knowledge and funding of technology is no longer an issue. However, incentives to motivate and increase knowledge and use new teaching tools (such as SGs) for lecturers are low despite the perception of the benefits of these tools in the learning process. The low use of learning-based games and scarce research on SGs in accounting education compared with other business areas seem to be related to the perception that few suitable games exist for undergraduate accounting subjects. This perception mirrors the fact that accounting education is perceived by lecturers as a mere technique rather than as an integral part of the management and business decision-making process.

1. Introduction

Serious Games (SGs) refer to games used in training and education, including simulation games (Crookall, 2010). Since 1980, the study of SGs as a learning tool has been furthered by intense research in this field. As Crookall (2010) states, simulation/gaming has taken the leap from methodology to discipline with a solid body of research. The recent use and acceptance of information and communication technologies (ICTs) has generated the further development of SGs and a growing interest in their potential for learning in higher education.

While some authors remain sceptical about the role of SGs in education (Foster, Mishra, & Koehler, 2011), most researchers in this area concur that SGs have great potential for active learning (Auster & Wylie, 2006; Boyle, Connolly, & Hainey, 2011; David & Watson, 2010; de Freitas, 2006; Gee, 2007; Gibson, Aldrich, & Prensky, 2007). They provide an excellent means to develop skills such as problem solving, decision making, multitasking and team work.

However, despite their technical development and the strengths that theoretical researchers highlight, there is a need for more empirical evidence on the effectiveness of SGs (Carenys & Moya, 2016; Connolly, Boyle, MacArthur, Hainey, & Boyle, 2012, Tobias &

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Fletcher, 2012). Nonetheless, evidence of their impact on student achievement is scarce (Young et al., 2012).

The use of SGs as an educational tool in universities is far from widespread. In fact, in some disciplines, it is non-existent. Business studies is an area in which simulations and SGs should be suitable as teaching tools. In fact, the use of business SGs goes back to US business schools in the 1950s. During the last century, they have been developed and applied primarily in the field of strategy, organization and marketing and mainly at a post-graduate level (Faria, 1998). Azriel, Erthal, and Starr (2005) studied the use of games in business education and showed that in addition to motivating students and encouraging teamwork, games are as good as traditional means for reviewing management theories and vocabulary. However, despite the development of simulation games with new technologies in the 21st century (mainly digital games), the use of SGs for undergraduate business courses is not widely analysed by researchers and has been generally ignored in accounting. If SGs are not used, the lack of empirical evidence on their potential impact will be an obvious consequence, and the lack of empirical evidence makes it more difficult to spread their use.

In 2002, Cook and Hazelwood demonstrated the effectiveness of games in learning accounting, an effect that had previously been elusive. Fifteen years later, the situation of the research and use of SGs in accounting has not changed substantially. These authors presented anecdotal experience that using games in teaching accounting increases participation and that they are effective learning tools. More recently, Riley, Cadotte, Bonney, and MacGuire (2013) presented a learning strategy that demonstrated how integrated business simulations can be used to enhance accounting education. However, there is a real lack of SGs in accounting, either as a consequence or as a cause of the lack of empirical evidence on their use, which is more notable than in similar business fields. According to Rebele and St. Pierre (2015), relatively few accounting education papers have been published on educational technology, which the current authors consider a major deficiency.

It is remarkable that even though the literature identifies lecturers as the key factor in introducing SGs in the classrooms, they have also been considered one of the main barriers. The main aim of this study is to analyse lecturers' perspectives on the adoption of SGs as a complementary tool in the undergraduate accounting education curriculum. We aim to contribute to the debate on potential explanations for the scarce use of SGs in the field of accounting despite the potential benefits. We also aim to identify lecturers' attitudes and reflections on the potential role of this tool. As a research methodology, we select an existing SG (a video game suitable for an undergraduate course in accounting), and we use a Delphi method with a panel of experts who are all university lecturers in undergraduate accounting courses.

The rest of this paper is structured as follows. The second section briefly highlights the contributions made by earlier studies on faculty members' views of the adoption of SGs in universities. This literature review focuses on the financial/business field. The third section describes the methodology and the development of the study. Finally, we present our study findings, conclusions and implications.

2. Literature review

Egenfeldt-Nielsen (2004) states that lecturers constitute the main barrier to applying SGs in higher education. Cook and Hazelwood (2002) highlight the reluctance of faculty to abandon the traditional lecture format, even for limited selected material. Additionally, Chin, Dukes, and Gamson (2009) note that the debate among educators and researchers on the potential educational value of SGs continues, mainly due to the scepticism shown by the educators about the value of such tools.

