

LEARNING BUSINESS ADMINISTRATION USING SIMULATION SOFTWARE

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ABSTRACT

In training accounting professionals, the use of spreadsheets and add-ins facilitates the learning of concepts and acquiring necessary skills, whose lack thereof has been shown repeatedly. This paper presents an educational experience related to accounting education and financial decision-making based on a comprehensive simulation model developed in Visual Basic for Applications and Excel. The course uses active learning techniques and employs several teaching methodologies (Problem-Based Learning, teamwork, conceptual maps) to promote student development of critical thinking for solving problems. The simulation software is deterministic, the economic and financial relationships set between the variables are transparent, and its interface is user-friendly. It takes into account a large number of variables on which decisions are taken that affect assets and liabilities, as well as financial and economic flows in the business. The simulation process results in a significant number of output variables that are reported in interim and annual financial statements and useful ratios that are used to analyze the financial statements.

INTRODUCTION

The curriculum content and traditional teaching methodology employed in Accounting have shown, for many years, significant gaps (AECC 1990; AICPA 1998; Albrecht and Sack 2000; Burnett 2003). It is no wonder, therefore, that there is widespread consensus in the international arena around the need to implement educational reform aimed at redesigning the content and pedagogy used to promote the development of knowledge and skills necessary for the adequate professional practice of graduates in these disciplines (Chabrow and Hayes 2001; Forristal 2002; Williams 1994).

The literature about accounting education (Apostolou et al. 2001; Rebele et al. 1998a; Rebele et al. 1998b; Watson et al. 2007; Watson et al. 2003) supports work that values the need to promote collaborative learning among students, cognitive learning, the development of non-technical skills,

and critical thinking in the sense of Glassner and Schwarz (2007).

Among the various methods postulated as likely contributors to the previous objectives that have acquired special relevance is the use of a Problem-Based Learning (PBL) methodology that, according to Milne and McConnell (2001) seems to eliminate the existing gap between higher education and the development of professional practice, and whose virtues, especially in the promotion of critical thought can be seen in Bonk and Smith (1998) and Johnstone and Biggs (1998). Through its use, Edmonds et al. (2003) and Heagy and Lehmann (2005) show some educational applications in the field of accounting “whose benefits outweigh the initial reluctance that they present to students”. In Spain, Monclús and Rodríguez (2006) present the experience gained in implementing the PBL methodology in the subject of computerized accounting systems and, as seen in Redolat (2004), the use of a simulation based on recording and processing accounting events in a computerized book-keeping application in a financial accounting course.

Additionally, the use of spreadsheets provides advantages to the new objectives that guide the teaching-learning process in accounting. Some examples in financial accounting can be seen in Kruck and Maher (1999), Lehman and Herring (2003) and Springer and Borthick (2004). In cost accounting, one can consult the developments put forward by Barsky and Catanach (2005), Chalos (1988) and Hoffjan (2005); and in the analysis and projection of financial statements, those of Togo (2004) and Togo (1992). In a course on management accounting, Wynder (2004) introduces a simulation tool that also allows the user to undertake other financial decisions, the results of which conclude the need for a more intensive use of such applications in teaching the subjects of accounting and management.

In fact, just as is shown by Mattessich (1961), the widespread use of computers and spreadsheets has given rise to the use of simulators since the late seventies, although its recent evolution has been intermittent, notwithstanding the use of *ad hoc* software and specific programming languages, for the creation of simulators. In

Domingo (2004) one can see the continuous evolution of business simulators and in Faria (1998) it is evident the increased use in business schools and companies. Some models can be seen in Brealey and Myers (1995), Cuervo (1994), López and Martínez (2000), Maroto and Mascareñas (1986), Martínez (1999), Mattessich and Galassi (2000) and Suárez (2003).

This paper aims to present an educative experience using an economic and financial simulator that was conceived, fundamentally, as a teaching tool that brings the student closer to the problematic issues associated with decision-making in the economic and financial sphere of the business. The practice allows for various teaching methodologies and contributes thereby, to the acquisition of additional skills in accounting and technical training in the area of accounting and finance.

The next section describes the structure, characteristics, and processes of the ‘Simul-e’ simulation software, which is followed by a discussion of the various decisions that are made in order to define the input variables which result in the output variables and financial statement reporting made by the simulator. Then after a detailed look at the teaching delivery methodology, the paper ends with conclusions and references.

