

Raising Funds: Entrepreneurs and Investors Negotiate an Amount to Invest and an Ownership Percentage

Antoni Olivé

Jordi Cuadros

Lucinio González-Sabaté

Vanessa Serrano

Xavier Jolonch

IQS Univ. RamonLlull. Via Augusta, 390
08017 Barcelona
Spain

Abstract

This paper summarizes the results of an activity which consisted of two parts: 1) the calculation of the value of a new venture and the funds needed during its first years of operation (simulation) and 2) the negotiation between an entrepreneur and an investor of an amount to invest in the new venture in exchange for an ownership percentage (role-playing). The research consisted of verifying: 1) whether the activity increases students' comprehension of the key concepts previously specified (increased knowledge) and 2) whether students' attitude is receptive to innovative teaching methods (students' attitude). The main conclusions of the research are: 1) students learnt; 2) students failed at realizing that forecasting the future free cash flows is the way to calculate the funds needed and the funds to be raised from investors; 3) some students did not comply with the negotiation rules; 4) students prioritized reporting agreements, regardless of their quality; 5) there is a significant number of agreements that were reached with a firm valuation inconsistent with the first part of the activity (simulation); 6) after having debriefed the first round, there is an improvement in the negotiation process of the second round (the negotiation consisted of two rounds); 7) the activity was well-accepted by the students; 8) some changes should be implemented in future uses of the activity.

Keywords: Entrepreneurial finance; fund-raising; firm valuation; ownership percentage; entrepreneurship education; simulation; negotiation; role-playing

1. Introduction

Some concepts, phenomena, and dynamics are complex and difficult to understand using traditional teaching methods, such as lecturing. Today's professors have to increase students' motivation and engagement, and have to think of activities to make students be involved. In contrast, current state of technology allows the existence of a wide range of interactive tools to bring to class. Simulations and role-playings are used to emphasize the concepts taught in class using traditional methods. This paper summarizes the results of an activity which consisted of two parts: 1) the calculation of the value of a new venture and the funds needed during its first years of operation (simulation) and 2) the negotiation between an entrepreneur and an investor of an amount to invest in the new venture in exchange for an ownership percentage (role-playing).

The research consisted of verifying: 1) whether the activity increases students' comprehension of the key concepts previously specified (increased knowledge) and 2) whether students' attitude is receptive to innovative teaching methods (students' attitude). Increased knowledge was measured by comparing the results of a post-test with the results of a pre-test and by verifying whether students score higher in the post-test than in the pre-test. It was also measured by analyzing the negotiation agreements to assess any progress in students' negotiation efficiency. Student learning perception was measured by a feedback survey. Everything is done with the aim of improving the learning of future cohorts of students.

The paper is structured as follows: we review the literature about fund-raising, negotiations, entrepreneurship education, gamification, role-playing, and simulations and games; we explain how the activity was done; we summarize the results obtained; finally, we discuss the results and list the main conclusions.

Entrepreneurial finance is an academic discipline that addresses key questions which challenge all entrepreneurs: 1) how much money should be raised; 2) when should it be raised and from whom; 3) what is a reasonable valuation of the company; and 4) how funding should be structured (MIT, 2002).

The terms of the deal between entrepreneur and investor are critical, and the first issue to be resolved in a negotiation is the ownership percentage for the investor (Byers, Dorf, and Nelson, 2011). The authors argue that most entrepreneurs have limited experience negotiating a fair deal with investors. However, they say that negotiating a deal is a skill that can be learned. Venture financing is one of the facets of entrepreneurship that should be taught (Kuratko, 2005).

In addition to the intrinsic difficulties of the discipline, fund-raising is characterized by agency problems and information asymmetries between entrepreneur and investor (Denis, 2004), and sometimes entrepreneurs and investors are motivated to act opportunistically toward one another (Christensen, Wuebker, and Wustenhagen, 2009).

The best negotiation should produce an efficient, wise agreement, the one that meets the legitimate interests of both parties, resolves conflicts fairly, and is durable. The process of negotiating a deal must be based on four principles: 1) try to take personalities out of the discussion; 2) try to get everyone working for a fair deal; 3) avoid taking rigid positions; and 4) set measurable outcomes (Fisher, Ury, and Patton, 2011). In any fund-raising negotiation, each side must choose between two options: accepting a deal or taking its best no-deal option which is to move on to find and negotiate with a new investor or entrepreneur. The entrepreneur (investor) evaluates the deal versus seeking another potential investor (entrepreneur) (Sebenius, 2001).

Neck and Greene (2011) state that current, mainstream approaches to entrepreneurship education are dated, and propose teaching entrepreneurship as a method instead of as a process. The method is a way of thinking and acting. It goes beyond understanding, knowing, and talking and requires using, applying, and acting. They propose a portfolio of practice-based pedagogies which includes serious games and simulations.

Entrepreneurs work in a complex, dynamic environment and must be able to deal with a broad range of unstructured problems and to adapt. Simulations allow students to gain experience of new and unexpected situations and to learn from failure (Honig, 2004).

Some papers (Lourenço and Jones, 2006; Rondon, Sassi, and Furquim de Andrade, 2013) compare the effectiveness of traditional and alternative teaching methods, in terms of knowledge acquisition and long-term retention. The challenge is to develop methodologies to measure the effectiveness of entrepreneurship education (Alberti, Sciascia, and Poli, 2004).

Feinstein, Mann, and Corsun (2002; p. 735) define role-playing as a technique that *“allows participants to immerse themselves in a learning environment by acting out the role of a character or part in a particular situation. The participant follows a set of rules that defines the situation and then interacts with others who are also role playing. This learning activity allows participants to get an in-depth understanding of many of the social interactions that arise when evaluating or solving a problem.”* They also define game (interaction among players constrained by a set of rules and procedures which can include competition and cooperation), simulation (if a model is a representation of reality, simulation is the behavior of the model), and computer simulation (attempts to replicate the characteristics of a real world phenomenon through the use of mathematics or simple object representations).

Role-playing asks students to imagine, think, and behave as if they were someone else in a particular situation. The learning environment is safe and low risk for students because they can separate themselves from the character they are playing. Role-playing is highly effective for students to learn about attitudes and behaviors (Shepherd, 2004) and is also an effective means of teaching negotiation skills (Essig, 2009).

Gamification is the use of game design elements and game mechanics in non-game contexts as a tool to increase student motivation and engagement (Dominguez *et al.*, 2013), is the incorporation of game elements into non-game settings to increase student motivation and engagement (Lee and Hammer, 2011), and is the application of game dynamics, mechanics, and frameworks into non-game settings to increase student motivation and achievement in the classroom (Stott and Neustaedter, 2013). Borys and Laskowski (2013) show that adding game elements, mechanics, or dynamics to the teaching process improves the students' results.

In simulations, students make decisions and track firm performance (Shepherd, 2004). Simulations refer to any procedure that is meant to imitate a real-life system. It is especially useful in examining situations that are too complex, difficult, or costly to explore in reality (Mahboubian, 2010). We should distinguish between game, simulation, and simulation game (Ellington, 1981). Games consist of any activity in which the user competes with others to achieve a goal. Simulations are virtual representations of reality. The player can experiment but is not able to alter reality. The results of the simulation are always the same, and the player can only visualize some fictitious situations. Simulation games refer to a combination of both. They consist of activities that are live representations of reality in which players compete. The activity referred to in this paper falls within the category of simulations, because it is a virtual representation of reality and does not involve interaction among the players.

Faria *et al.* (2009) review the history of business games and describe the changing technology employed in the development and use of business games, the changes in why business games are adopted and used, the changes in how business games are administered, and the current state of business gaming. Connolly *et al.* (2012) examine the literature on computer games and serious games in regard to the potential positive impacts of gaming on users, especially with respect to learning, skill enhancement, and engagement, and conclude that playing computer games is linked to a range of perceptual, cognitive, behavioral, affective, and motivational impacts and outcomes, being knowledge acquisition and content understanding among them.

