WHO WANTS TO BE A PERFECT ANALYST - A GAME-BASED LEARNING

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Abstract

The aim of this work is to evaluate the effect of educational games in information system classes. The present reflection aims to examine the impact of non-digital educational games on class motivation and information system course enjoyment.

In order to get some tips about this issue, a game learning strategy was implemented in the environment of a Higher Education environment in the unit of information system.

The question that led the work was about determining the impact of using game learning in the context of a specific course in a traditional Higher Education institution. To do so, we implemented a case study of the use a non-digital well-known game. We analysed the results obtained related to students’ marks. We also ask the students’ opinion about the activity.

The pedagogical model used, and the results of its application are presented. Student and teacher roles included in game-based learning are discussed.

In this case we describe an implementation of a learning game to promote the motivation and effective learning. One class, from the second-year course, participated in this activity, from the Accounting and Administration course. This activity was carried out during a week in the second term of 2017/2018 school year. Students were, in average, 19 years old. The subject was lectured in a traditional classroom complemented with a distance development collaborative work.

With this work, it was possible to attest the benefits of implementing a game-based learning and present some suggestions about how to implement a game-based learning. We attested that the motivation of students to participate in this kind of activity is high. Nevertheless, it is very important for them to understand the value of their participation in order to reach the course’s objectives and skills and second the importance of having a clear explanation of all tasks and responsibilities. Finally, we also considered the implications for the future and the educational games’ limitations.

Keywords: Gamification; e-Learning, Blended-Learning; Higher Education.

1 INTRODUCTION

Various types of non-digital games were “reinvented” and have been used in education systems, but usually they are already prepared or you need to develop them in an online platform if you want to use them online. Without computer program knowledge, it is difficult to manage it.

In this case we described an implementation of the famous game “Who Want to Be a millionaire?” This game was planned to mimic the well-known board games, with minor adaptations to be played in the classroom and to be based on information system knowledge acquired during the lectures. The games were done using PowerPoint© software and made available online using the moodle platform.

The game is a quiz competition, being the goal to correctly answer a series of ten consecutive multiple-choice questions about information system. Four possible answers are given (labelled A, B, C and D), and the student who is playing must choose the correct one. Aimed to prepare the students for final evaluation, the game questions have the structure and the difficulty level of the ones in the theoretical final exam, which will also be online, using moodle test tools.

The student’s learning performance and experience is most influenced by the teacher who makes the difference in the classroom. In fact, during this experience, we as teachers had to have a pedagogically active role. During the planning phase, it was important to reflect on the aim, structure and rules of the game, according with what knowledge students are expected to learn, and I believe this was very important for the success of this pedagogical model. In the classroom, my role as a teacher was essential.
If the contestant student gives a wrong answer to any question, his game is over. Main game participant has three lives at his disposal. Each one can only be used once during the game. The life lines are:

- Poll the class: each student of the class writes one answer, then the student who is playing chooses to accept, or not, the answer most voted.
- 50/50: the student ask the teacher to remove two incorrect answers, leaving the correct answer and one incorrect answer.
- Ask an expert: the student can ask a specific colleague to help him answer the question.

The following images present some pictures of the game implemented in the moodle platform:
Moodle was the Learning Management System (LMS) selected to support the unit of Information System. The unit is organized in different blocks, we named them “Lessons”. Each one has the following structure:

- Objectives:
- Program:
- Interactive PowerPoints
- Learning activity: game
- Reflection
- Useful links

We also prepare a Glossary - this tool is global to all lessons and it is built by students during the semester. Doing this, and with a little effort of each student, it is possible to have, before the exam, a very complete glossary composed by a high number of information system terms with high quality explanations.
To implement the learning game described in this paper we used the tool “Lessons in the moodle platform”

The lesson activity module enables a teacher to deliver content and/or practice activities in interesting and flexible ways. Teachers can use the lesson to create a linear set of content pages or instructional activities that offer a variety of paths or options for the learner. In either case, teachers can choose to increase engagement and ensure understanding by including a variety of questions, such as multiple choice, matching and short answer. Depending on the student’s choice of answer and how the teacher develops the lesson, students may progress to the next page, be taken back to a previous page or be entirely redirected down a different path. A lesson may be graded, with the grade recorded in the students’ gradebook.

