

Chapter 15

E–Government Simulation Tool for Accounting Education: Personal Income Tax Simulator

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ABSTRACT

This chapter describes a simulator used by accounting students to mimic the official process of filling out a Personal Income Tax form. According to the Portuguese law, this form describes the amount of the employees' Personal Income Tax withheld within a company, which must be submitted periodically to the Portuguese Tax Administration. This process is accomplished through an E-government tool accessed by only authorized company staff, which makes it impossible for accounting students to use it. This presents an obstacle for students who are learning about accounting because they cannot experiment with the “real” process in the courses they are studying. By using the proposed simulator that imitates the behavior and interface of the official tools, students can “learn by doing.”

1. INTRODUCTION

We live in a constantly changing society, making increasingly difficult to monitor these business developments, especially for those who have not yet entered the labor market. With the implementation of the Bologna process, most students are deprived of what was their “soft” entrance into the labor market, in particular, through intern-

ships. Courses in areas such as Accounting and Management once had access to a traineeship, which provided students with the possibility to make direct contact with real businesses in the course of their training.

In an attempt to overcome this difficulty imposed by the implementation of the Bologna process, the Business Simulation (BS) course was included in some of the degree programs such as

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the Bachelor in Business Management, the Bachelor in Accounting and Auditing, and the Bachelor in Accounting and Public Management, at ISCAC – Coimbra Business School. This course aims at reproducing the life of a company with respect to the areas of management and accounting, thereby providing students with an experience which approximates them to the business world reality.

During the BS classes, students use Enterprise Resource Planning systems (ERP) and simulators. The simulators have the function of generating external information such as business transactions and tax documents, which are then processed by the ERP. ISCAC currently uses ERP, the PHC package and the Enterprise Simulator (Silva et al., 2012). The simulators enable students to learn and test their knowledge in an environment which is identical to the real system, without jeopardizing the system with real consequences (Silva, Pedrosa, et al., 2011).

Given that the BS course at ISCAC has adopted the simulator “Enterprise Simulator” and its users have identified the need to develop new features for the simulator (Silva, 2010), emerged the idea to develop new modules for the simulator. After carrying out a thorough study of the simulator, it was concluded that the Virtual Government was a less developed area being responsible for the simulation of operations related to the delivery of documents to the Portuguese Tax Administration (PTA). Within this area two new modules related to the delivery of the Personal Income Tax (PIT) were chosen for development, including the “Periodic delivery of withheld Personal Income Tax/Corporate Income Tax (CIT) and stamp duty” (or the official name in Portuguese “Entrega de retenções na fonte IRC/IRS e Imposto de Selo”) and “Modelo 10,” briefly explained below.

During the life cycle of a company, many payments are made, such as the payment of salaries to employees. Upon payment of one’s income, companies withhold their employees’ tax amount. Companies are obliged to send the type and amount of tax withheld in the previous month on a monthly basis to PTA via the head-

ing “Sending withheld PIT/CIT and stamp duty,” available on the Portuguese Tax Administration Portal (<http://www.portaldasfinancas.gov.pt>). At the end of the accounting year, a company must discriminate against the total amounts withheld for each category and for each institution, person and company by completing a second form known as “Modelo 10,” also available on the PTA portal.

In order to develop these two new modules, the procedure used was the one proposed by Robinson (Robinson, 2003) characterized by the existence of four stages of development: analysis of the real system; conceptual model; computational model; and trial.

2. SIMULATION IN ACCOUNTING EDUCATION

We live in a society characterized by continuous technological innovations and improvements of human knowledge. This reality poses a new challenge to the current society, which is to learn faster and faster, and always bear in mind the economic and financial concerns. Schools are faced with these difficulties and use tools such as multimedia materials, software, simulators, etc., in order to improve the transmission of knowledge and the quality of education. Simulators, due to their relative low cost and potential (Banks, 2000; Law & Kelton, 2000), have demonstrated in the past to be excellent teaching tools in the most diverse areas, being the army one of the first groups to believe and apply simulation as a mean of education and training (Magee, 2006; Rosen, 2008).

Simulation has showed to be an important tool in different areas of knowledge (Banks et al., 1996; Law & Kelton, 1991; Stewart Robinson, 2002; Silva, Pedrosa, et al., 2011) and it is a well-known technique used in education. The importance of simulation in teaching lies in the fact that it allows students and teachers to analyze “what if” questions, thus testing different hypotheses of a real system, without jeopardizing the real system (Aldrich, 2005; Banks et al., 1996).