Schwarz (2009) describes how simulations prepare management students for making strategic decisions in complex and dynamic environments characterized by high uncertainty concerning the future. Pasin and Giroux (2011) say that students playing computer games are very skilled at learning and applying complex sets of rules, and show that although simple decision-making skills can be acquired with traditional teaching methods, simulation games are more effective when students have to develop decision-making abilities for managing complex and dynamic situations.

Klopper, Osterweil, and Salen (2009) list some of the benefits of using simulations in the classroom: 1) actions and strategies tested without the apprehension of failure or reprisal; 2) increased understanding of a system in a short time, compared to the real world experience; 3) very good tool to reinforce the theory learned; 4) learners have a great sense of competition and the desire to perform better; and 5) simulations enhance students' motivation. Listing the benefits of simulations, Ezz, Loureiro-Koechlin, and Stergioulas (2012) remind that there is a need for non-conventional tools in education. They are more effective than lecturing with regards to theoretical concepts, which are difficult to assimilate and retain after some time. Visual examples are easier to understand and assimilate, and simulations allow students to practice *in vivo* the theoretical concepts taught in lectures. Simulations also capture the attention of users, make them stay active, and accelerate learning based on trial-and-error because students are able to observe the consequences of their decisions. Simulations promote decision making and allow evaluation of human reaction to given situations. They allow failing without cost and can be stopped at any moment to analyze the effects of any previous decision. They also allow users to face situations rarely encountered in reality and for which they should be prepared. Finally, the authors state that simulations are an appropriate methodology, because today's students are "digital" and therefore completely familiar with these tools. In this regard, the learning style of the new "virtual generation" is very different from that of previous generations, since it is much more visual, interactive, and focuses on problem solving (Proserpio and Gioia, 2007).

Many papers report the results of using simulations and serious games in entrepreneurship courses. Garris, Ahlers, and Driskell (2002) present an input-process-output model of instructional games and learning, and list the key features of games, propose a game cycle, and detail the types of learning outcomes that can be achieved. Williams (2011; p. 12) evaluates the impact of using a business simulation game, SimVenture. "*It allows students to play a role, not just read books, listen to lectures and analyze case-studies. A simulation forces students to synthesize and integrate what they read and make actual decisions based on facts or data presented in the case.*"

The author says that today's students are experiential learners and prefer to learn by doing rather than to learn by listening, and games have many attributes of effective learning. Thavikulwat (1995) evaluates the impact of using DEAL, a computerized business gaming simulation which incorporates the four core activities of entrepreneurship (venture selecting, planning, executing, and assessing) and achieves cost-effective learning by doing. The author remarks that gaming simulations should have greater value in assessing entrepreneurship education than in facilitating it.

Bellotiet *al.* (2012) present the main requirements for a course on entrepreneurship using serious games, and define a set of metrics to evaluate the advancement of students. Wilson *et al.* (2009) determine what specific game attributes have an impact on learning outcomes. Hindle (2002) identifies some attribute categories and associated properties required of a simulation game to make it an effective teaching device in entrepreneurship contexts.

Randel *et al.* (1992), Terrell and Rendulic (1996), Prensky (2003), and Tao, Cheng, and Sun (2009) remark that simulation games cause an increase in user's motivation to learn. Waweret *al.* (2010) report the results of a feedback survey in which students indicate high interest in business simulation games as a form of education. However, almost half of the respondents perceives the game only as a form of entertainment, not a form of education, and three fourths of the respondents claim that simulation games simplify the reality too much.

Salas, Wildman, and Piccolo (2009) argue that the value of a simulation depends on the acceptance of the tool by the students, on quantified results (to what extent they have learnt in line with the expectations of the teacher), and on the students' behavior *a posteriori* (to what extent their knowledge increases). In sum, it depends on whether the user is ready to experience the simulated situation.

There is little understanding of the impact of the games on the learner's skills, behaviors, and attitudes (Williams, 2011). The impact of entrepreneurial simulations is still poorly understood and represents a significant future research activity (Honig, 2004).

2. Activity Description

The activity was conducted in the IQS School of Management (Univ. Ramon Llull) during the 2014-2015 academic year. There were two groups, with 51 and 52 students enrolled, from the "Strategic Management" fourth-year course of the Degree in Business Administration and Management. It was also conducted in the "Entrepreneurship" course of the Master in Global Entrepreneurial Management, with a single group of 37 students enrolled.

The activity consisted of two parts. In the first part, students were required to calculate the value of a new venture and the funds needed during the first five years of operation, using a Microsoft Excel® spreadsheet. In the second part, students were assigned the role of either an entrepreneur or an investor and had to negotiate in couples an amount to invest in the new venture in exchange for an ownership percentage.

The activity intended to instruct the students about: 1) the funds needed by a new venture during the first years of operation, and the year in which the funds needed achieve their maximum level (peak year); 2) the value of the new venture, given some parameters (cost of equity, cost of debt, ratio equity/debt, tax rate, and growth rate); 3) the sensibility of the value of the new venture to variations in the cost of equity and the growth rate; 4) the ownership percentage to be offered to an investor or to be requested to an entrepreneur, given the value of the new venture and the amount to invest; 5) the sensibility of the ownership percentage to variations in the cost of equity and the growth rate and, hence, in the value of the new venture; 6) the practicalities of negotiating an amount to invest and an ownership percentage for both entrepreneurs and investors.

The knowledge components to be taught were: 1) "the funds needed by a new venture, year by year, during the first years of operation, and the year in which the funds needed achieve their maximum level (peak year) are indicated by the annual and cumulated free cash flow"; 2) "the value of a new venture decreases with cost of equity"; 3) "the value of a new venture increases with growth rate"; 4) "given an amount to invest, the ownership percentage to be offered or to be requested decreases with the value of the new venture"; 5) "entrepreneurs wish to maximize the amount to invest and minimize the ownership percentage to offer in exchange while investors wish to minimize the amount to invest and maximize the ownership percentage to be requested"; and 6) "efficient negotiation strategies for entrepreneurs are those conducive to maximizing the value of a new venture while for investors are those conducive to minimizing the value of a new venture."

The teachers in charge of the activity assumed that students already knew that: 1) the value of a firm is the result of discounting the free cash flows generated using the weighted average cost of capital (WACC) as the discount rate; 2) the WACC is a function of the cost of equity, the cost of debt, the ratio equity/debt, and the tax rate; 3) free cash flows are the sum of EBIAT (earnings before interests after taxes), depreciation and amortization, variations in the working capital, and capital expenditure; and 4) the terminal value accounts for the free cash flows beyond the last year and is a function of the growth rate and the WACC.

The Excel-based simulation allowed the students to calculate the value of a new venture from the financial data contained in an income statement projection (see Exhibit 1 in the appendix of this paper), a cash flow projection (see Exhibit 2), and a balance sheet projection (see Exhibit 3). Students were given additional data to complete the income statement projection and the cash flow projection by filling in the cells of some fields: "Variable costs," "Depreciation and amortization," and "Taxes" in the income statement projection, and "Change in Working capital," "Capital expenditure," and "Equity" in the cash flow projection (see cells in green in Exhibits 1 and 2). "Free cash flow" indicated the funds needed by the new venture, year by year. "Cumulated Free cash flow" indicated the year in which the funds needed achieve their maximum level (peak year). When "Ending cash balance" was negative, students had to enter amounts in "Equity." The value of the new venture is shown in Exhibit 4 for the default parameters of cost of equity (10%) and growth rate (0%). Then, the students were required to calculate the value of the new venture for a range of the cost of equity from 10% to 15% and for a range of the growth rate from 0% to 5%. The results of the calculations are shown in Exhibit 5. In filling in the cells of Exhibit 5, the students had to realize that the value of a new venture decreases with cost of equity and increases with growth rate. Finally, the students were required to calculate the ownership percentage to be offered to an investor or to be requested to an entrepreneur, given each value of the new venture and the amount to invest, 30,000 € (it was assumed that from the 35,500 € needed in the peak year, 30,000 € would be raised from an investor and 5,500 € would be contributed by the entrepreneur). The results of the calculations are shown in Exhibit 6. In filling in the cells of Exhibit 6, the students had to realize that the ownership percentage decreases with the value of the new venture, given a fixed amount to invest. Ownership percentages were calculated using the following formula:

