COUNTING CHALLENGES: A TEACHING CASE ABOUT SERIOUS GAME DEVELOPMENT

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Abstract

The article presents a teaching case that uses gamification strategies in the undergraduate course of Accounting Sciences in a Brazilian University. The undergraduate in Accounting Science presents as principal characteristic the technicality. So, this graduation objectives the development of techniques and not necessarily the students’ abilities. Consequently, the graduates in Accounting Science become technicians with gaps in important skills, what prevents the development of their careers. Trying solve this problem, the Department of Accounting Sciences of the analyzed Higher Education Institution (HEI) created a compulsory discipline for the students of the last year of the Accounting with the objective of develop games projects related to accounting and business in general. The principal pedagogical objective of this discipline is to develop the students’ creativity, innovation, oral communication, teamwork and entrepreneurship. In this sense, the projects developed by students can be a board game, a card game or a digital game related to themes that they choose (about accounting or business in general). The development of these projects requires the analysis of the financial feasibility of the proposal and a justification for the target audience to which the game project is directed to. The projects are evaluated in three different moments. At the beginning of the semester the initial ideas and the theme are presented by the students and evaluated by professor; In the middle of the semester the projects are shown and evaluated by the professor, assistant and three guests linked to the faculty, and the final projects are judged by professor and four internal and external guests, mixing professionals from games, financial and accounting areas. At the end of the course, the students present a prototype of the project developed by them to a jury composed by internal and external members of the HEI analyzed. The jury evaluate the viability, innovation and creativity of the students’ project and, also, the performance in the oral presentation of each student. With this discipline, it is expected, also, that students develop a critical reflection about the labor market and the profession in Accounting area. To motivate the development of quality projects, the discipline counts with the help of the Group of Studies of Technology of the Education in Accounting, a research group linked to the HEI analyzed. The ten best evaluated projects in this discipline are invited to attend the Serious Accounting Game Accolade (SAGA) event, managed by mentioned group of studies. The invited groups present their projects to forty professionals of the Brazilian market, whose evaluate the commercial viability of this projects, their innovation and their education potential. The three best projects evaluated in this event are invited to develop the project by professionals of the area of games and accounting. The present case of teaching could be important for coordinators of courses of areas that need to develop students’ important skills, in a complementing the knowledge acquired during the course.

Keywords: Serious Game, Accounting, Undergraduate.

1 INTRODUCTION

Motivate students of higher education can be a difficult task. Huq and Gilbert (2017) say that motivation could reach high levels with cooperative learn when compared with the traditional lecture model. This may occur because the relationship created within the group improves the student’s involvement with the learning process (Fernandez-Rio, Sanz, Fernandez-Cando, & Santos, 2017) and so, generate a better quality of learning. Similarly, in the problem-and project-based learning models the students’ motivation has a central importance (English, & Kitsantas, 2013). This two types of methodologies also help to active the students’ intrinsic motivation (Deci, & Ryan, 2008, Bell, 2010). The bigger is the student's intrinsic motivation, higher is the probability he/she will reach the deep learning and avoid the surface learning (Vansteenkiste, Lens, & Deci, 2006).

Additionally, Roehl, Reddy and Shannon (2013) highlight that flipped classroom could change the traditional lecture class into an active learning process, providing opportunities to improve the
students’ engagement and ameliorate their relationship with professors. The time spent in the traditional lecture classroom to present the main concepts of some knowledge is used in the flipped model to go deeper in the matter. For these and many other reasons, the literature has shown that many active learn styles can ameliorate the student’s performance in different areas of knowledge (Dalsgaard, & Godsk, 2007, DeNeve, & Heppner, 1997, McCarthy, & Anderson, 2000, Prince, 2004).

When students are not correctly motivated, the process of learning cannot occur and the sense of lack of importance about the content become common in learners (Armbruster, Patel, Johnson, & Weiss, 2009). In Accounting area, the invitation for apply active learning methods in classroom is highlighted in literature (Loeb, 2015, Phillips, & Graeff, 2014). The Accounting undergraduate has the characteristic be extremely technical. In this context, the traditional lecture model becomes easy to apply and that is why it has been very much used into the Accounting classrooms. It may be easier for professors to show how to do, than construct the knowledge with students.