The simulation began by highlighting itself in military training, in medicine and in scientific disciplines such as mathematics, chemistry and physics (Gaba, 2004; Pasin & Giroux, 2011; Rosen, 2008). The success of its use was due to the fact that soldiers and students could apply their theoretical knowledge in a simulated and safe environment, where they would learn from their mistakes without being at risk (soldiers) or jeopardizing the real system (students). However, the simulation was quite costly, especially the one done with computers. With the proliferation of computers, simulation increased its capabilities and its cost decreased, opening doors to other areas such as business enterprises and management schools. By simulating, companies can test and explore, enabling learning through experimentation without fearing the consequences of failures (Adobor & Daneshfar, 2006; Aldrich, 2005; Pasin & Giroux, 2011; Summers, 2004). Currently, there are many examples of the application of simulation in the management and accounting courses, such as production lines, marketing, project management, accounting and taxation (Aldrich, 2005; Faria et al., 2008; Gunther et al., 2010; Pasin & Giroux, 2011; Siddiqui et al., 2008; Silva, Trigo, et al., 2011). One of the most well-known simulation games is the Beer Game (Pasin & Giroux, 2011) which was developed in the 1960s at the Massachusetts Institute of Technology (MIT) Sloan School of Management. It portrays the simulation of a supply chain, whose computerized game version was released in 1990. In this game, students have the opportunity to simulate a supply chain with the primary goal of anticipating the future needs of its customers.

2.1. Accounting and Management Teaching at ISCAC

At ISCAC, in the 1999/2000 school year, the first attempt was made to bring the academic and business worlds together with the creation of two new subjects called Accounting and Information Technology I and Accounting and Information

Technology II. These courses have a course load of three hours per week in Accounting and Audit and Business Management. Later in the 2007/2008 school year, the adequacy of Higher Education to the Bologna process resulted in a reduction of the total workload and abolished the compulsory internship curriculum. This change had a negative impact on several courses, especially in business oriented courses where one of the main objectives is to promote the first contact between the business reality and the students. With this change, Accounting students cannot entirely fulfill the requirements of the Order of Chartered Accountants (OTOC) to become a Chartered Accountant (TOC) without having practice subjects dedicated to the practice of Accounting and Management. Therefore, two new subjects called Business Simulation I and II were created at ISCAC. These subjects aim to simulate the business reality by creating a virtual market of enterprises. The methodological framework of these subjects highlight the emphasis placed on the learning methodologies of Problem Based Learning, while reinforcing an integrated contextual learning reality that mirrors the professional environment of the future graduates. In the ideological framework of “learning by doing,” these subjects offer students a practical vision of the future professional activity, thus facilitating entry into the labor market. The modernization effort and qualification is based on the development of the Project in Business Simulation (Silva et al., 2012).

The general idea of these subjects is to create a simulated market where a “virtual enterprise” is assigned to each group of students (consisting of 3 or 4 students) and organized by teachers. The activities of the companies, distributed by groups, allow students to interact among themselves, thus promoting business relationships and giving rise to a “virtual marketplace.” In the “virtual market” there are simulated business, banking and tax transactions, which are then given the appropriate accounting treatment and registered into the Enterprise Resource Planning system (ERP), for example, Primavera Software, Sage, SAP,

CentralGest, etc. Virtual enterprises (group of students) have to negotiate with each other, creating the interactivity and conditions for students to make decisions that are similar to the real world (Silva et al., 2012). The simulation of the various activities of the economic and financial life of a company also aims at assessing students' knowledge acquired throughout their academic career.

3. REAL SYSTEM

The first stage of the process proposed by Robinson is the characterization of the real system or problem reflected in this study with emphasis on the study of the *modus operandi* of Business Simulation subjects in ISCAC courses and the official process of submission of the "Modelo 10" and "Sending withheld PIT/CIT and stamp duty" on the PTA portal, since the aim of the project is to provide students with a tool that allows them to learn how to perform these two processes.

3.1. Business Simulation at ISCAC

Business Simulation subjects at ISCAC, taught in the courses of Business Administration, Accounting and Auditing, Accounting and Public Management, are present in the last two semesters of the courses. The aim is to combine different knowledge acquired during the academic training of students, particularly in the areas of management, accounting and taxation. The general function of Business Simulation subjects is to create a simulated market of virtual companies, formed by groups of students interacting, conducting business, banking, and fiscal simulated transactions, which are then treated in the appropriate accounting organization and recorded in an ERP system.

At the beginning of each semester, teams of two or more students are put together, with the future intention of being simulated companies, operating in one business area (usually defined by the teacher). Once the teams are defined, students

begin to study and analyze the characteristics of the business area assigned to them in the real world (e.g. on the internet, interviews, etc.), identifying their main features, such as: products and services (e.g. cleaning services, food, beds, laundry, spa, etc.), prices in the real market, identifying potential customers and suppliers (e.g. travel agencies) and the terms and procedures of specific industries (e.g. half board, full board, check-in, etc.). After a first analysis, students will learn about the software required by BS subject. In this study, the PHC software was used as an ERP system and the Enterprise Simulator as a transaction simulator.