Description of the game’s activities:

We provide students with several questions and their possible solutions, which can be wrong. The questions were selected from a repository of old exams. Students should check each solution and if they did it well they go to the next level of difficulty.

The challenges:

The major challenges were on how to implement the game using moodle platform. Since the moodle is the LMS used in our institution, we did not want to select another one, so we made a deep study about moodle platform in order to use it to implement a game-based learning. Also, I do not have professional training and courses in game-based learning, thus I had some difficulties, mainly in the planning stage.

In order to overcome these barriers, we used the same model that we are using in the blended-learning courses. We use the MIPO model [5]. In the MIPO model, the first phase of the instruction design is the analysis of the system. The teacher acts as an architect who, before starting a project, analyses contextual requirements. Later, the results are reflected on the learning organization. The analysis phase is the base for all the other phases of the instructional design. During this phase you must define the problem, identify the source of the problem and find possible solutions. This stage may include specific research techniques such as needs analysis, job analysis and task analysis [4]. [3] also enumerate within the analysis phase the need for identifying learner features, contents and tasks. During this phase, it is important to consider the context, the pre-requisites, the tools and the demanded skills to achieve the objectives. These objectives must be classified according to domain skills such as: intellectual skills, verbal information, psychomotor skills and attitudes [1]. The holistic context analysis gives us good information about students’ preferences.

The design phase uses the outputs from the analysis phase to plan the strategy to develop the instruction. The instruction design is the phase that demands the biggest effort and it is crucial for the learning success. The acknowledgment of the frequency of lecture model used on present classrooms, underlined by the European Committee [2] justifies a deep study in order to clarify and simplify the process and also cause change to happen. In the instruction design phase of MIPO model, the teacher acts as an architect who organizes the space and its elements. The instruction design phase consists in explanations about learning objectives’ details, evaluation mode, contents sequences and instruction strategies. This phase includes the specification of objectives, instruction strategy and the sequence of content [4] [3].

The development stage is based on previous phases of analysis and design. The purpose of this phase is to generate the lesson plans and lesson materials. During this phase, you will develop instruction lessons and all media and support documentation that will be used. This may include hardware and software [3]. We must also add the development of materials and procedures to the importance of planning instruction messages and their distribution.

For each lecture, it is important to develop or adapt material, develop presentations, organize lessons, seek for cooperation and represent it on an eLearning platform [6].

The implementation phase refers to the delivery of the course. The purpose of this phase is to promote an effective and efficient delivery of instruction. This phase must encourage learner’s understanding on contents. It is important to provide a good support in order to achieve the objectives defined [4] [3].

The evaluation phase measures the effectiveness and efficiency of instruction. Evaluation should occur throughout the entire design process, within the phases, between the phases and after
implementation. Evaluation may be formative or summative [4] [3]. The following image presents a graph view of the MIPO model:

![Figure 3: MIPO instructional model [7]](image)

To sum up, according to this MIPO model we should follow, interactively and dynamically, the following phases: learning environment analysis, instruction design, instruction development, unit implementation and model evaluation.

In this specific case, in general, we defined: learning environment analysis – students from second year of accounting and administration course, instruction design – game learning, instruction development - moodle development, unit implementation - online lessons and model evaluation – feedback of teacher and students.

The effort asked of the student is in accordance with the number of 6 credits, ECTS (European Credit Transfer System), credited to the unit. This pedagogical approach is student-centred, i.e., planned on the achievement of skills and conferring great importance to autonomous learning of the student.