Ownership percentage = Amount to invest / (Firm valuation + Amount to invest)

In the second part of the activity, students were assigned the role of either an entrepreneur or an investor and had to negotiate in couples an amount to invest in the new venture in exchange for an ownership percentage. Roles were assigned randomly. Students had 120 minutes, the duration of a session, to conduct five negotiations at least and achieve an agreement in three of them at least. The number of negotiations was set taking the duration of a session into consideration. After each agreement, the couple had to access an online form to report the terms of the agreement: 1) names of the entrepreneur and the investor; 2) amount to invest; and 3) ownership percentage. An Excel file was generated with the terms of the agreement and the date and time of the report. Adding a column with the value of the new venture calculated from the amount to invest and the ownership percentage allowed us to rank the agreements and identify the entrepreneurs within the fifty percent with the most firm valuation and the investors within the fifty percent with the least firm valuation. Firm valuations were calculated using the following formula:

Firm valuation = Amount to invest \times (1 – Ownership percentage) / Ownership percentage

Students had to report disagreements as well, using another online form to report: 1) names of the entrepreneur and the investor; 2) entrepreneur's last offer for amount to invest and ownership percentage; and 3) investor's last offer for amount to invest and ownership percentage.

The entire activity consisted of eight steps: 1) lecture; 2) pre-test; 3) simulation; 4) negotiation 1 (round 1); 5) negotiation 2 (round 2); 6) post-test; 7) debriefing session; 8) feedback survey. Steps 1, 2, and 3 took place in session 1. Step 4 took place in session 2. Steps 5, 6, 7, and 8 took place in session 3. The theoretical concepts to be used in the simulation were presented by the instructor during the lecture. Pre-test and post-test consisted of the same four questions. Answers were graded 1 (correct) or 0 (wrong). In the second simulation, students swapped their roles. Those who assumed the role of an entrepreneur in simulation 1, in simulation 2 assumed the role of an investor, and vice versa. During the debriefing session the instructor presented the results of the negotiations. The feedback survey consisted of 19 questions to be answered according to a scale ranging from total disagreement to total agreement and three open questions.

Some questions refer to the students' perception of the usefulness of the simulation ("The activity accelerates learning"). Other questions measure the degree of satisfaction ("If I was offered to do it again, even if it were not compulsory, I would do it again").

Students were rewarded: 1) if they completed the Excel autonomously and scored equal or higher in the post-test than in the pre-test; and 2) if they were entrepreneurs and were ranked within the fifty percent of students with the most firm valuation and if they were investors and were ranked within the fifty percent of students with the least firm valuation, for both negotiation sessions.

3. Methodology

In order to comply with methodological triangulation, three sources of evidence were used in this research to assess the students' learning: 1) achievement tests (pre-test and post-test); 2) the collection and analysis of the negotiation agreements; and 3) a feedback survey.

The purpose of achievement tests is to measure the influence of student participation on learning outcomes. By measuring knowledge before and after the activity, the effectiveness of the activity can be assessed.

Collection and analysis of the negotiation agreements allowed us to track the number of negotiations per student, the results of the negotiation (agreements and disagreements, amounts to invest, ownership percentages), and the firm valuation resulting from each of the students' agreements.

The feedback survey consisted of 19 Likert-scale questions to be answered according to a 6-level scale ranging from total disagreement (1) to total agreement (6), and three open questions. As far as the 19 Likert-scale questions are concerned, satisfaction for each student was computed as the sum of the responses ordered according to the degree of satisfaction (19 to 114).

4. Results

Results were derived from data collected for "Strategic Management Group 1" (SMG1), "Strategic Management Group 2" (SMG2), and "Entrepreneurship" (E).

The pre-test and the post-test consisted of the same four questions. The first three questions (Q1, Q2, and Q3) referred to knowledge components 2), 3), and 4) from the above list, and the students had to circle the correct option: "increases" or "decreases." Answers were graded 1 (correct) or 0 (wrong). The fourth question (Q4) referred to knowledge component 1) from the above list, and required a short text answer. (Q4 was: "You are about to present your business plan to potential investors. How would you calculate the amount of the funds to be raised?" Then, "by forecasting the future free cash flows" would be an example of correct answer). Answers to Q4 were also graded 1 (correct) or 0 (wrong). The mark for both tests was computed as a sum (0 to 4). Only paired data (46 for SMG1, 38 for SMG2, and 28 for E) were considered. Figure 1 shows the average mark for each question (Q1 to Q4) for all participants.

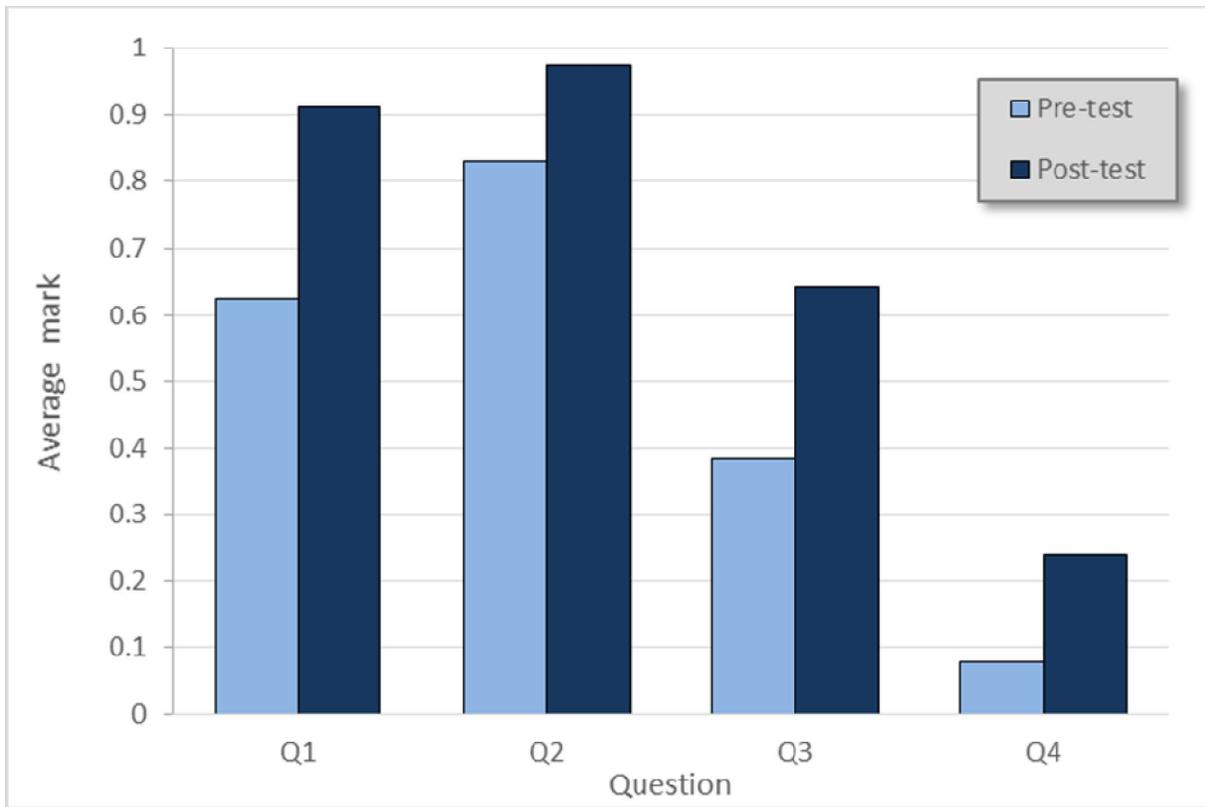


Figure 1: Average Mark for Each Question (Q1 to Q4) for all Participants

Figure 2 shows the distribution of mark differences (post-test minus pre-test) for all participants.

