

DEVELOPMENT OF CASE STUDIES TO IMPROVE ATTITUDINAL ENTREPRENEURSHIP COMPETENCIES: AN EXPERIMENTAL STUDY WITH STUDENTS FROM TEC DE MONTERREY

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Abstract: The way in which entrepreneurship is taught has a high impact on students' entrepreneurial capacity. In this sense, there have been several studies that analyze the impact that different forms of teaching have on the development of entrepreneurship skills. Different research indicates, in a general sense, that the more education concerning entrepreneurship, the more entrepreneurship skills are developed. Other studies report that students that were involved in a more practical and reflective educational model, reported greater intentions of undertaking an entrepreneurial experience. However, none of these studies use the development of "case studies" as a means of developing entrepreneurship skills. In this sense, this research project proposes an experimental study, with a control group of 30 students and three intervention groups of 90 students (from fifth semester forward), in order to measure the impact that the development of real entrepreneurs case studies (either of success or failure) had on students. All of this, in order to improve the attitudinal competencies of: (i) problem analysis mentality before proposing early solutions, ii) mentality of testing low-cost solutions before investing, and (iii) data-driven decision-making mentality rather than intuition. Results suggest that there were noticeable improvements in the soft skills learned by the students. There was a percentage change in the results of the intervention groups in comparison with the control group (even when the control group also registered improvements). Further studies may test this intervention in different settings or measure other soft/hard skills using the same intervention.

Keywords: educational innovation, higher education, entrepreneurship, competencies, experiential learning, case studies

Introduction

The way in which entrepreneurship is taught at universities has a very important effect on the entrepreneurial capacity of students and graduates (Campos *et al.* 2017). Tecnológico de Monterrey is one of the top universities in the world and it offers one the best entrepreneurship education (The Princeton Review, 2019). In addition, such institution is the leader in México, in regard to the entrepreneurial capacity of its graduates. However, there is still a lot to do. This is expressed in the Strategic Plan 2020 - 2030 of this institution, where two of the main pillars are Entrepreneurship and Innovation. The importance of teaching these aspects is that they are two of the variables that most explain the economic growth, work quality and the creation of better living standards (Acemoglu *et al.* 2013). Research suggests that both factors can be taught (Morris *et al.* 2013), and that the way of

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teaching them is a key factor that makes students have more entrepreneurial intention than others (Gielnik *et al.* 2015; Zhang *et al.* 2014).

In this sense, in the last two decades an exponential growth has been observed in the number of degrees or studies offered by universities around the world (Gielnik *et al.* 2015). But different educational practices or educational models have different impact on the entrepreneurial capacity of students. Some research suggests that a practical and reflective education, leads to greater entrepreneurial intentions. (Kassean *et al.* 2015; Arias *et al.* 2018; Curth *et al.* 2015). Other research suggests that the more experience with the entrepreneurship process, the more motivation or further action (Bechard, *et al.* 2005; Motos, 2000). According to Bechard *et al.* (2005), there are three types of entrepreneurship models. Of those three, the one that has given the best results is the "Competence Model", which is characterized by: a teacher that acts as a coach and students that are active in the co-creation of knowledge. The main objective of this teaching model is to evaluate or reorganize knowledge in order to encourage action. On the other hand, the study of Campos *et al.* (2017) published in the journal Science, indicates that an educational model based on promoting a pro-active mentality and an entrepreneurial behavior (e.g. problem solving, identification of opportunities), has better results than the traditional teaching methods; for example, finance or marketing for entrepreneurship.

Although these studies indicate a very clear path for the future of teaching entrepreneurship skills, the educational model of many classrooms inside of our institution, and many worldwide, remains traditional. However, a new educational model has been proposed, known as TEC21. This new model involves the reformulation of how entrepreneurship is taught in the university and, in theory, will follow the parameters of the "Competence Model" proposed by Bechard *et al.* (2005). In other words, this new model will be more experiential and focused on developing several skills, including an entrepreneurial mentality.