Familiarity with games only as an adult, a lack of knowledge of SGs and job routine are all barriers to the use of these tools in teaching (Young et al., 2012). Schrader, Zheng, and Young (2006) start from the assumption that adults see games as merely a way to encourage work and good behaviour, as if they were simply a reward. They argue that the status of SGs in education will not change while educators' perceptions of games with educational purposes continue to be formed by their personal experiences.

However, there are very few studies on the views of university lecturers and their perceptions of the teaching use and benefits of such tools. These issues are completely overlooked in those fields where they have potential but are not used, such as in accounting. Lean, Moizer, Towler, and Abbey (2006) sought to discover the specific barriers that university lecturers in general perceived regarding the adoption of SGs by conducting a survey based on a factorial analysis of replies. They found three key factors: the suitability of the games, resources issues and the risk which hinders the adoption of simulation games in the classroom. They concluded that the decision to use these techniques is based on the lectureŕs professional judgement of the benefits and costs rather than the availability of resources.

Focusing on the business area, Faria and Wellington (2004) conducted a survey of members of the *American Association of Collegiate Schools of Business* (AACSB) in which they gathered information from faculty members (both users and non-users of games, including those who had stopped using these tools) to determine why they did or did not use games for teaching-learning purposes. Of the 1076 responses obtained, 132 (12.3%) covered faculty in the accounting field. The authors found that 79.6% of the respondents said they had never used SGs in the classroom, 9.8% had stopped using them, and only 10.6% said that they actively used them. The results obtained by Faria and Wellington (2004) show that accounting is the discipline that has the lowest percentage of users, which is consistent with the findings of earlier studies, such as those by Chang (1997) and Faria (1998). Other studies, such as Tanner, Stewrt, Totaro, and Hargrave (2012), analysed the perception of management and marketing lecturers in US business schools through a survey showing that faculty members perceived simulations in general as helpful in the learning process and believed that SGs make learning more enjoyable. Vos and Brennan (2010) used semi-structured interviews to survey marketing lecturers at business schools in the UK and Ireland to identify the factors that prevent the wider use of marketing SGs.

When focusing on the reasons or factors identified in previous studies to explain the scarce use of SGs, most studies reveal a set of problems that faculty members face. The most important factor or barrier seems to be preparation time (Chang, 1997; Faria & Wellington, 2004), followed by the lack of availability or knowledge of suitable games (Faria & Wellington, 2004; Lean et al., 2006).

Administrative and technical issues are also considered important barriers in studies in which there is a general consensus about the lack of resources (with some exceptions, such as Lean et al., 2006). However, these reasons should not differ among different disciplines. Therefore, these previous findings do not help to explain why SGs are used less frequently in accounting compared with other business/finance disciplines.

Accordingly, the aim of our study is to provide research evidence on the use of SGs in accounting courses from the perspective of accounting lecturers to shed light on the role this tool has or should have in this discipline. Furthermore, we aim to explore why SGs are not more widely used and why they are less widespread in accounting than in other business disciplines. We also highlight the potential implications of our results for the more general debate on the teaching of accounting at the university level and on accounting education research.

3. Research methodology

Previous literature reveals the main barriers encountered by instructors in the use of SGs in the classroom and reveals that accounting is the field in business in which SGs are least frequently used. In this study, we perform a deeper analysis of the specific reasons for the lack of use of SGs in undergraduate accounting education. Our analysis has significant differences from previous studies. We use a different methodology, the Delphi method, to explore lecturerś perceptions. Among other advantages, this method allows interaction between the participants that is not possible in a traditional survey. Delphi allows for “debate” among participants and avoids some limitations of brainstorming. Another significant difference from previous questionnaires in the literature is that we ask the participants to play a digital game provided jointly with the questionnaire. The participants cannot answer the questionnaire without first playing the game.

3.1. Delphi method

The Delphi method is a general way of structuring the group communication process and making it sufficiently effective to allow a group of individuals who are functioning as a whole to address a complex issue. The method involves a questionnaire, but the key difference from a classical survey is that there is interaction between the participants while ensuring that the answers are anonymous. The method involves a monitor (the researcher driving the analysis) and a panel of experts on the subject under consideration. This method avoids direct confrontation among experts. Okoli and Pawlowski (2004) note that direct confrontation often leads to the hasty formulation of pre-conceived ideas and the rejection of new ideas as well as either the fierce defence of a given stance or an over-willingness to accept the views of others.

The questionnaire is sent by the monitor to the experts. Once the results of the first round are analysed and summarized, the report is sent again to the panel of experts, highlighting major contributions, differences in opinions and additional arguments or ideas expressed by the experts. The panellists then review their answers according to this information. This feedback ensures that information flows freely among the experts and helps to establish a common language. The process involves successive rounds that continue until a consensus or stable answers to the questions are obtained.