Saunders (1992) was concerned about the lack of some engineers’ skills, as the communication, caused by the undergraduate structure. In this sense, the author suggests as a complement to traditional classrooms of Engineering undergraduate the peer tutoring where students more advanced on the course could help the beginners. Choi, Lindquist and Song (2014) studied the benefits of problem-based learning on Korean nursing students and found evidences that this method can improve the critical thinking, problem-solving and self-directed learning when compared with students from traditional lectures. In Accounting area, the industry has shown concern about the lack of skills, and in particular non-technical skills, from graduated students (Howieson et al., 2014). When an undergraduate is built mostly in traditional lectures classrooms, some important abilities and competencies are not developed or, at least, are developed with limitations. So, is important for undergraduate students get in touch with different methods of teach-learning to expand their horizons.

In this sense, this paper report a teaching case where students from Accounting of a Brazilian public Higher Education Institution (HEI) were involved in an active learning methodology in the context of a discipline (during a semester), that was called BGII BGII. With the challenge of build up a serious game project, these students could develop some competencies that were not greatly encouraged during undergraduate. We believe that this case could be applied in another HEI with the intent of improve their undergraduate curriculum, forming individuals more prepared for life and for the professional performance. This case is not limited to Accounting undergraduate. Similar procedures can be done in different areas of knowledge especially in graduations that are typically technical.

The rest of this paper is organized as follow: in the second section, we present a brief overview about the active learn theory. In the third section, we explain the details of the discipline that we applied the active learning elements. In the fourth section, we discuss the results and possibilities of this case. And, finally, the fifth section shows our conclusions.

## 2 ACTIVE LEARNING THEORY

Active learning can be defined “as any instructional method that engages students in the learning process” (Prince, 2004, p. 223). In this sense, Loeb (2015) studied the use of active learning to teach ethics to accounting students and, according with this author, the benefits of this kind of methodologies are: a) adds realism to class, ii) enables the deep learn, iii) shows to students how a topic is covered, iv) stimulates both students and professors, v) improves the student’s educational experience, and vi) supports instructors in classroom. All these benefits occur because, in all active learning methodologies, students are involved in the process of knowledge construction. In this sense, the learning process become more meaningful when an active learning method are used in the classroom (Kanter, 2010).

Frederick (1987) highlighted that the students’ involvement is very important for active learning generate benefits. Walker (2003, p. 264) says that “When lecturing, instructor organizes and presents essential information without student input. This practice eliminates the opportunity for students to decide for themselves what information in important to know”. Therefore, the key to the deep learning in the active learning methodologies is the student’s participation on the knowledge construction. On traditional lectures this cannot occur, encouraging the surface learning (Roehl, Reddy, & Shannon, 2013).

Many studies show evidences and discuss that active learning can improve students’ critical think and write abilities (Walker, 2003, Youngblood, & Beitz, 2001). Prince (2006) also defends that active learning, when compared with traditional lectures, is better to retention of material and to motivate
students for further studies. The potential of active learning in improve the quality of students’ learning and motivation may help students in their relationship with other members of university/college. In this sense, Braxton, Jones, Hischy, and Hartley (2008) consider the active learning methods as a possibility of retaining students in higher education context. When relating with peers and professors, students feel themselves belonging to the academic context what help them to deal with difficulties periods and hard demands.

In this context, Michael (2006) presents as types of active learning the following methods: i) problem-based or case-based learning, ii) cooperative/collaborative learning/group work of all kinds, iii) think pair share or peer instruction, iv) conceptual change strategies, v) inquiry-based learning, vi) discovery learning, and vii) technology-enhanced learning. Many other authors also include in this range of methods the project-based learning (Bell, 2010, Blumenfeld et al., 1991, Andersson, & Saalman, 2017, Mills, & Treagust, 2003). This specific method has some benefits and characteristics that enhance its application in many contexts.

Project-based learning can be defined as practice of teach-learning where a real-world work task is delivered to students (DeFillipi, 2001, Hunter, & Botchwey, 2017). Kanter (2010) highlighted two types of project-based approach: i) an investigative project, where students search for answers about some topic (making research), and ii) a performance project, where students should develop something (building a tacit product). According with this author, both types can ensure a deep learning. Additionally, Hunter and Botchwey (2017) argument that a project-based learning approach has another two characteristics: i) the collaborative work between students, and ii) the fact that the problem is first analyzed and further defined. Finally, it is important to note that project-based learning has in technology a huge possibility of application. In this sense, for digital natives (the Z Generations, mainly) this methodology of teach-learning can be even more used.