SIMULATION SOFTWARE

CONCEPT AND CHARACTERISTICS

Simul-e is a deterministic simulation model, that shows the relationships between financial and accounting variables in order to summarize the economic and financial situation of the business (Otal et al. 2007a). It does not consider stochastic relationships between variables. The model is discrete, in that the user can add new output variables from what is generated by the application.

The program was developed using Visual Basic for

Applications (VBA) and Excel (Otal et al. 2007b), and it has a simple and intuitive interface, which does not require students to have advanced knowledge of accounting or computer skills in order to use it properly. And although it was originally developed in Spain, it has already translated and used in English version, and the requirements are as simple as Microsoft Excel '97 and 10Mb free in hard drive.

From assumptions relative to the evolution of the business, and decisions affecting its assets, the simulator reports provisional financial statements and gives the user various measurements and tools for analysis. Its transparent design (as opposed to black box models) allows for independent use by students and provides immediate feedback that helps the student establish immediate links between economic and financial decisions, and their consequences. It follows that, Simul-e is not, nor does it pretend to be, an accounting or bookkeeping application.

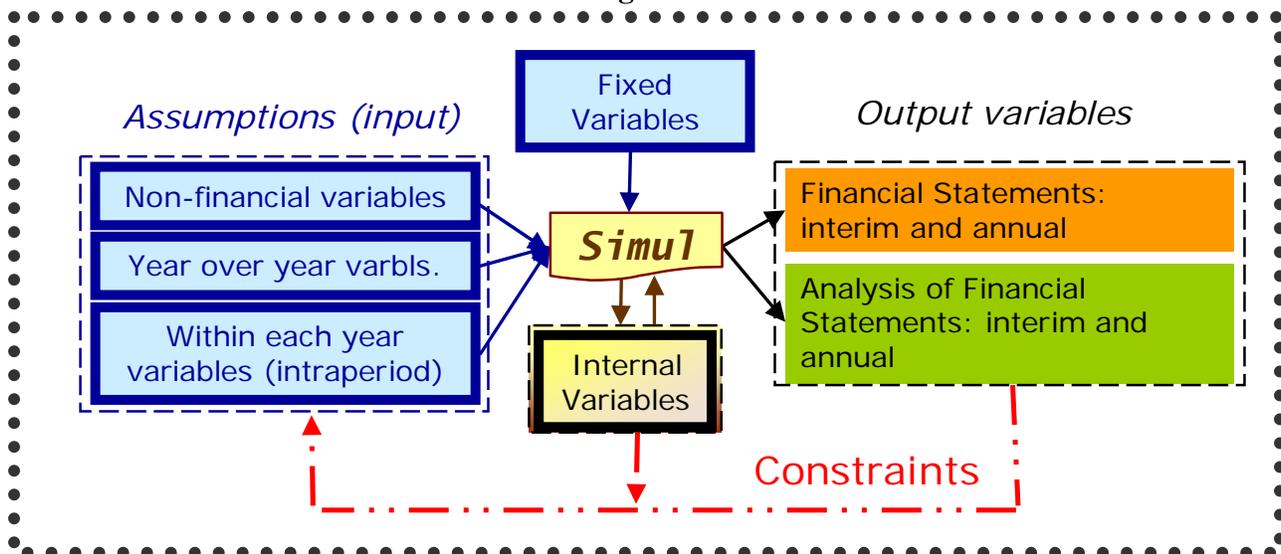
Figure 1 illustrates how the outcome of each decision is determined immediately, so that each decision can affect, and be made conditional to, subsequent decisions. Not only that, the information supplied to the simulator is treated in an intelligent form: apart from validating the data input for each variable (e.g. interest rates cannot be negative), in the preparation of the accounting information, the simulator rejects inputs that do not make economic or financial sense. The validation performed by the simulator is based, essentially, on economic criteria; although in some aspects criteria of a legal nature have been taken into account. This facilitates the raising of scenarios in different jurisdictions and in changing regulatory environments.