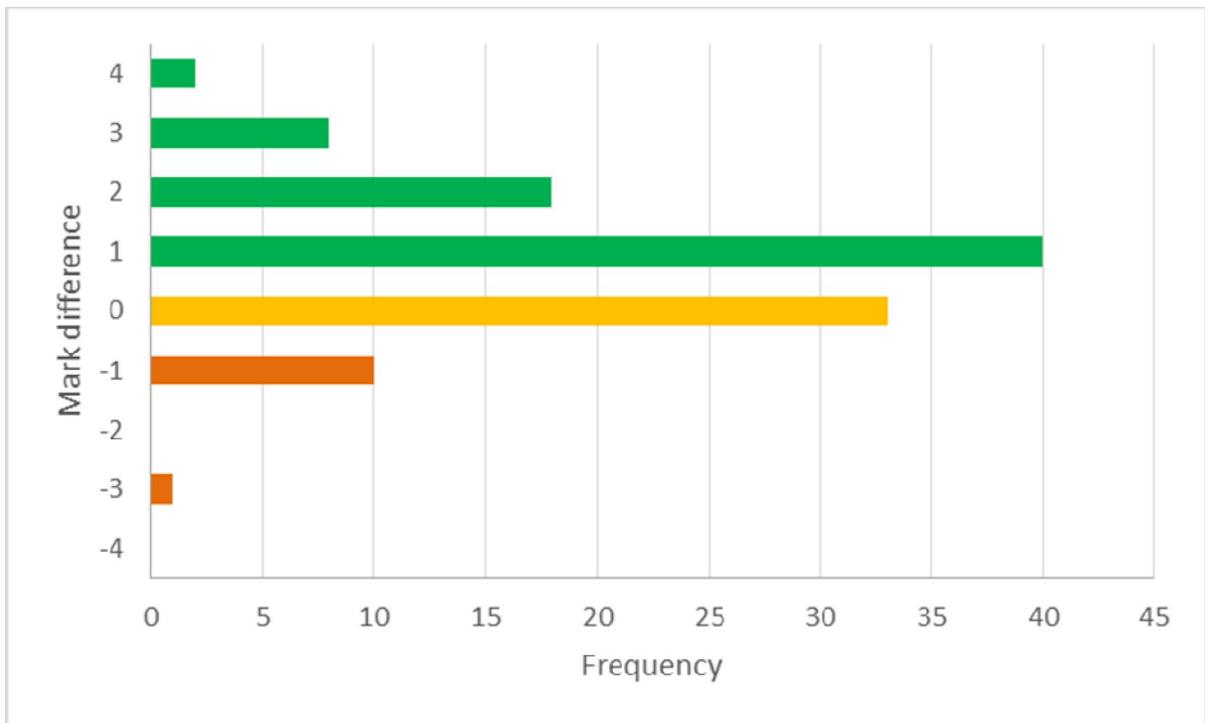


Figure 2: Distribution of Mark Differences (Post-Test minus Pre-Test) for all Participants (Green, Positive Differences; Orange, no Difference; Red, Negative Differences)

Students had to report both agreements and disagreements using an online form. The reports were accepted after a filtering process (110 accepted reports from SMG1 round 1, 128 from SMG2 round 1, 122 from SMG1 round 2, 108 from SMG2 round 2, and 60 from E). On average, 9.6% of reports were rejected due to errors.

For each group and negotiation round a figure was prepared to show the number of negotiations per student, indicating the role of the student (entrepreneur or investor) and the result of each negotiation (agreement or disagreement). Figure 3 shows the number of negotiations per student for group E (single round).

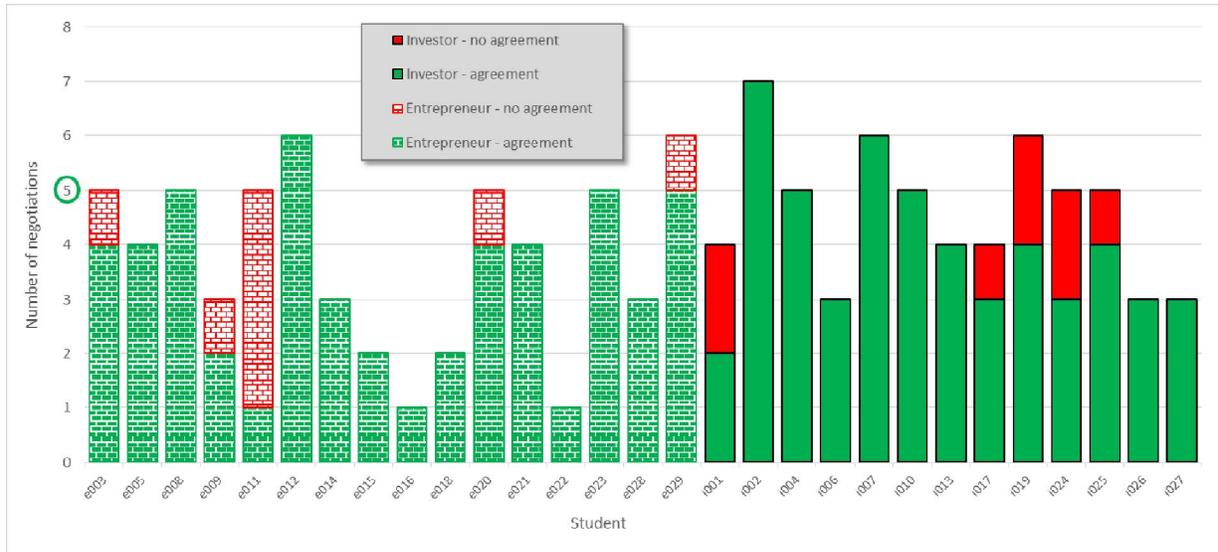


Figure 3: Number of Negotiations per Student for Group E (Single Round)

For each group and negotiation round a figure was prepared to show the firm valuations resulting from the amount to invest and the ownership percentage agreed in each deal. Firm valuations were calculated using the following formula:

$$\text{Firm valuation} = \text{Amount to invest} \times (1 - \text{Ownership percentage}) / \text{Ownership percentage}$$

Figures 4 and 5 show the firm valuations for group SMG2 in round 1 and round 2. Students are represented in the X-axis. Firm valuations resulting from the amounts to invest and the ownership percentages are represented in the Y-axis. Red lines indicate a range of “wise” firm valuations between 18,000 € and 140,000 €. The endpoints of the range are close to the minimum and maximum values of the new venture in the simulation (18,884 € for a growth rate of 0% and a cost of equity of 15% and 131,259 € for a growth rate of 5% and a cost of equity of 10%). Dashes indicate the average of firm valuations for each student calculated from the deals of each student.