The controlled feedback and anonymity of the participants (except for the monitor) allow the experts to change their stance in light of new information or to develop new viewpoints in light of their own approach or the approaches of other panellists without being unduly influenced by others. This panel setup also ensures that every participant has an equal chance of making his/her views known.

Reliability and validity are critical properties of measures in all types of research involving questionnaires. However, the Delphi method has specific critics, who make the following claims: (i) the reliability of measures obtained from judgements is questionable given that responses from different panels to the same questions can differ substantially; (ii) the consensus achieved in later rounds might be due more to pressure to conform than to a genuine converging consensus of opinions; and (iii) the suite of open-ended questions can make it difficult to measure reliability and validity. However, there is a large, long-established, open body of literature on designing Delphi studies, their advantages and successful examples (Okoli & Pawlowski, 2004). This analytical tool is increasingly used in social sciences to conduct “a priori” research (Loo, 2002).

3.2. The panel of experts

As Loo (2002) states, using the Delphi approach requires that special care be taken in the planning and execution. A panel of experts is the basis of the method. The panel's job is to make judgements and give views based on the information provided. Iteration, interaction and aggregation lead to a panel opinion, which is the study’s output. The people who participate in the Delphi process are not randomly selected. Although there is no agreement on the optimum number of experts in a Delphi study, most researchers believe that there should be at least seven members. To motivate the experts, they need to be given information on the aims of the study, the steps involved in the method, an indication of the number of questionnaires involved, the time needed to answer the questionnaires and the benefits for both themselves and the research that may emerge from participation in the Delphi study.

Our panel comprised 12 academics[3] who taught undergraduate accounting courses. Prior knowledge of SGs was not a requirement for taking part in the study, but a minimum of 5 years of experience in undergraduate accounting was required. All participants

[3] We included lecturers, assistant professors, senior lecturers, associate professors and full professors.

Table 1
Panel of experts: characteristics.

Characteristics		Number of experts
Gender	Male	7
	Female	5
Years of experience	< 10	3
	10–20	3
	> 20	6
Type of institution	Public	10
	Private	2

were full-time academics who divided their working time between teaching and research. As our main aim was to assess the impediments to using SGs in the accounting field, one of the common characteristics of the selected experts was that they had limited or no experience with the use of SGs in their classrooms. The experts diverged in demographic aspects such as place of origin, age and type of institution (public vs. private). The aim was to ensure a balanced sample and a wide diversity of opinions. Table 1 shows a summary of some of the characteristics of the panel members.

3.3. The game

The game sent to the panel of experts was *Platform Wars Simulation* (PWS). It was created by the Massachusetts Institute of Technology (MIT) (Sterman, 2010)[4]. This is a dynamic simulation that covers the special problems of multi-sided markets. The game is based on a case study on the launch of Sony PlayStation 3. Game players are given the roles of various video game producers, such as Sony, Nintendo and Microsoft. The players have to make various business decisions, including hardware pricing, negotiating use agreements with game designers and deciding whether to subsidize the third-party development of new games that are compatible with their platform. The players compete against a simulated competitor in an attempt to maximize their firm's net value. Although profit maximization is the main aim, other objectives can be set, such as boosting market share, making the business more profitable, and striking a balance between costs/volume and profits.

We specifically used a business game in which accounting information was a main resource to make managerial decisions, including pricing products, investment decisions or improving performance and profitability. We purposely selected a game in which bookkeeping was absent[5] because our main goal was not to test the use of technologies in teaching accounting. In fact, when providing the game to the panel, we made two a priori assumptions. First, accounting should be considered (a key) part of managerś decision making jointly with other sources of information that must be contextualized. This assumption probably excludes the use of the selected game in subjects such as an “introduction to financial accounting”, in which students are still learning bookkeeping and the main accounting concepts. Second, we assumed that the SG would be supplementary and never the core material of the course.

Among the existing business games, we selected PWS because it is used in prestigious universities, it is easily accessed, and there is some experimental evidence of its use in accounting courses, especially in management accounting, with a successful impact on studentś perceptions (Calabor, Mora, & Moya, 2016). The game is flexible enough for the instructor to select which part of the game is more relevant to highlight in the classroom or to complement other materials. This means that the instructor has the ability to reinforce the learning process with other traditional means in accordance with different learning aims. In our view, this makes this SG suitable for several accounting subjects, especially those related to management accounting and information analysis. In summary, we had the “a priori” assumption that this game was suitable for an undergraduate accounting course, except for introductory courses. However, this is not necessarily the view of all the experts, as demonstrated during the research.