SIMULATION PROCESS: MAIN COMPONENTS

The simulation process is iterative and involves the introduction of decisions and assumptions into each period of those that are integrated into the simulation horizon, the proper processing and calculations by the simulator, and the

Simulation Flowchart

Figure 1



subsequent generation and presentation of output variables. The simulation is carried out as a project and each project consists of the following elements:

- a) Identifying data, such as the name of the company, the name of the student and the first year of the simulation.
- b) The type of business that will be simulated. It may be an already existing entity with a financial position or a new entity.
- c) The simulation horizon defines the length of time over which the company will be simulated. It is composed of periods whose duration can vary.
- d) The input variables pick up the set of values assigned by the student, in terms of economic and financial decisions, whose impact will be analyzed. (The identifying data are also input variables, however here what has been referred to as input variables, strictly speaking, are those with economic and financial consequences in the simulation.) These variables are subject to classification, as shown in Table 1, according to their characteristics and the date at which they can be incorporated into the simulator. Moreover, some variables allow data input at varying levels of detail, depending on the level of difficulty utilized (i.e. unit price and physical units for several products vs. total sales).

Economic and Financial Decisions
Table 1

	Sales
	Purchases
	Other expenses
	Allowances/Impairment
Operating	Taxes
	Interest revenue and Interest expense
	Working Capital Management (Operating cycle periods)
	Cost allocation (Full-cost method)
Investing	Non-current assets: Property, plant and equipment; Intangible and Investments
Financing	Long-term liabilities and Owner's equity

- e) The internal variables are those variables necessary for the simulator to carry out its function properly. The user cannot manipulate them nor do they constitute the output of the system. Although occasionally they may become output variables to facilitate the data entry process, in any case, through a feedback process they help to determine the values the input variables can take.
- f) The output variables summarize the impact of economic and financial decisions taken by the student. It presents financial statements and indicators that help the analysis and interpretation of the reported

information. Additionally, the student can define new output variables (numeric and graphic), as he or she deems appropriate.

INPUT VARIABLES

PERIOD: BASIC TIME UNIT

The period is the basic time unit for Simul-e. Periods can be defined as monthly, bimonthly, quarterly, triannually, semiannually or annually, and they remain constant within each calendar year of the simulation horizon. It is possible to add or delete periods at any time giving the possibility to extend the simulation horizon to between 2 months and 24 years.

OPERATING DECISIONS

The assumptions about operating decisions of the business affect those associated with regular business activity. Common to all these decisions are the assumptions about accrual, which is assumed continuous and uniform during each period. In companies with seasonal activity, it is possible to use periods shorter than one year (monthly, bimonthly, etc.) to incorporate this effect throughout the year. The decisions taken are relative to:

- a) Sales. Operating revenues net of discounts, excluding interest revenue, other operating income and operating grants. It allows for different prices and quantities for up to three different types of merchandise or finished goods.
- b) Purchases, other expenses and wages and salaries. Purchases of inventory, other expenses and wages and salaries can be provided for (a) based on estimated sales for the period or, alternatively, (b) detailing the amount and unit cost of each productive factor with reference to the corresponding values in the previous period. The simulator allows for unit costs and quantities for three raw materials.
- c) Allowances and impairment. Involves estimates related to the impairment loss associated with current and non-current assets (depreciation of fixed assets, inventories impairment, allowance for bad debts, etc.).
- d) Taxes. Incorporates assumptions concerning the value-added tax and corporate tax rates. Also allows for the tax-effect method, bonuses and deductions.
- e) Interest revenues and interest expenses. The return on financial assets and liabilities considers variable interest rates and different rates depending on the amortization method and/or the nature of financial instruments.
- f) Working capital management. This designation covers aspects relating to the management of cash and other items of working capital. It picks up two sets of decisions:
 - i. Length of sub periods (days of inventory, average collection period, etc.) that make up the operating cycle; and

- ii. Granting of discounts for advanced payments on accounts receivable and accounts payable.
- g) Cost allocation. Following a full-cost method allows the assignment of costs to different departments and measure inventories adequately.

Along with the decisions associated with the current variables, the simulator also processes non-current decisions. Below is the investment and financing decisions.

INVESTING DECISIONS

The investment assumptions faced by the student are related to decisions about the acquisition, disposal and proper valuation of property, plant & equipment, investment and financial instruments linked to the company for more than one financial year.

Unlike the current decisions that occur in a continuous and uniform way during each period, each investing and financing transaction takes place on a specific date, in general, at the beginning of the period. (Except for assets' revaluation and the early settlement of liabilities that are presumed to be made at the end of the period, all others are due at the beginning of the period in which they occur.)