3 METHODOLOGY USED IN BGII

The challenge introduced to students of BGII is apply the concepts of gamification in a project to develop a game that need to be related somehow to Accounting area. The format of this project could be diverse and depends of the imagination of the student groups. So, they can ranging from simple cards games projects until digital games projects. The idea is enable the development of creativity. However, it is fundamental to students think about the consequences of their choice, such as: the audience of the project, game development costs, market insertion, sale price, etc. All this information need to be presented in the final project and they represent the possibility of applied the managerial knowledge developed during the undergraduate.

It is important to highlighted that the gamification occurs when games elements are used in non-game situations, like in education context and business training, for example (Landers, 2014). The purpose of gamification is to involve the individual in a specific task and, in this sense, improve their outcomes. According with Michael and Chen (2005, p. 23) “serious game are games that use the artistic medium of games to deliver a message, teach a lesson, or provide an experience”. So, in the context of BGII discipline, we consider all types of games (cards, board or digital) that have an objective that is not the pure entertainment as being a serious game. In this sense, students can utilize all types of game to develop their ideas. The only exigence is the game proposal be more than entertainment.

3.1 The Format of BGII Discipline

As said before, the objective of the BGII discipline is to elaborate a project of game considering the business rules in an organization. To do this, the students need use the knowledge obtained in previous disciplines he/she has been done during all the Accounting undergraduate. In this sense, the discipline of BGII is available to students only in the last semester of undergraduate. It is necessary that students have contacted all the necessary content for work in the accounting area to develop a better project.

Additionally, the BGII discipline has as a second objective to analyze the architecture of games, discussing and building rules and deal with its respective applications with the focus on accounting as an instrument for recording, measuring, controlling and supporting decision making in business contexts.

To reach these objectives the BGII discipline is structured face-to-face meetings which have the following objectives: presentation of the curse and program to students; approach about the subject “games” intending to present their importance to business context; formation of work groups (normally
with five students); delivery of group planning, including initial themes and ideas; delivery of the first version of project which include all the information related to the game; presentation of the project for a committee formed by the professor, the assistant and gaming professionals; a quiz about concepts and approaches treated during the discipline; final presentation of the project.

To help students to understand the main concepts about a game and its market, the gamification process and the use of serious game, an extensive theoretical reference is provided. In this sense, ten reading materials are related with these eight face-to-face meetings and their read are compulsory.

When a week has not a face-to-face meeting, students have the possibility to participate of a virtual meeting by the Moodle (the system utilized by the HEI). This virtual meeting is always scheduled to the same hour of face-to-face meeting and it is not compulsory. The objective of these virtual classes is to discuss, with all the students, the doubts and difficulties faced by students. Also, the professor of BGII and the assistant, since the beginning of the course, need to be available to face-to-face meetings outside of class time, with previously scheduling.

The evaluation criteria in BGII discipline is as follow: The student is approved in the discipline if he/she obtain final media higher or equal to 5,0 (five points) and frequency in face-to-face meeting of 70% (seventy percent).

It is necessary to note that the in the last presentation students are evaluated by the committee created to the discipline. The score obtain by the group in this moment is important to ranking the best projects, as we comment in the next two sections. But, the evaluation criteria is not necessary related with these scores. This occur because the professor need to attribute a grade not only consider the last presentation but assessing all the student participation in the discipline.

3.2 The Participation of Qualified Professionals from Game Market

It is fundamental for the development of this discipline the help of professionals from game market. In this HEI, we have the aid of a research group named GETEC (Group of Studies in Technology Education in Accounting, in Portuguese). This group have game designers working in serious games projects those help students from BGII in the development of their ideas. GETEC is also the responsible to incubate the best projects developed in BGII discipline and promote the SAGA (Serious Accounting Game Accolade) event, as we discuss in the next section.

The GETEC designers' support is important because Accounting students have not previously knowledge about the process of games development. So, to ensure greater security in the learning process, the help of game designers is fundamental. However, this participation cannot reduce the students' autonomy in the process of project development. These professionals need to be the counselors and not the developers of the games.

3.3 The Gamification Process Introduced in BGII Discipline

To improve the students’ motivation in the BGII, GETEC has created the SAGA. The 10 best projects developed in the BGII is invited to participate of this event where professionals from different places and areas of expertise evaluate these ten bests projects. The selection of the ten bests projects is realized by the final performance of the group in the last presentation in the discipline (see the 3.1 section). The participation in SAGA event is not compulsory for students of these ten best projects.

The SAGA event occurs once a year, after the end of BGII discipline (usually in December) in the dependences of HEI. Normally, SAGA event counts with the participation of approximately 30 executives and experts from game market and has one night duration. The three bests projects evaluated in the SAGA event are invited to be incubated by the GETEC to future commercialization. So, since the beginning of BGII, students know that his/her project has the chance of being commercialized. The possibility of make their project real increases their motivation to develop the game.