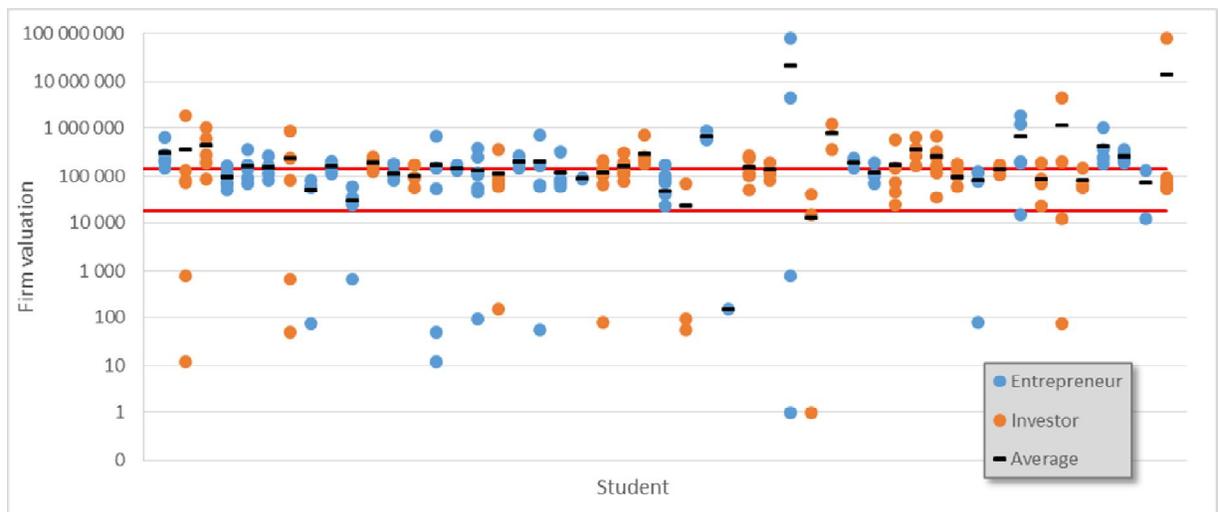


Figure 4: Firm Valuations for Group SMG2 in Round 1

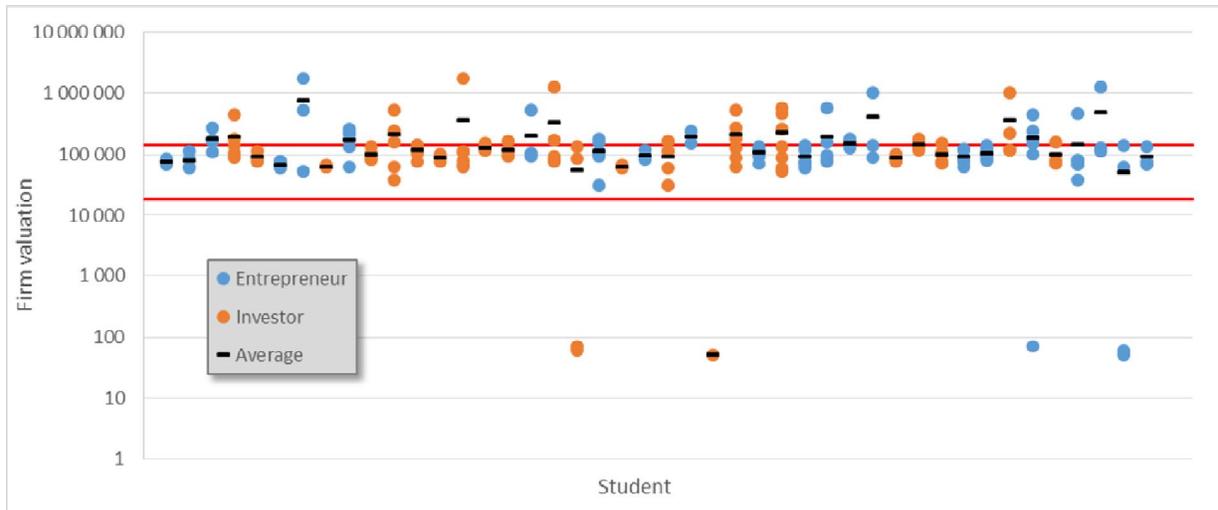


Figure 5: Firm Valuations for Group SMG2 in Round 2

For groups SMG1 and SMG2 a figure was prepared to graphically represent the agreements achieved in both rounds. Figure 6 shows group SMG2 deals in both rounds. Amounts to invest are represented in the X-axis and ownership percentages in the Y-axis. Green lines indicate the range of “wise” firm valuations between 18,000 € and 140,000 €. Round 1 deals are shown in blue and round 2 deals are shown in ochre. Deals leading to firm valuations falling out of the range of “wise” firm valuations are shown in circles (out-of-range) and firm valuations falling in the range are shown in dots (in-range).

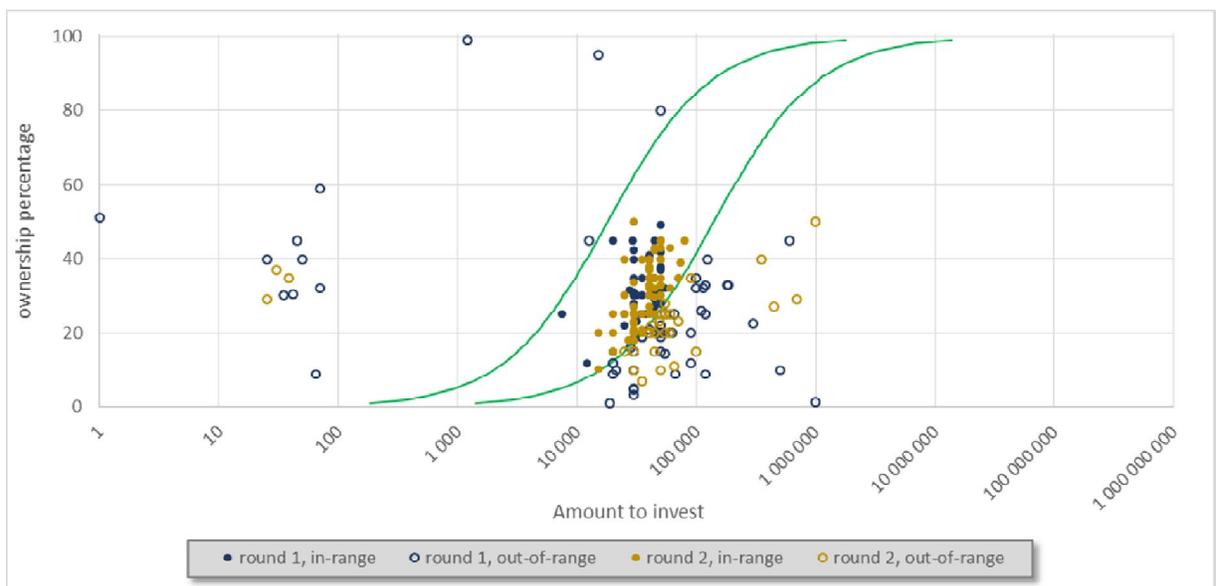


Figure 6: Group SMG2 Deals in Both Rounds

Figure 7 graphically represents the relative frequency of the four types of group SMG2 deals (round 1 and round 2, in-range and out-of-range). The difference between round 1 and round 2 is statistically significant (Fisher exact test, $p < 0.01$).

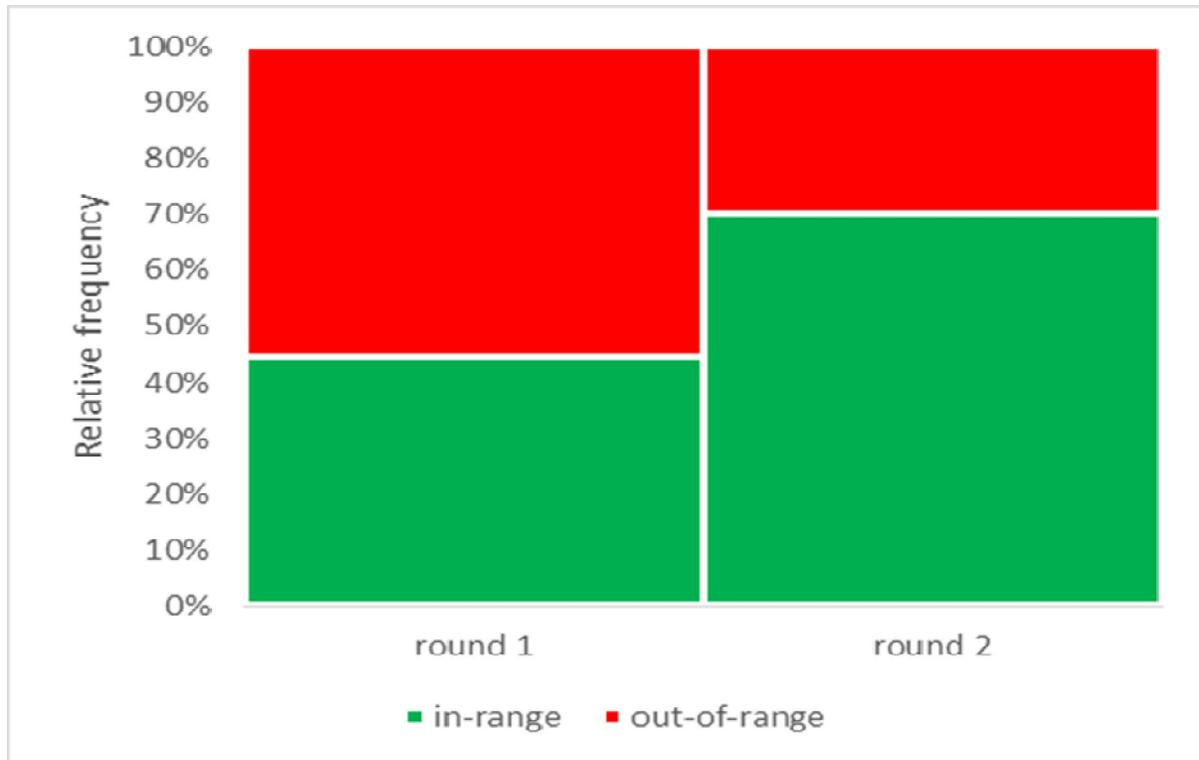


Figure 7: Relative Frequency of Group SMG2 deals in Both Rounds

As far as the feedback survey is concerned, 75 responses were collected in class after the debriefing session. Figure 8 shows an analysis of the responses to the 19 Likert-scale questions. Items are in Spanish as in the original survey. Satisfaction percentage for each item is also indicated. All items favor satisfaction with the activity.