The decisions taken in each period allow for:

- a) Acquisition of assets, in exchange for cash, on account or both, in which case it is necessary to determine the maturity date of the debt. The assets subject to such transactions may be:
 - i. Depreciable assets (two types)
 - ii. Non-depreciable assets (i.e. those with indefinite useful life)
 - iii. Financial assets for trading purposes (subject to gain/loss on disposal); and those to be held.
- b) Disposal of assets in cash, credit or both. If the transaction is done on credit, it should specify the maturity date.
- c) Recognition of impairment losses.
- d) Revaluation of fixed assets (recognizing other comprehensive income).
- e) Lending money under different amortization repayment terms.
- f) Early settlement of loans and non-trading (held to maturity) investments.

In addition, Simul-e classifies current maturities of long term assets, from long to short term, and reports them according to the due dates for each transaction, without intervention by the student in this process.

FINANCING DECISIONS

The financing assumptions allow for decisions related to fundraising (from lenders and shareholders), and the transactions associated with settlement of debt and distribution of dividends. (Financing transactions are accrued at the beginning of the period in which they take place, except for the following: distribution of dividends, advanced settlement of debt and the conversion of debt in

common stock. These three are presumed to be made at the end of the period.) The operations that can be incorporated into the simulator in each period are:

- a) Increases in common stock through contribution in cash (paid in full or in part), by conversion of liabilities or retained earnings.
- b) Decrease of common stock, in cash or through the cancellation of unpaid issued common stock.
- c) Splits and reverse splits: changes to the number of shares outstanding.
- d) Net income distribution: to dividends or retained earnings. If retained earnings plus net income become negative, no other allocation than retained earnings is allowed.
- e) Government grants received and subsequent transfer to the net income.
- f) Provision recognition and settlement, specifying the amount, if any, which constitutes a payment for that period.
- g) Loans under several terms and amortization methods (adjustable rate, constant, bullet amortization, etc.), and the possibility of advance settlement.
- h) Finally, Simul-e takes into account all payments to be done in each period, through lines of credit, which are automatically calculated and obtained in the beginning of each period. This prevents the existence of negative balances in cash, and the user knows *ex ante* (in advance) the financing needed to meet the period payments.

OUTPUT VARIABLES

The final stage of the simulation process is to obtain a set of structured information that faithfully reflects the economic and financial situation resulting from the decisions taken on the business. That said, Simul-e reports financial information than can be classified according with two criteria: one temporary (period); and the other functional (objective), depending on the expected use for the information. These approaches allow to focus the learning process in the specific topics covered in the course, weighting the students financial analysis capabilities or their reporting skills. Table 2 summarizes the categories in which the different output variables are grouped.

**Information Reported by Simul-e
Table 2**

Period	Interim: per period	
	Yearly: cumulative	
Objective	Reporting	Financial Statements
		Adjusted Financial Statements
	Analysis	Percentages
		Variation rates
		Ratios

Given the time criterion, the output consists of two sets of financial statements, classified by the time interval it covers:

- a) Interim financial statements, related to each period of the simulation horizon (month, quarter, semester, etc.).
 - b) Annual financial statements, related to December 31st.
- Depending on the expected use for the information, the objectives are classified into two groups whose contents are detailed in sections 4.1. and 4.2. following:

- a) Financial information geared to a presentation, comprising a set of financial statements, and
- b) Accounting information focused on the analysis of financial statements, including adjusted financial statements, rate variations, percentage values and ratios.

REPORTING

The information for reporting purposes organizes the financial statements based on generally accepted accounting principles and in those suggested by accounting literature when the financial statement is not standardized. The financial statements (interim and annual) are:

- a) Balance Sheet (or Statement of financial position).
- b) Income Statement: in one statement expenses are classified by nature; and in the other, are classified by function.
- c) Value Added Statement.
- d) Cash Flow Statement.
- e) Statement of Changes in Owner's Equity.