3.4. The questionnaire

3.4.1. General design

Designing the questionnaires appropriately is another key element to ensure the success of the Delphi method. The questions must be clear and precise, may be quantifiable (measured on the Likert scale) and might be open or closed, giving each expert sufficient scope to clarify, explain or qualify his or her own opinion or judgement.

In this study, the questionnaires contained two types of questions. The first type included closed statements of a quantitative nature in which experts were asked to make an evaluation based on a 5-point Likert scale (5 indicating strong agreement). For all the closed statements, the experts were given the opportunity to state their arguments and explain their viewpoints in addition to giving their scores on the Likert scale. The second type included open questions of a qualitative nature to enrich the study by encouraging the experts to provide statements not previously mentioned in the closed questions.

As previously discussed, there are several rounds of questionnaires whose number, a priori unknown, would depend on when

[4] MIT Sloan Teaching Innovation Resources (MSTIR) is a collection of teaching materials, including case studies and management simulations, which MIT Sloan offers as a free, open teaching resource. (https://mitsloan.mit.edu/LearningEdge/simulations/platform-wars/Pages/default.aspx)

[5] There are some interesting SGs related to bookkeeping and the accounting cycle (such as Van Der Heijden, 2016).

consensus or stability is reached. For the purpose of this study, in order to determine whether a consensus (or stability) in the group's answers has been reached, the variation between two successive questionnaires is considered in terms of the inter-quartile range and the median.

Once replies were gathered from the first round, a report was constructed that contained the descriptive statistics of the answers to each question and the arguments presented by each panellist. In the second round this report was then sent to the experts along with their (individual) responses from the first round. At the same time, a new questionnaire was sent in which the previous closed questions remained the same but all the comments mentioned by the experts in the first round were incorporated in this second round as closed questions of a quantitative nature. Once the panellists saw the group data and the arguments made by other experts, they could respond again to the questionnaire, reaffirming their stance with further arguments or changing it in light of the arguments made by other experts (and/or any new considerations).

This process should be repeated until consensus or stability is achieved, in this case this happened after the second round, whose results are considered the final responses.

This process should be repeated until stability is achieved, which in this case, happened after round 2.

3.4.2. The questions

The content of the questionnaire should help us to get evidence on lecturerś perceptions on SGs as a tool in accounting education, which might help us in the search of potential explanations for their scarce use and contribute to the debate about their future. The questions are mostly based on previous SG research and divided into three different sections. Based on the assertions of behavioral, cognitive, and constructivist pedagogical and learning theories, several researchers have determined the "pedagogical values" or "attributes" that SGs should contain to be effective learning activities (Tollefsrud, 2006; Yusoff, 2010; Huang, Johnson, & Caleb, 2013). The first two sections[6] refer to the attributes of the specific game our panellists have received jointly with the questionnaire: PWS. The third section of questions includes general questions regarding the problems, risks and benefits of using SGs in the classroom, without being referred to this specific game in particular. The reason for asking the panellists about this specific game before asking about more general questions on SGs is to avoid any bias in their answers which might exist due to potential pre-conceptions caused by their lack of or limited experience with SGs. Following this order, the panellists will be familiarized at least with the use of this specific game before answering the general questions.

(a) Section 1: Technical aspects of PWS

The first section contains questions related to the technical values of the game. These are the attributes identified in the literature related to how "friendly" or easy to understand the game is independent of its content and objective. These types of attributes are considered in the literature as the first step to the analysis of the potential value of SGs as a teaching/learning tool (Westera, Nadolski, Hummel, & Wopereis, 2008; Yusoff, 2010; Bulander, 2010; Huang et al., 2013).

(b) Section 2: Learning values of PWS

The second section contains questions related to the learning values of the specific content of the game identified in previous studies (Westera et al., 2008; Wilson et al., 2009; Charles, Charles, & McNeill, 2009; Yusoff, 2010; Bulander, 2010; Stainton, Johnson, & Borodzicz, 2010; Arnab et al., 2012).

(c) Section 3: General view on SGs

Finally, the third section contains questions related to the benefits and impediments of using SGs as a tool in the classroom. It has questions based on the questionnaires used by previous literature on these aspects in other fields (e.g., Chang, 1997; Faria & Wellington, 2004; Lean et al., 2006; Tanner et al., 2012).

4. Results

In this section, we provide the final output based on the second round, which was the last round of the process given that consensus or stability was got for all answers by this round. However also some comments related to the previous round are shown in order to analyse some of the changes in the panellists responses. We present the results divided into those related with questions on the evaluation of the specific game (section1 and section 2) and the results related with the general view on SGs (section 3).