After the preparation work has been made, the simulated companies (group of students) are ready to work. Whenever there is a need to make a purchase, the simulated company (Group A) purchases from another simulated company (Group B). As in real life, every commercial transaction (e.g. purchases and sales) generates documents by commercial ERP system (e.g. invoice, credit note and debit note). Each document is analyzed, classified and recorded in the ERP system. After the accounting process, as in real life, documents are organized and stored in a folder organized in accordance to accounting best practices (e.g. purchases, sales, receipts, payments, etc.).

In general, simulators mimic transactions outside the company including purchases from suppliers, banking and delivering finances statements. They generate the respective documents for each transaction, such as invoices and proof of delivery to the PTA portal. These documents are processed by the accountant (students) and are later inserted in the ERP system. In this respect, it is important that students use both ERP systems and simulators, since the two systems complement each other.

3.2. "Modelo 10" and "Sending Withheld PIT/CIT and Stamp Duty"

Since 1999, all personal incomes earned in Portugal are taxed under the Code of the Personal Income

Tax (CIRS, 2012). The incomes are separated into different categories, such as (CIRS, 2012): Category A – incomes earned from dependent employment; Category B – business and professional incomes; Category E – incomes earned from capital; Category H – pensions.

In the past, companies would pay their taxes by filling out forms manually. In most cases, this task was done by the company's TOCs and the documents were then directly delivered to the facilities of the Portuguese Tax Administration (PTA). In recent decades, European Union governments have invested in E-government tools to improve the quality of services offered to citizens, businesses and associations (Eurostat, 2010). Nowadays, the forms that were previously completed manually are now completed and sent through a Web application provided by the Portuguese government, known as the PTA portal (<http://www.portaldasfinancas.gov.pt>), as is the case of "Modelo 10." In Portugal, some of the electronic forms are required by law for companies such as, for example, the form of Collective Income Tax (CIT), according to Article 120 of the Collective Income Tax Code (CIRC, 2012).

During the lifetime of a company, many payments are made like, for example, the payment of salaries to employees. As referred to in Article 119 of the Personal Income Tax Code (CIRS, 2012), upon payment of income to businesses or institutions, a tax amount is withheld, and this information must be sent monthly to the PTA section "Sending withheld PIT/CIT and stamp duty" released in the PTA portal. Companies then are responsible for informing the type and amount of tax withheld for each month. It is only at the end of the accounting year that the company discriminates against the total amounts withheld for each category and for each institution, person, and company by filling a second form, the "Modelo 10," also available on the PTA portal.

In other words, we can say that every month, whenever a worker receives his salary the company retains the values for the PIT and Social Security.

The amount subsequently paid and communicated to the Government is based on the completion of two forms available on the PTA portal under section "Sending withheld PIT/CIT and stamp duty," filled monthly, and the "Modelo 10," completed at the end of the year. By sending this information, PTA is then aware of the tax paid by each employee. This provides the employee with the amount deducted (PIT) by the company at the end of each year. In the past, this procedure was carried out on paper and the forms were delivered to the PTA, which made the process very time consuming and complex. Now with the use of these new E-government tools, the process has become more efficient.

Although students learn to calculate the values of the PIT in the course, they do not have the opportunity to apply these same skills in a real situation since part of these applications are only available to real companies and chartered accountants. This limits the learning process of accounting students since they only have the opportunity to make contact with a similar situation in the beginning of their professional careers. Thus, this project aims to provide students with the opportunity to send two types of forms ("Modelo 10" and "Sending withheld PIT/CIT and stamp duty") through a simulator that mimics the PTA portal. This way, students can learn and test their knowledge in an environment which is identical to the real one, without, however, jeopardizing the real system with real consequences (Silva, Pedrosa, et al., 2011).

4. CONCEPTUAL MODEL

This section presents the conceptual model that is a result of the formalization of the system's behavior and dynamics (Law & Kelton, 1991). The main goal of the model is the construction of an appropriate model of the problem identified in the real system. There are several languages used to specify conceptual models, like the Unified

Modeling Language (UML), which was chosen for this project using the “Use Cases” and “Classes” diagrams (Arlow & Neustadt, 2002).

The use case diagram represents various elements, in particular the limits of the system, system actors and use cases (Arlow & Neustadt, 2002). This kind of diagram consists in designing a model that presents the common requirements of the system to the end user or an expert in a particular area. Its creation focuses only on demonstrating how the system will work, and not how it should be developed. A use case is the specification of a sequence of actions performed by one or more actors in the system, subsystem or class in order to obtain a particular result (Arlow & Neustadt, 2002). In other words, use cases describe in a simple manner what the actor (user) wants the system to supply, thus facilitating communication between the analyst and the end user (see Figure 1).