FINANCIAL STATEMENT ANALYSIS

To carry out the financial analysis, Simul-e offers the following tools:

- a) Adjusted financial statements. Financial statements are consistent with those described in paragraph 4.1, although deserve three considerations:
 - i. Simplified structure, based on economic and financial meaning, with no formal and legal considerations.
 - ii. Balances on the balance sheet represent the period to which they relate, in other words, they are average values (not referring to the last day of the period).
 - iii. The values contained in these statements are used in the calculation of the rest of the variables necessary for the economic and financial analysis.
- b) Vertical analysis. The adjusted financial statements are expressed in percentage terms on a reference variable, taken from the statement itself.
- c) Horizontal analysis or rates of variation. The value of each set of adjusted financial statements represents the change relative to its value that it had in the previous period or year (depending on whether it is interim or annual).
- d) Ratios. A set of quotients (and other indicators) that provide the basis for analyzing the status of the

business in each period. They are grouped into four categories:

- i. Solvency. Provides information about the company's ability to meet its long-term payment obligations.
- ii. Liquidity. Evaluates the company's ability to meet its short-term payment obligations (in two ways: static and dynamic).
- iii. Profitability. Helps to determine the performance achieved by the company and its owners/shareholders in the period.
- iv. Earnings per share. Calculates a per share value related to each outstanding share.

TEACHING DELIVERY

The training of graduates (undergraduate and graduate), in disciplines related to financial economics and accounting, assumes the gradual development of a comprehensive course or module, according to the curriculum, which is primarily oriented to training for decision-making. These courses combine aspects of several different related subject areas: cost accounting, management, financial accounting, corporate accounting, presentation of financial statements, analysis of financial statements, analysis of operations, financial planning, investment valuation, among others. In this context, the course design that follows has the aim that students will:

- a) Learn how to articulate the economic and financial relationships that exist at the heart of a business.
- b) Be able to skillfully assume the direct and indirect consequences of economic and financial decisions made within the scope of the business.
- c) Acquire critical thinking skills in order to analyze problems.
- d) Address the challenges of teamwork and have the opportunity to present and defend their work in public.

The course takes place over 48 hours of actual student work, divided as shown in Table 3, and is grouped into sessions of 2 hours each. Attendance is presumed mandatory to the extent that, because the work develops progressively, any missed sessions will make it more difficult to fulfill the requirements of the discussion and complete the scheduled assignments of the course. In addition, the student must have some prior knowledge of accounting (having had acquired this in university or pre-university level courses) and has available at the beginning of the course the materials and tools that will be used: the training manual for the application, the simulation software, an Internet connection and access to web pages containing information, videos and examples.

Distribution of course hours

Table 3

Introduction to the simulator	4
Simulation tool	2
Introduction, design and presentation of conceptual maps	12
Business simulation exercises	28
Oral presentation	2

The course consists of four parts, throughout which various training modalities are used (class lecture, development of conceptual maps, Problem-Based learning, case studies and teamwork). The following section details the sequencing of activities and the objectives associated with each one.

CONTENT SEQUENCING

The first part of the course opens with a presentation of the objectives, whose purpose is to inform and familiarize students with the concept of simulation, placing special emphasis on highlighting the important features and differences with respect to the design of a business plan. Although some aspects may be the same, it is not always the case. With the help of slides and audiovisual materials, the teacher uses traditional class lecture to present the information. Many students are being introduced to this concept for the first time, and from a practical perspective it is necessary to underpin the discussion with some background about what a simulation is, and what it is not, as well as to introduce the different types of simulation that can be carried out within the economic, financial and accounting functions of a business.

In the next section, the student works with the simulation tool with the help of informational video tutorials (downloadable from the Internet: <http://www.simul-e.net>). These videos are interactive and require the student to actively participate as they progress through the explanation of the basic functions of the simulator. This second part can be completed in two hours and can be done either at home, or in the classroom, depending on how the course is organized. In any case, these tutorials ensure that the student has a readily available source of information to turn to at any time after the lesson. Answers to many of the doubts raised by the use of the simulator are usually found in the accompanying manual, but email may also be used to help immediately clarify any minor gaps in understanding that may arise.

Once the student knows the overall objectives and has a basic understanding of how the simulation software works, a brief example is presented that shows students how to establish relationships between economic and financial variables that are at the heart of any business. The objective

of this third section is, therefore, to recognize the relationships between cause and effect in relation to the development of economic variables of the business and to acquire a sound relational ability relative to the development of the financial side of a business. This is a progression of three parts; first, the teacher gives an overview to guide students in how to develop conceptual maps, then students work together in groups to elaborate their maps, and finally, the groups present their work in class.