4.1. Evaluating PWS

4.1.1. Technical aspects

The general conclusion of the first section of the questionnaire is that the experts were very positive in their evaluation of the technical aspects of the SG provided, and that there was a high degree of consensus already after the first round. The experts' scores

[6] The first study that identified these two blocks of attributes was OTA 1988, in http://files.eric.ed.gov/fulltext/ED295677.pdf.

Table 2
Final results on the technical aspects of PWS.

On the game	Mean	St.Dev	Quartiles			Inter-quartile range
			Q1	Median	Q3	
The game has a pleasant, straightforward interface	4.08	0.64	4.00	4.00	4.75	0.75
The game is dynamic and gives enough feedback	4.08	0.76	4.00	4.00	4.75	0.75
The game does not require technical knowledge	4.42	0.49	4.00	4.00	5.00	1.00
The game is easy to manage	4.25	0.60	4.00	4.00	5.00	1.00
Results do not give the impression of being random	3.67	0.75	3.00	4.00	4.00	1.00
The game instructions are easy to follow	3.50	1.04	2.75	4.00	4.00	1.75

differed only slightly in the second round and were close to the group median. Table 2 shows the results of this first section of questions ranked by the level of consensus.

There was general agreement among the experts that the interface was pleasant and straightforward. Some respondents included additional comments that stated that the feedback provided by the game was swift and very visual. There was also a high consensus that no technical knowledge was required to use the game and that it was easy to manage. The lowest agreement with the statement according to the mean of the scores and the lowest consensus (although there was still consensus) among the experts was related to the game rules and instructions. In the first round, most experts agreed that the instructions were easy to follow, but one expert disagreed and argued that the game's instructions were not clear. In the second round, the other experts did not change their opinions substantially, but some added the argument that the game was sufficiently intuitive and did not require more detailed instructions. In general, we can conclude that the game passed the test related to technical matters. Therefore, these issues would not be a barrier in applying this specific SG in the classroom.

4.1.2. The learning values

The results of the questions in the second section, related with the learning attributes of PWS, are shown in Table 3 ranked by the level of consensus. Overall, we can observe that the scores and the consensus are lower than in the case of technical attributes. However, the scores cannot be considered "negative", with a clear exception related to the suitability of this game for accounting courses. This issue has the lowest mean (2.33) and the lowest consensus. We consider this an interesting result that will be analysed later.

We can observe that both the highest agreement (more than 4) with the statement and the highest consensus reached by the panellists is that the game allows students to practice decision-making, helps to integrate concepts and the game is fun. On this last point, one of the panellists added the comment that despite scoring this statement quite high, he believed that students are used to activities that are much more fun. Therefore, this characteristic should not be over-weighted.

There was also some consensus, albeit with scores between 3 and 4, that the game adequately reflects the real world, is an effective tool for putting knowledge into practice and has a well-constructed narrative.

In fact, the first round yielded significant differences regarding the realism of the game. Those experts who positively valued this aspect argued that the game was realistic. However, the game needed to simplify the real world and concentrate on certain objectives and a limited number of variables, which was satisfactorily accomplished by this SG. The experts who took a more negative view mainly referred to the fact that the real world is much more complex than the behaviour modelled by the game. However, in the second round, after reading all the arguments expressed in the first round, the experts who disagreed with this statement increased their scores (coming closer to the group median) and agreed with the need to concentrate the variables on the learning aims. The arguments expressed by a panellist that encompass similar arguments expressed by those who changed to a higher score in the second round was *"I agree that one needs to simplify the real world for teaching purposes"* and *"It is vital that tomorrow's managers learn how to simplify complex situations"*.

Table 3
Final results regarding PWS as a learning tool.

PWS game	Mean	St.Dev	Quartiles			Inter-quartile range
			Q1	Median	Q3	
The game allows students to practise decision-making	4.25	0.43	4.00	4.00	4.75	0.75
The game helps to integrate concepts	4.08	0.64	4.00	4.00	4.75	0.75
The game adequately reflects the real world	3.42	0.76	3.00	4.00	4.00	1.00
The game helps to evaluate learning	3.25	0.83	3.00	3.00	4.00	1.00
The game is fun	4.08	0.95	3.75	4.00	5.00	1.75
The game is good at putting knowledge into practice	3.83	0.80	3.00	4.00	4.75	1.75
The game's narrative is well structured	3.67	1.03	3.00	4.00	4.75	1.75
The game's learning aims are clear	3.50	1.12	2.75	3.50	4.75	2.50
The results obtained reflect the decisions made	3.50	1.12	2.75	3.50	4.75	2.50
The game is suitable for accounting courses	2.33	1.31	1.00	2.00	4.00	3.00