In this unit we intended to reach the following objectives:

1. Understand the notion of Database System (SBD);
2. Understand the notion of Database Management System (DBMS);
3. Identify in a DBMS the levels of ANSI / SPARC Architecture;
4. Understand the importance of each level of ANSI / SPARC Architecture;
5. List the functions and characteristics of the DBMS;
6. Describe the historical evolution of SBDs;
7. Understand concepts associated with the Relational Model of databases, namely, relation or table, tuple or row, attribute or column, primary key, foreign key and integrity rules;

2 HOW THE INITIATIVE WAS RECEIVED BY THE USERS OR PARTICIPANTS

With the incorporation of the game in the information system classroom, it was possible to optimize the teaching environment and student learning outcomes. At the end of each game, the students provided a very positive feedback about this pedagogical practice and showed respect and empathy for teaching and for the effort that goes into lesson planning. Results showed that games offer students the opportunity for a more fascinating, rich, exciting and personalized experience combined with efficient learning.

In this game-learning process the students are aware of the importance of being very well prepared to win the game.

The introduction of the games in the classroom gradually increased the students’ visits to Moodle. Before classes, they mostly search for lecture notes, aiming to be prepared for the subjects that will be the target of game.

After lectures, motivated by game, they started doing the quizzes uploaded in the platform. When solving these quizzes, students started to use Moodle interactions tools to share their knowledge and difficulties.
From this experience, we conclude that games can be important to help students be active learners with creative thinking, and to guide them to acquire their knowledge through a continuous process of learning, reflection, and controlling in their own learning process.

Therefore, this experience revealed that the teacher must introduce the game and the playing process and be the person who ensures that rules are followed. Moreover, the teacher should act as a coach who gives instructions during the game to promote reflection and familiarization with the subject matter and expected learning outcomes.

These activities increase the interest of the students in the information system study. As students use the chat to communicate with each other and with me, it is easy to list the issues that were poorly understood by them.

On this activity we asked for an individual participation. The instructor took the responsibility for the design and instruction organization, acted as facilitator of the discussion and guided the instruction [8]. The instructor accomplished all the process, gave some learning clues and directions, solved conflicts. Students were remembered of the importance of promoting a good discussion environment.

The results show that gamification-based teaching practices have a positive impact upon student achievement and students’ attitudes toward lessons. 43 students participated in the unit. In the first test students got the average of 12, 24 (scale 0-20), as shown in the following image:

![Figure 4: First test results](http://example.com/first_test_results.png)

After the participation in the learning activities students had another test. This time we had 39 participation and we got an average of 14,83.

![Figure 5: Second test results](http://example.com/second_test_results.png)
This is a good result but we can’t say that the results have a direct link to the implementation of the activity. Nevertheless, in the questionnaire that students answered at the end of all activities 94% said that they liked the activity and 87% said that their participation in this activity improved their learning. They attest the importance of this kind of activities promoting their learning motivation.

3 PLANS TO FURTHER DEVELOP THE INITIATIVE

I hope that, in the future, with school/administration support, I am able to enhance my competences in game-based learning, namely to develop Games that: help students reach learning goals; promote discussion, and a free space for discussion, and help students see and understand the importance of acquiring knowledge outside the classroom. A well-designed e-learning environment discussion can stimulate an active, interactive and participated learning. In future, we are planning to continue developing this activity. We are thinking of increasing the number of questions and giving a bigger globality and openness to the game. Nowadays we see the changing of the markets that use open repositories and mobile learning. Taking into consideration the main characteristics of the e-learning environments such as flexibility, pedagogy and the better use of resources we intend to implement this game in a larger space. This game could be used in order to help implement the necessary changes in the curriculum and make it more open. Promoting the participation of students beyond this unit, this course or even this institution. To do this we have to evaluate the needs for administration changes and push the institution in order to be a truly blended-learning institution. Where it is not the face to face class that is supported by online class but the other way around. The face to face class will be used to support online classes. This vision could help in the development of a school that is led by thoughts and not by a wall. In this scenario, it is crucial to make this kind of learning game available to all of those who want to learn in a fun way. It could support their Lifelong learning or even their formal learning in a huge community of practices.

REFERENCES