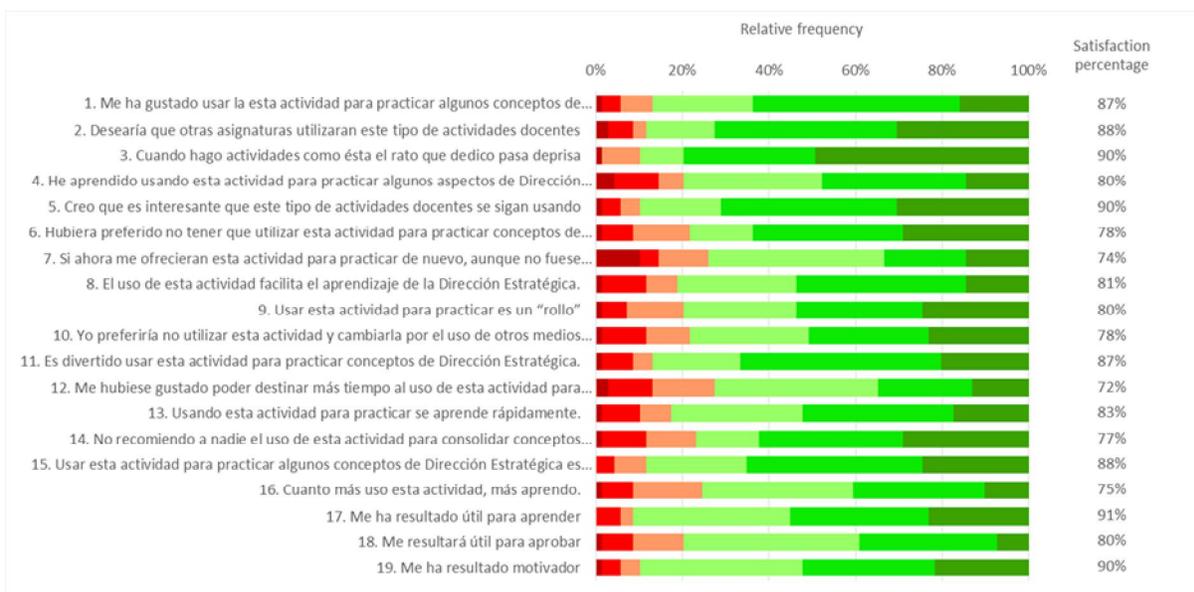


Figure 8: Analysis of the Responses to the 19 Likert-Scale Questions

A word cloud was prepared with the responses to the open questions. The words suggest an interest of students: 1) to do the activity (or similar activities) more frequently; 2) to be given more time to complete the activity; and 3) to do the activity in a more serious atmosphere (some students complained that some classmates did not take the activity seriously).

5. Discussion

The results of the pre-test and the post-test allow us to conclude that students learnt, since the average mark of the post-test is higher than the average mark of the pre-test, for all four questions (see Figure 1). However, very few students answered correctly the fourth question (“You are about to present your business plan to potential investors. How would you calculate the amount of the funds to be raised?”). Students failed at realizing that forecasting the future free cash flows is the way to calculate the funds needed and the funds to be raised from investors, a result consistent with the finding that many agreements involved amounts to invest very scattered and not concentrated around the 30,000 € of the simulation.

The distribution of mark differences (post-test minus pre-test) in Figure 2 also allows us to conclude that students learnt, since the difference is positive (higher mark in the post-test than in the pre-test) for 69 students. The difference is 0 (same mark) for 33 students, indicating no additional learning. The difference is negative (lower mark in the post-test than in the pre-test) for 11 students, indicating that the students answered randomly.

Figure 3 for group E, and the same figures for groups SMG1 and SMG2, are especially useful to detect incompliances with the negotiation rules: 1) some students did not reach the goal of conducting five negotiations at least; 2) some students did not reach the goal of achieving an agreement in three of the negotiations at least. On the other hand, some students conducted more than five negotiations and some other did not report any disagreement. It seems that students prioritized reporting agreements, regardless of their quality. They preferred to report an agreement, albeit inconsistent in amount to invest and ownership percentage, than to report a disagreement. They preferred accepting a deal than taking their best no-deal option which is to move on to find and negotiate with a new investor or entrepreneur (Sebenius, 2001). This makes sense taking into consideration that students were not penalized for inconsistent agreements and, in contrast, were penalized for not achieving three agreements at least.

Figures 4 and 5 for group SMG2 in round 1 and round 2, and the same figures for groups SMG1 and E, show the firm valuations resulting from the amount to invest and the ownership percentage agreed in each deal. Firm valuations within a “wise” range were expected at the outset. A negotiation process conducive to an efficient, wise agreement (Fisher, Ury, and Patton, 2001), without “winners” and “losers,” would have led to firm valuations falling within a narrow range, and firm valuations for each student concentrated around their average. Entrepreneur firm valuations in the upper area of the figures would have meant high firm valuations as a result of the agreement between a “tough” entrepreneur and a “weak” investor. Investor firm valuations in the inferior area of the figures would have meant low firm valuations as a result of the agreement between a “weak” entrepreneur and a “tough” investor. Figures 4 and 5 show that: 1) a lot of firm valuations fall out of the range from 18,000 € to 140,000 € 2) for some students firm valuations are not concentrated around their average; and 3) in both the upper and the inferior areas of the figures there are firm valuations for both entrepreneurs and investors, results all that indicate that there is a significant number of agreements that were reached with a firm valuation inconsistent with the first part of the activity (simulation). It seems that: 1) some students did not understand the purpose and goals of the activity; and 2) some students did not take the activity seriously. In view of the firm valuations resulting from the first round of the groups SMG1 and SMG2, the instructor remarked that firm valuations in the simulation ranged from 18,884 € (0% growth rate, 15% cost of equity) to 131,259 € (5% growth rate, 10% cost of equity), and that for an amount to invest of 30,000 € the ownership percentages to offer to the investor or to require from the entrepreneur ranged from 61.4% to 18.6% respectively. Therefore, students could have internalized that the new venture required to raise 30,000 € from external investors in exchange for an ownership percentage in the range from, say, 20% to 60%. After having debriefed the first round, the improvement in the negotiation process is notable for SMG2 in round 2 (see Figures 5, 6 and 7). The analysis of the outcome of the negotiation process suggests that: 1) agreements whose firm valuations fall out of the range should be discarded because they are the result of inefficient, unwise negotiation processes (Fisher, Ury, and Patton, 2011), the result of a lack of understanding of the purpose and goals of the activity, or the result of a poor interest in the activity; and 2) winners should be the students who achieved agreements whose average firm valuation falls within the range, in the upper half (entrepreneurs) or in the inferior half (investors).

Figure 6 shows that many agreements involved amounts to invest very scattered and not concentrated around the 30,000 € of the simulation.