The package “Sending withheld PIT/CIT and stamp duty” contains the functionalities that enable students to fill and submit the tax form of “Sending withheld PIT/CIT and stamp duty.” This process involves the validation of the forms by the system, which in case of errors will issue a warning message for them to be corrected.

The other package of the simulator is the filling process of the “Modelo 10” form that has several features (see Figure 2).

The package “Modelo 10” allow students to do the following operations:

- Save “Modelo 10,” students are able to save the form that they are filling at any

time, regardless of the validity of the data. In order to do so, they will have to name the file;

- Open “Modelo 10,” students can open a previous saved model and continue to add populate data;
- See help to fill in, students can consult the help topics of “Modelo 10” at any time during the completion of the form by clicking on the button “help to fill in;”
- Validate “Modelo 10,” during or after completing the “Modelo 10” students have the possibility to validate it. This function verifies and shows all errors found in the data entered;
- Print “Modelo 10” temporary, prior to submission of the “Modelo 10” students are able to print an “unofficial” document to have a better perception of the data entered;
- Submit “Modelo 10,” after completing the “Modelo 10” form, students may submit it. Before the form is submitted it will be validated automatically by the system. If the form contains any type of error, it will be communicated to the student in the form of a message, thus stopping the submission process;
- View submitted “Modelo 10,” after proper submission of the “Modelo 10” form, the student may consult the “official document.”

The class diagram provides support to coding since it describes the static structure of the system,

Figure 1. Use case diagram of package “sending withheld PIT/CIT and stamp duty”

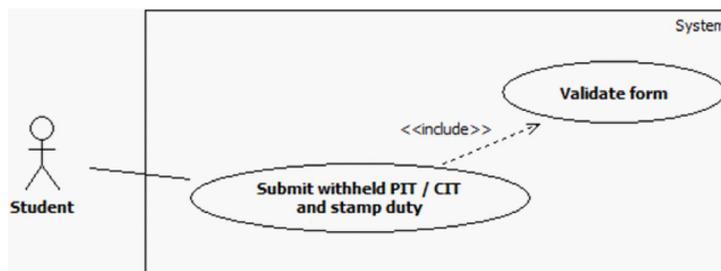
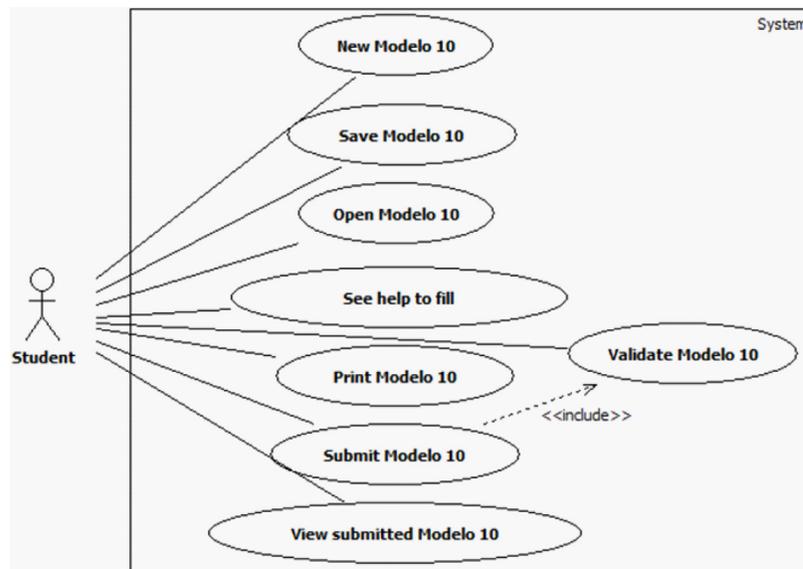


Figure 2. Use case diagram of package “Modelo 10”



including the entities, their internal structures (attributes and behaviors) and relationships (Nunes & O’Neill, 2004). The class diagram presented in Figure 3 contains the main entities, attributes and relations between them. As one can see in Figure 3, particular attention was given to the construction of a model that could support the two forms to implement, the “Modelo 10” and “Sending withheld PIT/CIT and stamp duty.” There is also the possibility of easily inserting new fields to forms if required.

Table 1 shows the respective entities and attributes presented in the above class diagram.