The teachers' presentation is carried out with the help of the simulator. First from a theoretical perspective, and then shown numerically, for example, that an increase in the average payment period has consequences on a wide range of variables reported in the financial statements and in some ratios. Students are then divided into groups, in which they will reflect and discuss the causal relationships between economic decisions and the variables that result.

When the application is incorporated into the lesson, it is usually well received and offers little difficulty for the student to operate. In fact, because it is simple to obtain numerical results and graphics, based on the decisions taken (albeit partial), and with those that test the functionality of the simulator, it creates expectations that allow students to ease into the learning process in an almost imperceptible way.

The work of the students is to discuss and solve questions and exercises that delve into the establishment of causal relationships between the decisions and the economic and financial variables. This work uses the criteria for the design of conceptual maps as in Cañas and Novak (2006). The questions are similar to those previously discussed in class that have arisen from the presentation made by the teacher. For example, what are the consequences on shareholders equity and for investors to get a loan for the business? Or, if the company carries out a capital increase by converting retained earnings, does it increase liquidity? What is the effect on solvency? The answers are expected to be concrete: an increase in cash flow and therefore in the liquidity ratio, or an affect on equity, that increases but does not impact cash flow and therefore does not change the liquidity and in this case, neither the solvency... and so on until all consequences are exhausted. If the group meetings are conducted in class, the teacher usually takes part to guide and evaluate the participation of each member of the group in the discussions.

Three facts should be taken into account: first, the student will not necessarily know in detail the concepts contained in these questions, which will require him to seek information (from the references given in the class materials or from additional material), second, the response should be formulated in terms of causality, which requires the student to develop graphs and conceptual maps that relate both input variables (or decisions) and the output variables affected by the transaction, and three, the solution must be prepared and written by the group, after it has been discussed and agreed upon. To this end, each group receives a number of related

questions, equal to the number of members. This facilitates group cooperation in developing the solutions.

Each group must submit to the teacher the proposed solution and, if appropriate, suggest improvements. After the teacher reviews the response, the group presents the question in class along with the proposed solution. This makes it possible to undertake a sufficiently large set of different questions. The purpose of the oral presentation rests not only in assessing the response or the expressive capacity of the students. Ultimately these relationships will be useful later as students evolve to the next stage of the course. The oral presentation runs for approximately 90 minutes, at a rate of eight to ten minutes per group.

The fourth part of the course is designed to allow the student to critically analyze the economic and financial aspects of a business. To that end, each group must complete a full simulation of a business project. Each team is assigned a project, and although they each have common features, there are unique elements specifically defined for each case. Therefore, each project has characteristics that make it significantly different from the others so that, in the final class presentation, groups who present first do not lose interest for the remaining presentations and later groups do not apply to their case any solutions encountered in the work of their classmates. This section gives students the opportunity to work with the content and tools that they have acquired and practiced in previous lessons. In most cases, this is the final section of the course, and as a result, it develops the most essential aspects in the final project.

However, in courses given to students with more advanced training, the course can include a fifth part in which each group is charged with developing their own simulator, using Excel, not only completing the business simulation project using the Simul-e simulator.

BUSINESS SIMULATION EXERCISE

As noted above, the work prepared should meet the requirements common to all groups and, simultaneously, should maintain its own elements that are distinctive from those of the others.

The selection of a company that will serve as the reference for the simulation exercise is based on suggested business plan proposals that can be accessed at: http://www.emprendedores.es/crear_una_empresa/plan_de_negocios. The website offers information for each project which serves primarily to provide structure about the formal aspects of the company, marketing issues, human resources organization, business model orientation, and SWOT analysis, among others. Additional information supplied by the website are the orienting figures that, for the first year of the simulation horizon, serve as the basis and provide realism to the estimates presented by the simulator.

The details of business plans downloaded by students from the Internet must be studied carefully, and then subjected to scrutiny in order to alter some of the features to ensure the achievement of the objectives for this project. In

fact, the proposals do not contain all the information needed to develop the simulation. For example, the website data provide information for only one year and do not contain current interest rates or expected rates of inflation. It is necessary that students seek additional sources of information from the European Central Bank, National Institute of Statistics and others (i.e. Federal Reserve).