The attribute of being helpful to evaluate learning obtained a neutral mean score and some consensus. Some experts (25% of the panellists) gave a positive score. They mostly added arguments that clarified that a game would help with the evaluation of learning if the instructor required arguments and reflections from students on the results obtained in the game. In this sense, one of the experts stated, "*Just like in real life, in the game, random decisions may yield good results. The game helps insofar as it numerically evaluates an abstract, open reply. I share the view that the student must justify the decisions made, even though it is not always easy to make justifications in the real world*". Experts who did not agree nor disagree (50% of the panellists) with the attribute of the game being helpful as an evaluation tool considered it difficult to quantify how much had been learned from the game: "*You should check how much students know before and after they play the game to see how much they have really learned*". Finally, the following comment neatly summarizes the stance of the experts who disagreed with the statements (25% of panellists): "*I value the game more as a learning tool than an evaluation tool. I believe that for it to be used as an evaluation tool, students would have to argue the case for each and every game decision they make*".

However, after two rounds, there was no consensus on the clarity of the game's learning aims. Most of the panellists (75%) who scored this feature positively stated that one of the positive features of the game is that the lecturer can establish the learning aims and that the flexibility offered by the game is an important positive characteristic. However, the remaining 25% considered the lack of clarity of the game's objectives a problem. Similar results were obtained with respect to the link between decision making and the results obtained in the game. While 75% of the panellists were highly or quite convinced that the results obtained by the players reflected their decisions, 25% of the panellists felt that the results obtained seemed random. However, it is interesting that some qualified this view by saying that the results are also the outcome of market movements. Thus, they are exogenous to individual decisions that might reinforce the need to justify decisions made by players and the important role of the instructor to require arguments to justify decisions when students are playing.

Finally, in our view, one of the most remarkable results of this second section of the questionnaire was the fact that there was no real consensus on the adequacy of the game for undergraduate accounting courses. The variations between the two rounds were not significant. Some experts scored the statement in both rounds very positively, while others scored it negatively. Panellists who gave positive (although not extremely high) scores (3–4) believed that the game was suitable for subjects such as the analysis of financial statements, management control, management accounting and competitive strategy. Panellists who gave negative scores (1–2) considered the game unsuitable for any of the traditional undergraduate accounting subjects (even management accounting or the analysis of financial statements), although they failed to offer a clear rationale in their answers. None mentioned Introduction to Accounting or Financial Accounting among the suitable courses.

4.2. General view of SGs

In the third section of the questionnaire, we asked our experts about SGs in general and, more concretely, about the potential barriers for their use in the classroom from the perspective of the lecturers. We also asked them to list (without ranking) the potential benefits of SGs as a learning tool in accounting education, asking to classify them into three categories: benefits for the institution, for the lecturers and for the students. We added these potential benefits to the second round and asked the panellists to score them.

4.2.1. Barriers to incorporating SGs in the classroom

Table 4 shows the results from these questions ranked by the level of consensus. In the panellists' view, the most relevant barriers to implementing SGs in the classroom according to the mean with high consensus are the lack of information on which games are most suitable for each course, the lack of resources for purchasing games, and the general lack of knowledge on SGs.

However, it is interesting that no respondents added comments or arguments to the score given to the lack of resources, except for one panellist who said, "*I do not know what game licenses cost, but even if we were to use free games, I assume that looking for them, adapting them and using them would also require resources I do not have*".

Table 4
Final results regarding the barriers of incorporating Serious Games in the classroom.

On Serious Games and the problems you see as an educator in incorporating such tools in the classroom	Mean	St.Dev	Quartiles			Inter-quartile range
			Q1	Median	Q3	
Lack of information on which games are most suitable for each course	4.00	1.00	4.00	4.00	4.75	0.75
Lack of resources	4.17	0.90	4.00	4.00	5.00	1.00
The amount of class time required to play games	2.42	0.95	2.00	2.00	3.00	1.00
The faculty members' lack of knowledge on SGs	4.08	0.76	3.75	4.00	5.00	1.75
There is a risk that the game will become an end in itself, making students focus on fun rather than learning	3.42	1.11	2.75	4.00	4.00	1.75
Lack of support from institution and/or colleagues	3.33	1.18	2.75	3.50	4.00	1.75
The relationship between the costs of incorporating the game in the classroom versus the learning benefits	2.92	1.04	2.00	3.00	3.75	1.75
Changes to course materials	3.08	1.12	1.75	3.00	3.00	2.75
Technical issues, for example, over-complicated software, lack of technical support	2.42	1.44	1.00	2.00	4.00	3.00
Large number of students	3.50	1.38	2.00	4.00	5.00	3.00

There was less consensus on the risk that the game would become an end in itself, making students focus on fun rather than learning. Regarding this risk, one of the panellists who highly agreed with the statement added the comment that there is a risk that students might concentrate on trying to cheat the algorithm on which it is based. Other panellists who disagreed with the statement argued that *¨the element of play does not make the activity any less educational"* and that its usefulness largely depends on the instructor. In the second round, only one panellist changed his view, arguing, "*It is unlikely that all students will be interested in learning through games, and no doubt some of them will press the 'Enter' key to finish as fast as possible or to check how the game works so that they can beat the machine. I have changed my score because my colleagues' comments have made me realize that the teacher's role is as vital in this field as it is in all other classroom activities*".