The creation of this diagram is an important step for encoding the model since it identifies the key entities and attributes, as well as the relationships between them. For a better understanding of this model, the description follows:

1. The IrsFormUser is responsible for holding the data regarding a certain form saved by a student;
2. A simulation saved (IrsFormUser) may be of the “Model 10” or “Sending withheld PIT/CIT and stamp duty,” i.e., an IrsFormUser has an IrsForm;

3. A form consists of one or several tables, namely one IrsForm has one or more IrsTable;
4. Each of the tables may include one or more fields, meaning in this case that an IrsTable contains one or more IrsField;
5. Each of the fields in the form belongs to a certain type, which matches an occurrence of the IrsFieldType entity. Thus, each IrsField has an IrsFieldType;
6. The IrsFieldValue, the entity responsible for containing the information stored by the user. In this case the entity relates to the other two entities, the IrsField IrsFormUser;
 - a. To a field of a form (IrsField), none or multiple records can match. In case the user does not fill out the field, it will not contain any record. Otherwise, it may contain one or more records depending on the type of field. Thus, if we are dealing with a field that provides the insertion of lines as it is the case in Table 05 of the “Modelo 10,” a field can match multiple records. If it is a single field, as it is the case of the remaining tables of the “Modelo 10,”

Figure 3. Class diagram of the conceptual model

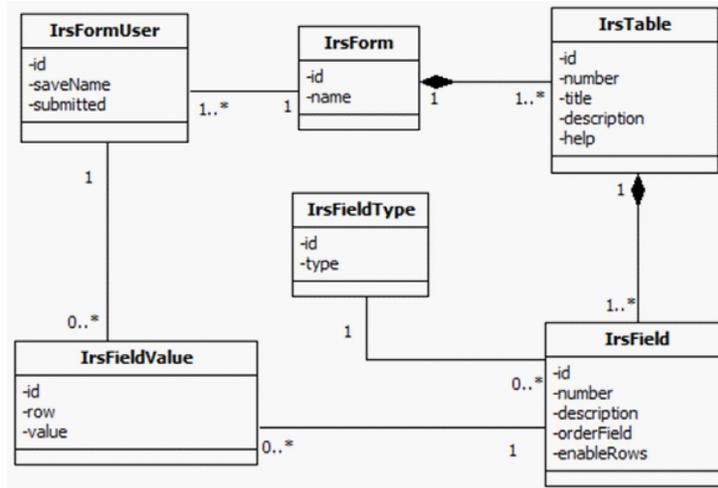


Table 1. Description of the class diagram tables

Entity	Description	Attributes
IrsFormUser	Generic information regarding de saved model.	Id, file name, submitted
IrsForm	Information regarding the forms.	Id, form name
IrsTable	Information related to the tables of the form.	Id, table number, title, description and help text.
IrsField	Information relative to the fields of the form.	Id, field number, description, order, show lines.
IrsFieldType	Information about the field type.	Id, field type
IrsFieldValue	Information about the value of the field.	Id, line number, value

- one field corresponds at the most to one register;
- b. On the other hand, to a stored form corresponds none or several registers, depending on whether or not the user entered values on the form. Therefore, any one or more IrsFormUser corresponds IrsFieldValue.

5. CONCEPTUAL MODEL

The computational model is obtained through the coding process, which consists in converting the conceptual model to code. Thus, this section, presents the two modules developed for Enterprise

Simulator, including the module “Modelo 10” and the module “Sending withheld PIT/CIT and stamp duty.”

The chosen technologies and programming languages for implementation where, namely, PHP (a programming language on the server side), CSS (an extension to the HTML language to define styles), JavaScript (a language used to perform validation operations on the client side), jQuery (a library of JavaScript functions that simplifies the creation of routines in JavaScript), MySQL (a database management system), and Model View Controller pattern.

The Model View Controller (MVC) is an architectural pattern that simplifies the development and maintenance of a system and separates

the behavior of the system from interface. This pattern of development was originally created by Trygve Reenskaug research center in Palo Alto Xero's (PARC) in the late 1970s (Reenskaug, 1979; Reenskaug et al., 1995). The MVC architecture is characterized by a system divided into three levels of distinct layers, Model, View and Controller, each of which are described as follows:

- Model, this layer is responsible for the business model of the application. It allows encapsulation, information access and enables the reuse of classes developed. The links can be separated based on the model itself, facilitating their individual management;
- View, this layer is responsible for presenting the model in a suitable format to the user, or by generating the user interface, in this case the render of a Web interface;
- Controller, this layer is responsible for controlling access to view and the layers Model. This layer receives the users input and invokes the right model and returns the result as interface in the corresponding to View.

Following the MVC pattern was reached by structuring the project folders, as is shown in Figure 4.