4 DISCUSSION

In the active learning methodologies, the students' autonomy need to be encouraged to incentive the students' intrinsic motivation (Deci, & Ryan, 2008, Michael, 2006). To do this, the BGII discipline allows students to choose the subject that will drive the development of the game. In addition, this discipline also allows students to choose the type of game they will develop (card, board or digital).
The only restriction is that the game needs to be related to accounting or business area. These possibilities are important because they allow students to reflect about the previous knowledge acquired during the undergraduate that will fit better with their project.

The blended format of BGII discipline is also necessary. Students need to develop the project in group and, to do this, is necessary time to discuss all aspects of the project. In addition, this discipline is taught in the last semester of Accounting undergraduate of this HEI. So, the blended model can make this period less hard because many students on this point of accounting undergraduate (to the Brazilian context) are working (Durso, Cunha, Neves, & Teixeira, 2016). At the same time, the professor and assistant must incentive students’ participation on online classes, because this moment is important for take questions and/or see other groups’ questions.

One important point of BGII discipline is the professor’s role in classroom. Unlike traditional classes, in a project-based learning discipline professors are not the knowledge holders. Instead, they are facilitators of the learning process (Solomon, 2003). In this sense, the availability of professor and assistant during online classes, face-to-face classes and outside of class time is important to ensure the learning process and to develop students’ sense of security.

Another important mechanism used in BGII discipline is the strategy of incentive. The possibility of makes the project became real (by incubating it in GETEC) is important to make students more motivated with the development of the project, creating better works. Additionally, students’ motivation can be an important strategy to incentive students to finish their graduation (Blumenfeld et al., 1991, Braxton, Jones, Hischy, & Hartley, 2008). Because this discipline is thought in the last semester, students can be more concern with work matters than with the academic subjects. Thus, utilize mechanisms to improve these students’ motivation is fundamental to guarantee the learning process. In this sense, the presence of the GETEC group and the realization of SAGA event are essential to develop in students the desire for develop the best accounting/business game.

To exemplify, this paper shows in Figure 1 and Figure 2 two projects that students have been developing in BGII discipline.

![Figure 1. Board Game “Pyramid of Professions” developed by students in the BGII discipline and incubated by GETEC.](image)
Figure 2. Board Game “E-Tower” developed by students in the BGII discipline and incubated by GETEC.

The Figure 1 shows one of the project that was developed on the context of BGII discipline and was incubated by the GETEC group. The “Pyramid of Professions” (a board game) deal with the career development within an imaginary corporation. The player begins as a trainee and aims to be the first player to became the Chief Executive Officer (CEO) of this company. The Figure 2, also shows a board game project developed by students in BGII and incubated by GETEC group. Unlike the “Pyramid of Professions”, “E-Tower” is a collaborative game related to the theme of business ethic subject. In this case, players need to cooperate to make the hypothetical company win.

5 FINAL CONSIDERATIONS

The paper objective was to report a case of teach-learning that used an active learning method in a discipline (BGII) of Accounting undergraduate students of a Brazilian HEI. In this sense, this study discussed the possible benefits that an active learning approach can bring to classroom environment. More specifically, this paper treated about the project-based learning methodology.

As we highlighted, students in the BGII discipline have as a challenge to elaborate a game project considering the business rules in an organization. In this process, students utilize the knowledge they have accumulated in the undergraduate. In addition, many other abilities that are not developed during the Accounting undergraduate are encouraged in the BGII discipline.

For example, the necessity of develop the project in group helps students in the socialization abilities. Additionally, the group work also develops the communication skills in students. The innovative profile is another ability encouraged during the BGII discipline. Students need to develop a game project that needs to be thought in relation to their marketability and, in this sense, it needs to be innovator. At long last, the necessity of present (many times) the project in the presence of evaluators helps to develop students’ oral skills.

The method used in BGII discipline brings benefits to accounting profession as well. The projects that students develop need to be related with accounting and business area and need to contain more than simple entertainment. In this sense, all these projects developed in BGII can be consider as serious games. So, they help to disclose accounting and business matters to different individuals, improving the knowledge in this area and creating more interests in these subjects.

Finally, the possibility of making the project real by incubation can have positive consequences for both students and HEIs. This is because the introduction of the best projects in the market generates the recognition of patents. For educational institutions, this possibility is an important mechanism for the development of knowledge and, for students, it represents a possibility to undertake

REFERENCES