Having said that, the following question arose: Under what conditions should entrepreneurship be taught, in order to increase the chances of students pursuing a career in entrepreneurship? Based on the problematic and the context presented previously, this research aims to measure the effect that will have an intervention (case studies developed by students) in the development of three attitudinal competencies of entrepreneurship. All of this, through experiential learning based on the design and development, by students, of various cases of success and failure of entrepreneurs.

It is believed that from the development of cases, students will be able to develop different attitudinal competencies, aligned with the study of Campos *et al.* (2017). These competences are: (i) problem analysis mentality before proposing early solutions, ii) mentality of testing low-cost solutions before investing, and (iii) decision-making based on data rather than intuition. And so, the proposed methodology would change the traditional way of case-based teaching. Because, instead of having professors teaching the cases, students will develop them by themselves, which will enable them to analyze directly and critically the factors of success and failure; as well as to extract insights that could be used for their own projects. This was measured quantitatively through the experimental method "Pre-test – post-test". That is, a survey (Vaseline information) was applied to the chosen groups, before they carried out the intervention and after it, in order to measure the impact.

The development of the cases by the students will also be a way to make the learning more experiential, since they will be the owners of the research (interviews with entrepreneurs, writing and designing their cases). Experiential learning, according to Motos (2000), is "the consequence of the involvement of people in an activity in which, in addition of having a direct experience, they are offered the opportunity to analyze in a critical way the process followed, extract some useful insight from this analysis and apply the knowledge learned in one's own work or daily behavior".

The main research objective of this paper is the following:

To test the intervention of "cases studies developed by students", in order to measure if it has an impact on the improvement of three attitudinal/soft skills: i) problem analysis mentality before proposing early solutions, ii) mentality of testing low-cost solutions before investing, and (iii) decision-making based on data rather than intuition.

After carrying out the experiment, it was clear that students were able to further develop their entrepreneurial skills, compared to the students that did not do case studies. In other words, the students that had to develop a case study throughout the semester showed a considerable increase in the ownership of the entrepreneurial skills (up to 29%), in comparison to the students that followed the traditional educational model (that presented an increase of up to 9%). Which is why it can be concluded that this new method of teaching entrepreneurship was successful. This research is important for academic literature because uses an intervention not previously tested, which is useful to advance in our understanding of how to better build entrepreneurial skills in universities. For practitioners (i.e professors and universities), it gives a practice to use with students to enhance entrepreneurial skills.

This paper is structured as follows. In the literature review section, we present previous research in practices or educational models which aimed to enhance entrepreneurial skills. In methodology, we explain the methods used in this research, and then we present results followed by the discussion.

Literature review

Entrepreneurship, understood as the ability to respond to the market on latent problems in society, is one of the factors that most explains economic growth and its wellbeing (Acemoglu *et al.* 2013). In this sense, in the last two decades an exponential growth has been observed in the number of degrees or studies offered by universities around the world (Gielnik *et al.* 2015). This strategy has been linked to promoting the capacity of students and graduates to undertake more courses regarding this area, and through this, have more entrepreneurial intentions; which is indicated by various studies (Gielnik *et al.* 2015; Zhang *et al.* 2014). Despite this, different teaching entrepreneurship perspectives have shown unequal results.

A study carried by Kassean *et al.* (2015) reported that a more practical and reflective educational approach with real cases or practices, will create greater intentions of entrepreneurship in students. Additionally, an article by Arias *et al.* (2018) reports that students have a higher satisfaction level with a project-based education. Moreover, in the study of Curth *et al.* (2015) evidence proved that education aimed on developing an entrepreneurial mindset based on competences, provides greater impact on variables such as ambition, resilience and creativity. Other studies that have addressed the topic are Dou *et al.* (2019), Naby *et al.* (2017), Fayolle *et al.* (2015). On the other hand, the study of

Campos *et al* (2017) published in the Science journal, indicates that an educational model based on promoting proactive mentality and an entrepreneurial behavior (for example, problem solving, opportunities identification), has better results than traditional teaching processes, such as finance or marketing. At a higher education level, a study from University of Valencia by Conchado *et al.* (2013) points out that graduates from their bachelor's degrees in Spain lack soft skills competences, which indicates a need for institutions to modify their way of teaching. Meanwhile, a paper published from López Ruiz (2011) highlights that teaching methodology should change towards a pedagogical approach centered on interdisciplinary modules, seeking to solve the nucleus of problematic situations. Additionally, Mojab *et al.* (2011) analyzed three soft entrepreneurial competences with IT students: initiative, ambition and, critical and analytical reasoning. In another one (Inada, 2019), three competences (“being entrepreneurial, entrepreneurial passion, self-efficacy”) were measured in Japan. Results showed that all improved after the class.