In the project root folder is present the file "index.php" which is the entry point into the application. Depending on the URL in question, the application will load the modules required to answer. The folder "/config" contains all the information necessary for the installation of the simulator configuration on the server, containing the configuration to access the database, absolute paths to important project folders, and global variables. The folders "/model," "/view" and "/controller" contain files relating to each area of the Model View Controller pattern. The folder "/libs" contains the libraries that are used throughout the project. Finally, the folder "/public" contains all the files that are available directly to the

end user. There is a subdivision into three subfolders of the folder, "/public/images," "/public/CSS," and "/public/JS," corresponding to image files, CSS files styles and JavaScript files and jQuery.

5.1. User Interface

As already mentioned, two modules (packages) were developed, the simulation of the submission of the form of "Modelo 10" and the simulation of submission of the form of "Sending withheld PIT/CIT and stamp duty," to be integrated in Enterprise Simulator in the module of Virtual Government. Since the module mimics the E-government PTA portal, special care was taken in developing a simulator similar to the original. Given the similarity between the two applications, warning were included in the simulator to alert users of the fact that this is a simulator and not the application's official portal of finance.

Figure 5 represents the layout of the delivery "Sending withheld PIT/CIT and stamp duty" the simulator and PTA portal, being visible similarities.

Figure 4. Project structure following the MVC pattern

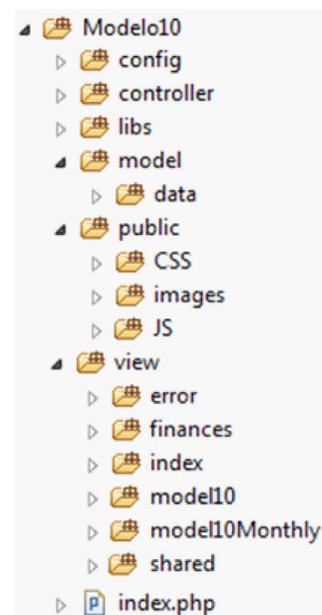


Figure 8. View of “Modelo 10”: enterprise simulator vs. PTA

Enterprise Simulator

PTA Portal

part is on the overview of the simulator, a second is on the usefulness and ease of use of the simulator, the third part is on the skills acquired with the use of the simulator and finally, the fourth part is on the overall assessment and evaluation of the simulator made available through the simulator itself. The survey was not mandatory and it was conducted during the month of June. The results are based on 21 students who attended BS subject in the second half of the 2011/2012 school year, enrolled in the Accounting and Auditing, Business Management and Accounting, and Public Management courses.

The survey begins by assessing the overview on the simulator by students, shown in Figure 9. By observing the data presented in Figure 9,

some important conclusions regarding students' opinions can be made. Note the fact that all the students in the sample state they know what a simulator is (1.1.), that they recognize its important role in the lecturing of Business Simulation subject (1.3.) and all students considered it as an important educational tool (1.4.). However, most students are only familiar with the simulator used in ISCAC, Enterprise Simulator (1.2). According to of most students there is still a need to develop new features in the simulator (1.5.).

Regarding the assessment of the usefulness and ease of use of the simulator the findings, in Figure 10, reveal that most students consider the simulator as being easy to use (2.1.), defending its usefulness even during classes (2.3.). Despite

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the high interest shown by students regarding the simulator (2.4.), it appears that the frequency of use of the simulator during classes does not fully reflect the interest shown (2.4.). This is possibly due to the fact that there are countless activities to be developed during classes BS classes, not all done with the simulator. Finally, it appears that most students understood the concept of Virtual Government (2.5.), which is the area of Enterprise Simulator where the “Modelo 10” and “Sending withheld PIT/CIT and stamp duty” modules fit in.

Then we analyzed the set of questions to understand the skills acquired using the two new modules of the simulator, whose answers can be

seen in Figure 11. One begins to see that 80% of students who responded to the survey have had the opportunity to use the IRS simulator (3.1.). The vast majority of students think that the simulator makes learning more motivating and productive (3.2.) and yet, all the respondents revealed interesting simulation applications officers to equip students with knowledge through their use (3.3.). Most students’ revealed that they were able to perform the process of submitting the official periodic forms “Sending withheld PIT/CIT and stamp duty” (3.4.) or “Modelo 10” (3.5.), thereby revealing the importance of the simulation of these two items. When asked about the importance of developing new simulators of this type, the answer