There was also less consensus, but without much dispersion, in the lack of support from the institution and/or colleagues, although most of the answers were neutral. The opinion of the panellists who considered this a barrier can be summarized by the following remark: "*My institution's lack of appreciation of the research work on teaching methodologies by lecturers discourages us from experimenting and introducing new teaching practices that require a great deal of effort. The difficulties increase if there is a lack of funding for computer rooms, technical support and so on, but the latter is not the main problem"*. The view of experts who did not consider this a problem is exemplified by the comment, *¨Such initiatives are generally prized by institutions"*. The neutral attitude of some panellists might be summarized by the statement, *"At the end of the day, such activities depend on the lecturer's enthusiasm, and this game in particular, as well as others, can be used without any kind of support"*.

Regarding the number of students in the class, the lack of consensus could be justified by the different accounting courses that the panellists had in mind. In fact, one of the panellists who scored the difficulty of using the game highly (5) argued, "*My score stems from the fact that my university has large classes, and the computing classrooms are small"*. However, another panellist who gave it a low score (2) did not consider the number of students to be a problem, arguing, *¨Bearing in mind that these tools are especially useful in the last years of the degree or in optional courses, I do not think the number of students is a problem — at least at my university*".

In both rounds, the experts were asked to add any barriers they perceived that had not been covered in the questionnaire, but no new contributions were made.

4.2.2. The benefits of using these tools for teaching-learning purposes

As mentioned, the questionnaire sent in the second round included not just the barriers created by SGs for the lecturers that had been identified in the literature, but also the potential benefits expressed by the panellists in their answers in the first round. They were classified into three categories: for institutions, for lecturers and for students. The results are summarized in Table 5 and ranked by consensus.

The panellists agreed in giving the highest value to the benefits for institutions: *¨Gives an image of modernity¨*, "*Helps to standardize teaching tools among universities"*, *¨Brings new technologies to higher education¨*, and *¨Dovetails with teaching innovation policies¨*. While the rest of the benefits were positively valued by the panellists, it is remarkable that the lowest consensus was in relation to the statements that SGs make teachers' abilities an intangible asset and improve the reputation of the institution.

With respect to the potential benefits for instructors identified by the panellists in the first round, the following were highly rated

Table 5
Benefits for universities, for faculty, and for students.

	Mean	St.Dev	Quartiles			Inter-quartile range
			Q1	Median	Q3	
1. For Universities (Institutions)						
Gives an image of modernity	4.67	0.47	4.00	5.00	5.00	1.00
Helps to standardize teaching tools among universities	4.58	0.64	4.00	5.00	5.00	1.00
Brings new technologies to higher education	4.42	0.49	4.00	4.00	5.00	1.00
Dovetails with teaching innovation policies	4.42	0.49	4.00	4.00	5.00	1.00
Facilitates the MOOC design	3.75	0.92	3.00	4.00	4.75	1.75
Makes teachers' abilities an intangible asset	4.00	1.00	3.00	4.00	5.00	2.00
Improves reputation	4.00	1.00	3.00	4.00	5.00	2.00
2. For Lecturers (Faculty)						
Helps to make the course more engaging	4.25	0.43	4.00	4.00	4.75	0.75
The students are more motivated and more willing to work	3.87	0.80	3.25	4.00	4.00	0.75
Allows for practical applications of the learned concepts	4.33	0.62	4.00	4.00	5.00	1.00
Helps to make teaching easier and more dynamic	4.33	0.62	4.00	4.00	5.00	1.00
Requires re-thinking methodologies to adapt teaching to the students	3.58	0.64	3.00	4.00	4.00	1.00
3. For Students						
Facilitates autonomous work and self-assessment	4.25	0.43	4.00	4.00	4.75	0.75
Facilitates the understanding of concepts	4.17	0.55	4.00	4.00	4.75	0.75
Facilitates the interrelation of concepts and disciplines	4.50	0.50	4.00	4.50	5.00	1.00
Helps to make learning more enjoyable	4.42	0.49	4.00	4.00	5.00	1.00
Allows one to relate concepts with the real world	4.42	0.49	4.00	4.00	5.00	1.00
Allows one to learn by experience	4.42	0.49	4.00	4.00	5.00	1.00
Increases the number of learning resources	4.37	0.50	3.75	4.00	4.75	1.50

in the second round and had high consensus: "*Helps make the course more engaging*", "*The students are more motivated and more willing to work* ", "*Allows for practical applications of the learned concepts" and " Helps to make teaching easier and more dynamic".* It is remarkable, in our opinion, that the panellists listed these benefits when referring to benefits for the faculty when, in fact, these statements could be more directly linked to benefits for students and did not directly mention any potential benefits for faculty members or their amount of work.