According to (Sobrado and Fernández, 2010), the development of entrepreneurial skills can be strengthened starting from the educational perspective; through the use of creativity skills, problem solving activities, the assessment of economic risks and the development of plans and business projects, etc. Some methodologies that can be useful for the development of entrepreneurial competencies are problem work, project work, seminars, field practices, independent student work and techniques that require collaboration, such as group activities. (Sobrado and Fernández, 2010). Another way in which entrepreneurship skills can be taught is through incorporating “learning to undertake” in the universities’ curricula and bringing real entrepreneurs to the classrooms (who would transmit their experience); all of which would turn the teaching and learning experience from being only theoretical, into an experience that would reflect the future reality that students will have to face. (Albano, 2014). For this to happen, a promotion of mainly the seminar or workshop style, with an open, flexible and adaptable methodology would be ideal; so as to achieve: a culture for an entrepreneurial environment, a favorable environment for participation and creativity, knowledge of the sector and network of relationships. (Albano, 2014).

A study carried out by Grané *et al.* (2014) reported that nine undergraduate and graduate final year students have developed entrepreneurial skills through mentoring and evaluating groups of first year students. Through this system, the student-tutors have developed a series of transversal competences such as the ability to lead a team, the ability and critical spirit or oral communication, thus acquiring entrepreneurial skills of great utility for their incorporation into the workplace. (Grané *et al.* 2014). Another study carried out by Navarro *et al.* (2020) intended to identify eight entrepreneurial skills (network formation, conflict resolution, achievement orientation, ability to take risks, teamwork, creativity, autonomy and initiative) in 780 students between 15 and 20 years old of secondary education institutions. They used a survey under a Liker scale and the results showed that the relationship of the institutions under study shows in a grouped way a strong average level, that is, the processes are being directed correctly so that students generate and build entrepreneurial and business skills in their territory capable of counteracting problems in the environment. (Navarro *et al.* 2020).

Despite the various studies in this area, little has been done to understand the scope of developing cases studies as a tool of experiential education at higher education level; and, whether or not, this has an important effect on the development of attitudinal skills for entrepreneurship or, as expressed by Campos *et al* (2017), on the entrepreneurial mindset.

Research Methodology

In order to prove that entrepreneurial competencies could be assimilated in a better way by case studies, the first thing to do was to define the parameters that would be measured. Such parameters were proposed as several questions that had to do with the different attitudinal skills. Each competence had a set of approximately ten questions. The goal of this question was to identify the variation in the level of three attitude skills between three homogeneous groups of students and a control group, after they have carried out the development of the case (intervention), as well as provide a specific rubric that measured the level of each skill (see Annex 1).

Such skills were defined in advance, at a meeting with 9 teachers from the México City campus, Monterrey campus, Santa Fe campus and Mexico State campus; so as to define which attitudes were the most important in order to develop an entrepreneur.

After having identified the questions, as well as the skills that were going to be under analysis, it was necessary to establish the students that would be subjects for the study. This was simple since the institution in which the research was carried out offers a course named: "Education for the development of entrepreneurial leadership". Which is why it was decided to choose the students that were enrolled in such course, as subjects of study. However, from the different groups, only four were chosen; from which one of them would act as a control group, while the other three would be intervention groups.

The previously mentioned studies have applied similar experimental or quasi-experimental methods; so, in a way, this study is aligned, even though the later intervention (case development) has not been tested before. The method "pre test - post test" was used, because of its experimental scope. This approach made it possible to clearly identify whether an intervention had been carried out with the groups; and whether such intervention was the cause of an improvement in sub-skill levels (Creswell, 2017).