Figure 9. Global overview of the enterprise simulator

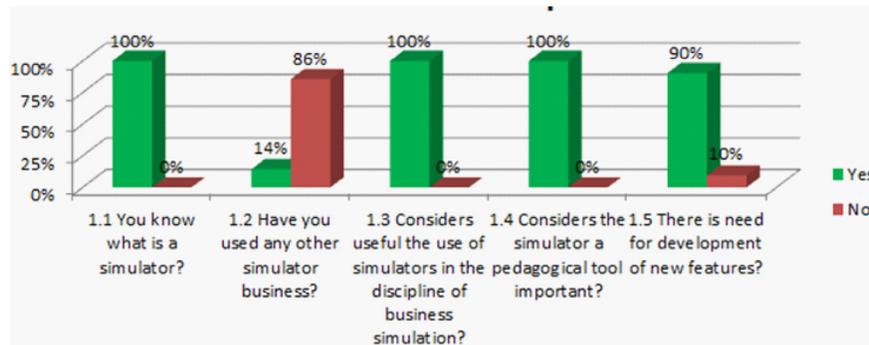


Figure 10. Perception of usefulness and ease of use

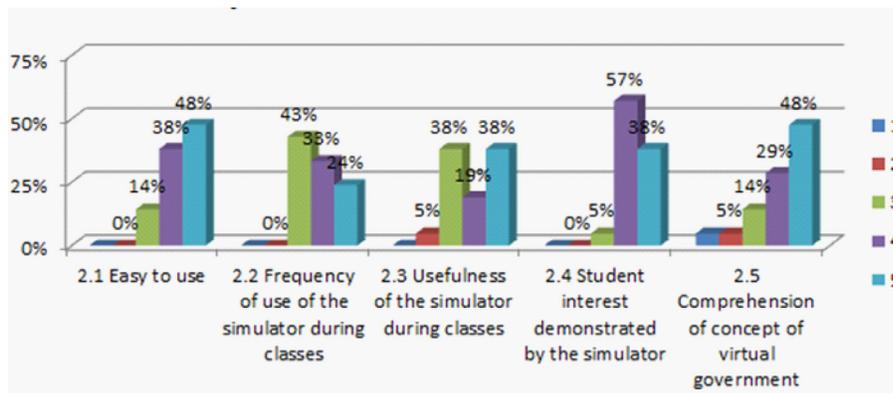
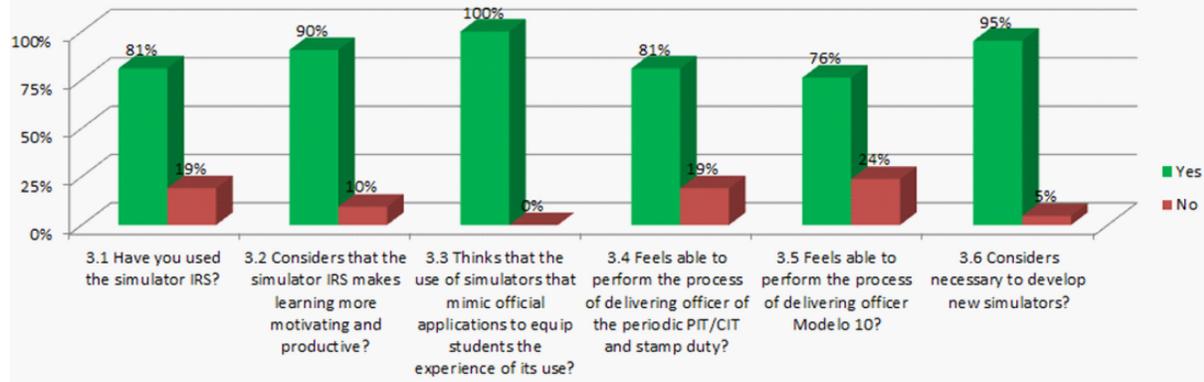


Figure 11. Skills acquired with the new modules



was almost unanimous, with a positive response from 95% of students (3.6.) (see Figure 12).

To assess the added value in using the simulator, students were first asked if they had already performed the official handover of the “Modelo 10” or the periodic submission of “Sending withheld PIT/CIT and stamp duty.” As expected, the majority of students, about 67%, never followed an official handover periodic “Sending withheld PIT/CIT and stamp duty” or “Modelo 10.” Nevertheless, a significant number of students, about 33%, had already done and were asked several other questions, with results presented in Figure 13.

The initial understanding of the official submission of these documents was characterized by students as a complex process (4.2.). Moreover, the simulator module “Sending withheld PIT/CIT and stamp duty” and “Modelo 10,” are seen by students as a means to facilitate the understanding of the official application (4.3.). Once again, the idea that the simulators help teaching through experimentation, is reinforced and more value is given to its use (see Figure 14).

Finally, we present the overall evaluation of the simulator Enterprise Simulator and more specifically, the overall evaluation of the two new modules, the “Sending withheld PIT/CIT and

stamp duty” and the “Modelo 10.” In general, students were satisfied either with the Enterprise Simulator as a whole, or by the IRS simulators, which correspond to the two newly created modules.