Other features common to all projects, whose inclusion has been the result of progressive experience in the delivery of the course, are that:

- a) Each project should be spread over three years, using semi-annual periods. This makes a provision in the project to incorporate seasonal patterns and allows for a discussion about the methods used by the simulator to produce interim reporting –not annual.
- b) The company should sell and/or process products, maintain some type of stocking inventory system, and allocate costs to inventory. In courses where students have prior advanced training, it is recommended that they study a processing company. In the first editions of the course, it was not yet necessary to establish minimum requirements, and thus, students often chose to simulate service companies or companies that market products online without any storage system thereby transferring risk related to inventory management to their suppliers. Although the simulator allows for up to three products, if the group has not received prior advanced accounting training, it is suggested that the study be restricted to a single product. This helps to avoid serious difficulties in the achievement of results and an overall understanding of the process by bringing excessive complexity to the parts.
- c) Among the current decisions, the exercise should include purchases and sales realized, at least in part, on credit. This introduces additional considerations about rebate policies, interest rates and managing the average period of accounts receivables and payables.
- d) Investment activities should include the acquisition and sale of long term assets, which address the depreciation consequences, and the treatment for extraordinary or non ordinary items.
- e) With regard to financing activities, the company has to obtain government grants for the purchase of fixed assets. This requires an association between the recognition of revenue with the corresponding depreciation. In addition, they should use a constant or straight line amortization and only interest amortization (or bullet amortization) for any loans obtained.

The distinguishing characteristics of the projects are contingent on the type of business, the industry sector, and the economic and financial structure required. For example, while some groups have leased items, others must buy property, some have highly indebted financial structures, while others opt for equity. Also to be considered are the timing of return on investment, the inherent risk of the business and, consequently, the interest rates of financing transactions, and so on.

As described above, the course developed for students who already have degrees in administration and business management, includes a fifth section. The objective is that students develop their own business simulator using a spreadsheet. The challenge is usually well received among students who have had some previous work experience, in that they understand the added value gained through completing this activity. Where appropriate, the work in the classroom is organized around group meetings between teacher and students, in which the teacher guides the difficulties or inconsistencies that the model shows and suggests changes and improvements.

The basic features of the simulator design are:

- a) To consider five annual periods.
- b) To prepare the following financial statements: balance sheet, income statement, cash flow statement, and statement of changes in owner's equity.
- c) It is not necessary that the spreadsheet contain macros programmed in VBA or the use of data validation restrictions.

GROUP STRUCTURE

The formation of groups is not left entirely to the discretion of the students. It is usually guided to prevent the appearance of differences between students, which in fact happened in earlier editions of the course. In Barkley (2005) and Michaelsen et al. (2004) one can see in detail the factors to consider in forming teams for learning. For undergraduate students, we try to use the following criteria:

- a) The groups are composed of 3 members.
- b) Teams should be composed of members of both genders (though in some programs is not easy to meet this criterion).
- c) Students who have more knowledge of Excel and/or accounting should not be in the same group. (Concerning the previous computer knowledge received in the first session (dedicated to the simulator introduction), the previous accounting training looks at the grade obtained in accounting subjects already studied.)
- d) Extroverted students are grouped with more introverted students, according to an assessment made in class or in previous courses.
- e) Group members should not be previously "united" by the bonds of friendship or other affinity.

EVALUATION

The course evaluation happens continuously, so that students are kept aware of the scores earned in each test. However, to determine the final grade, there are five values that make up the assessment of the student's work, each having a different weight in calculating the overall total. The evaluation criteria and the weight given to each part of the course are shown below.

**Final Grade Weight
Table 4**

Simulation Test	10%
Conceptual Maps	25%
Business Simulation	35%
Oral Presentation	20%
Productivity	10%

The test consists of 20 questions (true/false) on issues of simulation, system concepts, variables, etc.

The assessment of conceptual maps evaluates the number of variables present in the design and the importance of the relationship between the variables. Additionally, the student will receive a penalty in the concept map if it lacks the relevant variables in order to understand it, or if the relationships have been established erroneously.

In evaluating the business simulation exercise, the guiding criterion is the consistency of decisions over time with respect to the stated objectives, as well as the appropriate use of financial and accounting criteria when assigning values to business transactions and making estimates about the future. There should be an effort made on the part of the student to persuasively explain both the origin and meaning of the figures, to link the presentation of the simulation with a synopsis that establishes relationships between the meaning and the figures arrived at by the results, and also, to anticipate future events. Usually, students are inclined to present very profitable scenarios that are unlikely. Therefore the assessment looks at, among other things, evidence concerning the origin of the data, the development of an economic and financially sustainable hypothesis, a satisfactory presentation that highlights outstanding issues from the project, and the proper use of reference citations.