Agreements were achieved within a range from 0 € to 1,000,000 € thus demonstrating that students did not perceive the connection between the two parts of the activity (simulation and negotiation), despite the fact that the instructor remarked, before starting the two rounds of the negotiation, that the new venture of the simulation required 35,500 € in the peak year and that an external investor could contribute with 30,000 €. Therefore, many students did not take this information into account in their negotiations, probably because they did not internalize the notions of funds needed and funds to be raised from investors. Finally, the figures show some inconsistent agreements (for example, investing 1,000,000 € in exchange for a 0% ownership or investing 1,000 € in exchange for a 100% ownership in SMG2 in round 1).

Figure 6 shows an improvement in the negotiation process of group SMG2 between the first and the second rounds. There are more ochre dots (round 2, in-range) than blue dots (round 1, in-range) in the area delimited by the two green lines (range of “wise” firm valuations). There are more blue circles (round 1, out-of-range) than ochre circles (round 2, out-of-range) out of the area delimited by the two green lines. Figure 7 also confirms the result. In-range agreements in round 2 have a higher relative frequency than in-range agreements in round 1.

This paper presents only initial results. Some changes should be implemented in future uses of the activity: 1) create a name and a product for the firm to help students in the practicalities of the negotiation; 2) before each of the two negotiation sessions remark that there is a formula to calculate the firm valuation from the amount to invest and the ownership percentage; 3) encourage the students to use the formula when negotiating; 4) before each of the two negotiation sessions remember that, among the entrepreneurs, the winners will be the negotiators ranked within the fifty percent of students with the most firm valuation (average) and, among the investors, the winners will be the negotiators ranked within the fifty percent of students with the least firm valuation (average), but within a range of “wise” firm valuations; 5) redesign the negotiation process to allow students to conduct as many negotiations as possible during the session and to comfortably use their laptops and, specifically, the formula to calculate the firm valuation; 6) encourage entrepreneurs to take the initiative in the negotiation process by suggesting an amount to invest to the investors; 7) show in the blackboard in real time the outcomes of the negotiations; 8) do not require the students to report the disagreements; 9) exclude those students who do not take the activity seriously; and 10) penalize for inconsistent agreements.

Achievement tests and a feedback survey, as well as some techniques used in this research to collect and analyze the deals (Figures 4, 5, and 6 are the result of using these techniques) allow us to measure the effectiveness of entrepreneurship education (Alberti, Sciascia, and Poli, 2004) and the advancement of students (Bellotiet *al.*, 2012). The analysis of the responses to the feedback survey indicate that the activity increased student’s motivation and engagement (Dominguez *et al.*, 2013; Lee and Hammer, 2011; Stott and Neustaedter, 2013), and was valuable and effective because it was well accepted by the students and they learnt what the professor expected them to learn, thus supporting the argument made by Salas, Wildman, and Piccolo (2009).

6. Conclusions

The conclusions of the research are: 1) students learnt, since the average mark of the post-test is higher than the average mark of the pre-test, for all four questions, and the distribution of mark differences (post-test minus pre-test) is positive for two thirds of the students; 2) very few students answered correctly the fourth question (“You are about to present your business plan to potential investors. How would you calculate the amount of the funds to be raised?”). Students failed at realizing that forecasting the future free cash flows is the way to calculate the funds needed and the funds to be raised from investors; 3) some students answered the tests randomly; 4) some students did not comply with the negotiation rules (either did not reach the goal of conducting five negotiations at least or did not reach the goal of achieving an agreement in three of the negotiations at least); 5) students prioritized reporting agreements, regardless of their quality; 6) many agreements involved amounts to invest very scattered and not concentrated around the 30,000 € of the simulation, and some agreements are inconsistent in themselves (for example, investing 1,000,000 € in exchange for a 0% ownership); 7) there is a significant number of agreements that were reached with a firm valuation inconsistent with the first part of the activity (simulation) (firm valuations out of the range, firm valuations not concentrated around their average, and firm valuations for both entrepreneurs and investors in both the upper and the inferior areas of Figures 4 and 5); 8) after having debriefed the first round, there is an improvement in the negotiation process of the second round; 9) the activity was well-accepted by the students; 10) the activity should be done in a more serious atmosphere; 11) some changes should be implemented in future uses of the activity.

Besides the above list of conclusions, the combination of a simulation and a role-playing to teach one facet of entrepreneurial finance has proven promising. Participants learnt what the professor wanted them to learn, and showed motivation, active participation, and satisfaction with the activity. The results detect increased negotiating skills between the first and the second rounds. Ten changes have been proposed for future editions of the activity in order to solve the problems observed in the negotiation stage, especially the students' difficulties to connect the two parts of the activity (simulation and negotiation).

Finally, we have qualitatively compared this experience with that of previous years, and despite the difficulties encountered we believe that the activities facilitate understanding and learning of the topics taught in greater degree than the traditional masterly classes.

Acknowledgments

Our thanks to Obra Social "La Caixa" for the funding provided to support this research.

References

- Alberti, Fernando, Salvatore Sciascia, and Alberto Poli. 2004. "Entrepreneurship education: notes on an ongoing debate." 14th Annual IntEnt Conference, Napoli, July. Vol. 2.
- Bellotti, Francesco, et al. 2012. "Designing a course for stimulating entrepreneurship in higher education through serious games." *Procedia Computer Science* 15: 174-186.
- Byers, Thomas H., Richard C. Dorf, and Andrew J. Nelson. 2011. *Technology ventures. From idea to enterprise*. New York, NY: McGraw-Hill.
- Borys, Magdalena, and MaciejLaskowski. 2013. "Implementing game elements into didactic process: a case study." *Active Citizenship by Knowledge Management & Innovation: Proceedings of the Management, Knowledge and Learning International Conference 2013*. ToKnowPress.
- Christensen, Esben, Robert Wuebker, and Rolf Wustenhagen. 2009. "Of acting principals and principal agents: goal incongruence in the venture capitalist-entrepreneur relationship." *International Journal of Entrepreneurship and Small Business*, 7(3): 367-388.
- Connolly, Thomas M., et al. 2012. "A systematic literature review of empirical evidence on computer games and serious games." *Computers & Education*,59(2): 661-686.
- Denis, David J. 2004. "Entrepreneurial finance: an overview of the issues and evidence." *Journal of Corporate Finance*, 10(2): 301-326.
- Domínguez, Adrián, et al. 2013. "Gamifying learning experiences: practical implications and outcomes." *Computers & Education*, 63: 380-392.
- Ellington, Henry. 1994. "Twenty years of simulation/gaming: reminiscences and thoughts of a Scottish practitioner." *Simulation & Gaming*, 25(2): 197-206.
- Essig, Linda. 2009. "Suffusing entrepreneurship education throughout the theatre curriculum." *Theatre Topics*, 19(2): 117-124.
- Ezz, I., Loureiro-Koechlin, C., and Stergioulas, L. 2012. "An investigation of the use of simulation tools in management education." In *Simulation Conference (WSC), Proceedings of the 2012 Winter*(pp. 1-14). IEEE.
- Faria, Anthony J., et al. 2009. "Developments in business gaming. A review of the past 40 years." *Simulation & Gaming*, 40(4): 464-487.
- Feinstein, Andrew Hale, Stuart Mann, and David L. Corsun. 2002. "Charting the experiential territory: clarifying definitions and uses of computer simulation, games, and role play." *Journal of Management Development*, 21(10): 732-744.
- Fisher, Roger, William L. Ury, and Bruce Patton. 2011. *Getting to yes: negotiating agreement without giving in*. New York, NY: Penguin.
- Garris, Rosemary, Robert Ahlers, and James E. Driskell. 2002. "Games, motivation, and learning: a research and practice model." *Simulation & Gaming*, 33(4): 441-467.
- Hindle, Kevin. 2002. "A grounded theory for teaching entrepreneurship using simulation games." *Simulation & Gaming*, 33(2): 236-241.
- Honig, Benson. 2004. "Entrepreneurship education: toward a model of contingency-based business planning." *Academy of Management Learning & Education*, 3(3): 258-273.
- Klopfer, Eric, Scot Osterweil, and Katie Salen. 2009. "Moving learning games forward."