CONCLUSION

After completing the necessary work for the development of the simulator and after collecting data on user satisfaction, some final remarks

Figure 12. Students’ accompaniment or realization of the official form handover

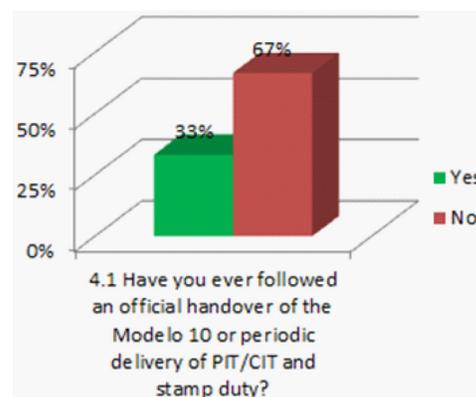


Figure 13. New modules added value

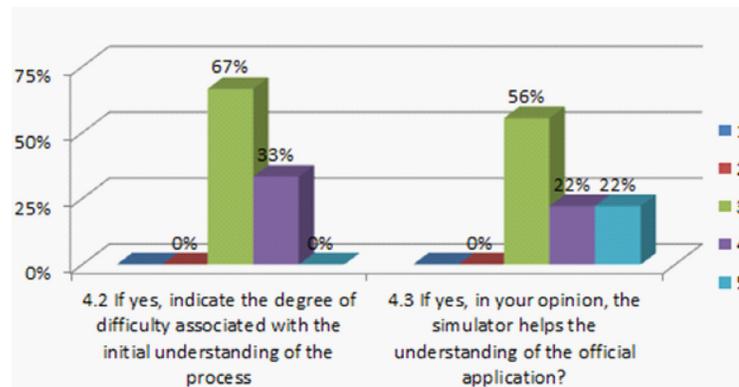
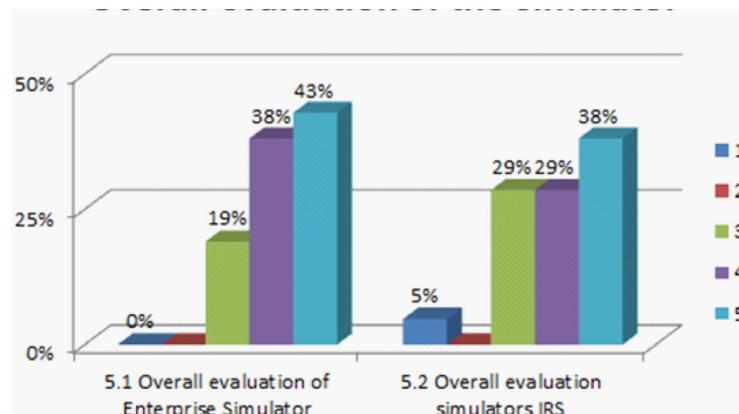


Figure 14. Overall evaluation of the simulator



can be made concerning the work done and the proposal for future work.

With the implementation of the Bologna courses in areas such as Accounting and Management, students no longer have an internship which is fundamental to bring academia into the business world. In an attempt to fill in this gap, the subject of Business Simulation was included as part of these courses with the main objective of experimenting the *praxis* of a company regarding the area of Management and Accounting.

In past decades, simulation has proven to be an asset in many different areas such as for ex-

ample, in education. With simulation, students can analyze the way the system works and test new possibilities using imitation without fearing the mistakes. Simulation not only allows for a better understanding of the system being analyzed (in this case the business world), but it also allows one to study existing alternatives without causing real system consequences (profit losses).

Since ISCAC currently uses the Enterprise Simulator in its Business Simulation classes, the idea of collaborating with the existing simulator and developing new modules arose as a way to enrich it, particularly in the area of E-government.

In order to pursue this idea the Robinson methodology was chosen, among several existing development approaches (Stewart Robinson, 2003). This methodology has four steps: the real system, conceptual model, computational model, and experimentation. Of these four steps, the computational model is accentuated since it contributed to this study in the development of modules “Modelo 10” and “Sending withheld PIT/CIT and stamp duty” to integrate in the module Virtual Government of the Enterprise Simulator. The MVC pattern architecture allowed these two modules to be developed with a common base.

Finally, experimentation proceeded to solve a practical case for each of the modules developed, thus validating the use of the simulator. An online survey was carried out where students who attended Business Simulation classes gave positive feedback on the use and usefulness of the developed modules. Students state that the use of the simulator helps understand the official process and underline the need to develop future modules as, for instance, in social security.

The Enterprise Simulator has now become more complete in Virtual Government. However, as the survey findings show, students continue to report the need to develop new modules. This is very positive since it demonstrates the students’ interest in using simulation when teaching accounting. This study does not end here as the future modules for the Enterprise Simulator, such as the Social Security module, are currently being developed.

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