With respect to the benefits for students, they were all scored highly with high consensus. The high score given to the belief that SGs facilitate the understanding and interrelation of concepts and disciplines is remarkable. This should be consistent with considering and teaching accounting as a key element to make decisions in finance, investments, and organizational strategy. However, most of the panellists did not give a high value to this SG when they were asked about its suitability for accounting courses.

5. Conclusions and implications

The results obtained from the Delphi method with a panel of accounting academics lead us to conclude that there is considerable agreement among accounting lecturers on the main potential benefits of SGs and the main barriers that prevent SGs from being used more widely in the classroom. Their arguments align with attitudes of faculty members in other fields.

Providing institutions with an image of modernity is one of the main benefits highlighted in this study. The consensus on this matter may lead us to consider the importance of convincing institutions that the benefits of using SGs as a learning tool on undergraduate programs outweigh the costs. This is also linked with the situation of institutions providing incentives in order to motivate lecturers with additional resources. In fact, the lack of resources is considered the most significant barrier to the use of SGs. However, from our results, we can provide a deeper analysis of this issue. It seems obvious that the lack of resources is not necessarily linked to financing suitable games since they are not necessarily expensive, and some of them may even be found free of charge. In the same way, the need for technology poses fewer problems than previously existed because most institutions currently have sufficient investments to provide the required technology. In fact, it is remarkable that technical issues highlighted as barriers by previous studies are not considered problematic, in line with the growing use of technology. Thus, this perceived "lack of resources" seems to be related to non-giving incentives for faculties and other staff to invest in their main resource (time) to work on or research these teaching skills.

Given that our results show that the general perception of accounting academics about the benefits and barriers does not seem to differ significantly from the perception of faculty members in other business fields, and those factors would be similar regardless of the different disciplines, we can conclude that they do not seem to explain why SGs are less widespread in accounting undergraduate courses.

From our results we may also draw some conclusions specifically related to undergraduate accounting courses. We can observe one remarkable disagreement in the perception of some accounting academics. It seems that the most significant lack of consensus among the experts in our study refers to the suitability of this specific PWS game (or, indeed, any other games they know) for undergraduate courses in accounting. Even those panellists who considered the game suitable for management accounting and the analysis of financial statements did not give a high score. In fact, it is fair to say that this game does not focus on accounting in isolation. The players must make decisions according to the information (mostly accounting information) they receive or elaborate, but there is no "bookkeeping" in such a game. Accounting is a key part of the game, but it is seen not as a technique but rather as a part of the decision-making process. It seems paradoxical however that some panellists considered this game unsuitable for any undergraduate accounting subject at all, yet at the same time they scored the game positively in all aspects related to potential benefits in the learning process.

We conclude that this may reflect a general tendency to teach accounting in isolation from other business decisions. It is our view that accounting academics have a tendency to teach accounting as a technique, without connecting accounting with general business strategy, investment and finance. This somewhat disjunctive approach may contribute to undergraduate students' lack of enthusiasm for accounting subjects or may explain why students often consider accounting subjects to be "hard" and/or "boring" compared with other business subjects. Accounting is one part of an overall undergraduate business curriculum, and understanding accounting as part of business from the instructorś perspective might affected their teaching styles and also change significantly the students 'learning experience. It is also fair to say that coordination among different business disciplines is not very common in undergraduate courses. The use of SGs would contribute to run simulated business ventures where making decisions related with production, finance, investments, marketing, strategy, etc. in the same team would help the undergraduate students to simulate "real world" and to get as successful teaching–learning experience.

A recent review of the accounting education literature (Apostolou, Dorminey, Hassell, & Rebele, 2015) shows a continuous trend away from publishing results on empirical studies and towards publishing descriptive studies, instructional resources and cases. We advocate for the role of empirical research in accounting education, and studies on SGs are a key step to increasing awareness of SGs and their use. Through this paper, we also wish to contribute to the present debate on the importance of changing trends in the teaching of accounting, even in undergraduate courses. The perception of "non-suitable games for accounting courses" seems to be partially driven by the lack of games, but also by the perception of what "accounting education" itself actually entails. The impact on learning would not be the SG itself but how it is used to make the learning process a different experience.

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