- Kuratko, Donald F. 2005. "The emergence of entrepreneurship education: development, trends, and challenges." *Entrepreneurship Theory and Practice*, 29(5): 577-598.
- Lee, Joey J., and Jessica Hammer. 2011. "Gamification in education: what, how, why bother?" *Academic Exchange Quarterly*, 15(2).
- Lourenço, Fernando, and Oswald Jones. 2006. "Developing entrepreneurship education: comparing traditional and alternative teaching approaches." *International Journal of Entrepreneurship Education*, 4(1): 111-140.
- Mahboubian, Maziar. 2010. "Educational aspects of business simulation softwares." *Procedia-Social and Behavioral Sciences*, 2(2): 5403-5407.
- MIT. 2002. *Entrepreneurial Finance*. Available at: <http://hdl.handle.net/1721.1/68674>. Last access: January 11, 2015.
- Neck, Heidi M., and Patricia G. Greene. 2011. "Entrepreneurship education: known worlds and new frontiers." *Journal of Small Business Management*, 49(1): 55-70.
- Pasin, Federico, and Hélène Giroux. 2011. "The impact of a simulation game on operations management education." *Computers & Education*, 57(1): 1240-1254.
- Prensky, Marc. 2003. "Digital game-based learning." *Computers in Entertainment (CIE)*, 1(1): 21-21.
- Proserpio, Luigi, and Dennis A. Gioia. 2007. "Teaching the Virtual Generation." *Academy of Management Learning & Education*, 6(1): 69-80.
- Randel, Josephine M., et al. 1992. "The effectiveness of games for educational purposes: a review of recent research." *Simulation & Gaming*, 23(3): 261-276.
- Rondon, Silmara, Fernanda ChiarionSassi, and Claudia Regina Furquim de Andrade. 2013. "Computer game-based and traditional learning method: a comparison regarding students' knowledge retention." *BMC medical education*, 13(1): 30.
- Salas, Eduardo, Jessica L. Wildman, and Ronald F. Piccolo. 2009. "Using simulation-based training to enhance management education." *Academy of Management Learning & Education*, 8(4): 559-573.
- Sebenius, James K. 2001. "Six habits of merely effective negotiators." *Harvard Business Review*, 79(4): 87-97.
- Schwarz, Jan Oliver. 2009. "Business wargaming: developing foresight within a strategic simulation." *Technology Analysis & Strategic Management*, 21(3): 291-305.
- Shepherd, Dean A. 2004. "Educating entrepreneurship students about emotion and learning from failure." *Academy of Management Learning & Education*, 3(3): 274-287.
- Stott, Andrew, and Carman Neustaedter. 2013. "Analysis of gamification in education." Technical Report 2013-0422-01, Connections Lab, Simon Fraser University, Surrey, BC, Canada, April.
- Tao, Yu-Hui, Chieh-Jen Cheng, and Szu-Yuan Sun. 2009. "What influences college students to continue using business simulation games? The Taiwan experience." *Computers & Education*, 53(3): 929-939.
- Terrell, Steve, and Paul Rendulic. 1996. "Using computer-managed instructional software to increase motivation and achievement in elementary school children." *Journal of Research on Computing in Education*, 28(3): 403-414.
- Thavikulwat, Precha. 1995. "Computer-assisted gaming for entrepreneurship education." *Simulation & Gaming*, 26(3): 328-345.
- Wawer, Monika, et al. 2010. "Business simulation games in forming of students' entrepreneurship." *International Journal of Economics and Management Sciences*, 3(1): 49-71.
- Williams, Dina. 2011. "Impact of business simulation games in enterprise education:" 11-20.
- Wilson, Katherine A., et al. 2009. "Relationships between game attributes and learning outcomes review and research proposals." *Simulation & Gaming*, 40(2): 217-266.

Income statement					
(Amounts in €)					
	Y1	Y2	Y3	Y4	Y5
Net sales	3.000	10.000	20.000	40.000	50.000
Variable costs	-1.500	-5.000	-10.000	-20.000	-25.000
Contribution margin	1.500	5.000	10.000	20.000	25.000
Selling and administrative expenses	-4.000	-7.000	-8.000	-9.000	-10.000
EBITDA	-2.500	-2.000	2.000	11.000	15.000
Depreciation and amortization	-3.000	-3.000	-3.000	-3.000	-3.000
Operating income	-5.500	-5.000	-1.000	8.000	12.000
Net interest expense	0	0	0	0	0
Profit before taxes	-5.500	-5.000	-1.000	8.000	12.000
Taxes	0	0	0	0	-2.550
Net income	-5.500	-5.000	-1.000	8.000	9.450

Exhibit 1: Income Statement Projection. Cells Filled in by the Students in Green

Cash flow projection					
(Amounts in €)					
	Y1	Y2	Y3	Y4	Y5
Beginning cash balance	0	0	0	1.000	10.000
Operating income	-5.500	-5.000	-1.000	8.000	12.000
Taxes	0	0	0	0	-2.550
EBIAT	-5.500	-5.000	-1.000	8.000	9.450
+ Depreciation and amortization	3.000	3.000	3.000	3.000	3.000
- Change in Working capital	-300	-700	-1.000	-2.000	-1.000
- Capital expenditure	-30.000				
Free cash flow	-32.800	-2.700	1.000	9.000	11.450
Cumulated Free cash flow	-32.800	-35.500	-34.500	-25.500	-14.050
Equity	32.800	2.700	0	0	0
Ending cash balance	0	0	1.000	10.000	21.450

Exhibit 2: Cash Flow Projection. Cells Filled in by the Students in Green

Balance sheet projection					
(Amounts in €)					
	Y1	Y2	Y3	Y4	Y5
Cash	0	0	1.000	10.000	21.450
Working capital	300	1.000	2.000	4.000	5.000
Fixed assets	27.000	24.000	21.000	18.000	15.000
Total assets	27.300	25.000	24.000	32.000	41.450
Debt	0	0	0	0	0
Equity	27.300	25.000	24.000	32.000	41.450
Total liabilities	27.300	25.000	24.000	32.000	41.450

Exhibit 3: Balance Sheet Projection

Firm valuation						
(Amounts in €)						
	Y1	Y2	Y3	Y4	Y5	
Free cash flow	-32.800	-2.700	1.000	9.000	11.450	
Terminal value					114.500	
Total	-32.800	-2.700	1.000	9.000	125.950	
Cost of debt	8%					
Cost of equity	10%					
Tax rate	30%					
% Debt	0%					
% Equity	100%					
WACC	10,00%					
Growth rate	0%					
Discounted cash flow	53.054					

Exhibit 4: Firm Valuation (Default Parameters for Cost of Equity and Growth Rate)

Discounted cash flow:	Growth = 0%	Growth = 1%	Growth = 2%	Growth = 3%	Growth = 4%	Growth = 5%
Cost of equity = 10%	53.054	61.743	76.605	86.570	105.191	131.259
Cost of equity = 11%	43.487	50.344	58.724	69.200	82.668	100.627
Cost of equity = 12%	35.632	41.145	47.760	55.845	65.952	78.946
Cost of equity = 13%	29.091	33.693	38.913	45.297	53.100	62.853
Cost of equity = 14%	23.578	27.303	31.649	36.784	42.947	50.480
Cost of equity = 15%	18.884	22.001	25.598	29.795	34.754	40.706

Exhibit 5: Firm Valuation for a Range of Parameters for Cost of equity and Growth Rate

% ownership:	Growth = 0%	Growth = 1%	Growth = 2%	Growth = 3%	Growth = 4%	Growth = 5%
Cost of equity = 10%	36	33	29	26	22	19
Cost of equity = 11%	41	37	34	30	27	23
Cost of equity = 12%	46	42	39	35	31	28
Cost of equity = 13%	51	47	44	40	36	32
Cost of equity = 14%	56	52	49	45	41	37
Cost of equity = 15%	61	58	54	50	46	42

Exhibit 6: Ownership Percentage for each Firm Valuation and a fixed Amount to Invest of 30.000 €