The oral presentation is evaluated in two ways:

- a) The ease with which the group describes the simulation project, highlighting the most important aspects, making transitions between group members, and adhering to the expected time frame; and
- b) That the student makes eye contact with the audience, has confident body language, for example, without rigid or nervous movements (stepping side to side, tapping hands on the table), uses appropriate silence, and speaks clearly without using filler phrases or words.

When assessing productivity, we look at the degree of involvement of each group member. To do this, each student is asked to distribute ten points among all team members, so only whole numbers are used, which prevents the same rating being given to all members. The aim is to compare the degree of involvement perceived by the teacher about an individuals' contribution, to that which the student gives to the group based on his opinion.

CONCLUSIONS

Training in accounting needs to facilitate the learning of content and skills not normally covered in traditional curricula. Furthermore, the use of new pedagogical teaching practices and tools facilitates the acquisition of these new skills. In this regard, the benefits for teaching students in the use of spreadsheets and simulators have been proven across many disciplines. The incorporation of these tools into a comprehensive training program in the area of economics, finance and accounting is still inadequate and needs to be integrated into the curriculum in order to achieve, for the student, increased engagement in learning and acquiring skills in the assessment of evidence, formulation of hypotheses and the associated reasoning based on these.

The simulation application presented here, Simul-e, integrates a large number of economic and financial relationships within the company, which gives an immediate overall picture of the flows generated and the variables affected by each decision. Its versatile structure and simple interface allow the student to individually keep track of various management areas of the company. In that sense, it is a valid tool not only for learning about topics covered in more advanced courses, but also to guide the development of economic and financial reasoning as the student begins to have contact with these disciplines. A contributing factor is that, because it is a comprehensive and modular application developed in an environment with which the student is already familiar (spreadsheets), the results shown by the simulation are transparent. And in this way, it encourages progressive use at increasing levels throughout the learning process.

The structure of Simul-e is based on Excel, which makes it unnecessary to learn an *ad hoc* application; on the contrary, this facilitates its use, ensures continuous updating and immediate upgrading to changes associated with a new accounting framework. Therefore, this approach reduces the cost of learning for both student and teacher and reduces considerably the limitations to use it. In addition, Simul-e does not, as with similar type tools, use only a prospective process oriented to the development of feasibility plans. Instead, because it is specifically designed to train professionals, it allows the student to analyze in detail the significance that every economic and financial decision has on equity, profits, cash flows and other variables that are relevant for understanding and anticipating business development.

The teaching practice proposed here is based on the successive use of different learning methodologies that focus on both knowledge acquisition and skill development. On the course schedule, it is possible to adjust the level of difficulty or degree of detail with those that analyze the economic and financial consequences of decisions in the business. In this way, it promotes growth in stages, challenging the student to develop their own computer applications for resolving issues and questions that arise in their study of the disciplines of economics, finance, and

accounting.

The issues facing the student cannot be easily resolved without previously undertaking a data search and developing an analytical problem-solving capacity. Thus, the student seeks to find only the necessary data, disregarding that which is irrelevant, and establishes the correct links between variables to solve the proposed questions. On the other hand, the role of the teacher is to help students correctly frame the problem, explore possible decision paths, require them to generate and analyze procedures, strengthen problem solving and decision making, along with the ability to defend them within changing scenarios. This goal can be achieved in Financial Accounting courses, and specially in Financial Analysis courses, where the previous knowledge acquired by the student offers a more complete and in-depth opportunity to explore the characteristics of the simulator.

The perception built on the basis of opinions gathered from students (undergraduate, graduate, with and without previous work experience) are consistent with: a) that the dedication, degree of involvement in the course, and the work required has been greater than originally anticipated, and having “the feeling that I constantly had new challenges and tests to overcome”, b) having learned or reinforced concepts that “they should already know” so that they are integrated with a broader view of reality in business and the consequences of economic and financial decisions, and c) they have understood and valued the usefulness of group discussions, the need to give constructive criticism on the work of classmates and the public presentation of their own decisions, putting them up for debate and suggestions from their colleagues. Moreover, the opinions gathered from students showed that those with previous work experience in administration or accounting appreciate the training received with special interest and often give a better assessment than those students who lack work experience in the field of business management.

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