Research design

As for the framework for this research paper, it consisted in three stages. The following figure shows, in a summarized manner, the order and purpose of each stage of the process.

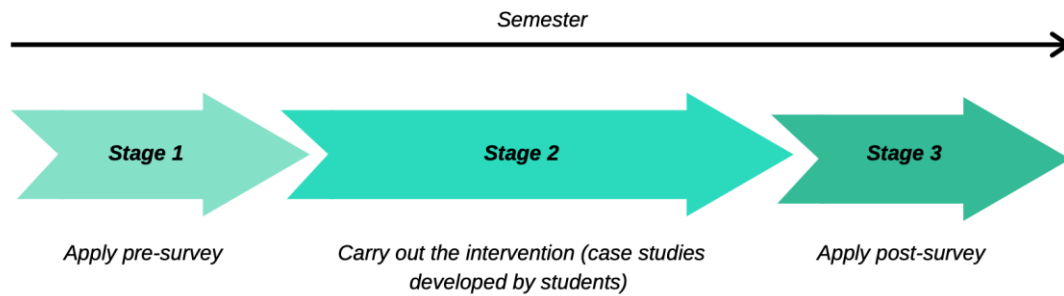


Figure 1: Graph of stages carried out during the semester

As it can be seen in Figure 1, stage 1 and stage 3 took less time than stage 2, and that both of them (stages 1 and 3) consisted of the same activity but in different periods of time. In order for this to be clearer, the three stages are described more into detail, below:

1. Stage one: Apply pre-survey

The objective of this stage was to identify the level in which the entrepreneurial competencies were presented in the students. Also, this was done in order to have a before and after analysis of the qualitative factors (the attitudinal skills).

And so, it was necessary to determine at the beginning of the semester the level in which students presented the three attitudinal skills, along the 4 groups (both the control and the intervention groups). This was carried out through an online survey that was sent to the different students. In it, the task was to answer several questions and rank them from 0 to 5 (0 being never and 5 being always). In total, the survey consisted of forty questions. Such questions were the result from previous studies and contributions from the 9 teachers.

For students to carry out the case study intervention, they were trained on development and design of these for a couple of sessions. They were also given a guide at the beginning of the study that included the general information about case studies, as well as the elements regarding each skill (see Annex 1), so they could focus the collection of data on those elements. This allowed students to understand the objective of the studies, and therefore, to establish a path where they could achieve the wanted results of this article: develop entrepreneurial skills through experiential learning.

2. Stage two: Carry out the intervention (case studies developed by students)

For this stage, the study plan for the intervention groups was altered (into a new educational model). Instead of receiving classes in a normal manner, students had to develop a case study based on real life entrepreneurs and their experiences of success and/or failure. Such cases were developed throughout the course of the semester. Students were given the chance of choosing the entrepreneur they felt most comfortable with (it could be someone they knew or someone they found interesting), while following the guidelines provided by their professors.

3. Stage three: Identify the development of the skills throughout the semester

The objective of this final stage was to identify the development/changes that the entrepreneurship competencies had on students throughout the semester.

And so, just as it was done at the beginning of the semester, the survey (which consisted of the same questions as the one applied at the beginning of the semester) was applied again to the same groups of students. The goal of this was to determine the level of the three attitudinal skills in the four groups, at the end of the semester. In order to contrast the level of attitudinal skills in each one of the three groups regarding the control group, as well as the changes that took place after the course. Afterwards, the results were analyzed through statistics and graphical representations. As well as compared to the results that were obtained at the beginning of the semester.

Data collection

Sample

And so, the sample that was studied consisted of 120 students who were enrolled in the course “Education for the development of entrepreneurial leadership” (class offered for all careers from students in 5th to 9th semester). Since students take the same subject and possess similar skills, it was considered as a homogeneous group which was recommended by literature related to Design of experiments (Sharma, 2017).

Data analysis

As for the analysis of the data that was collected, the first that was done was to separate the surveys according to the group they belonged to (whether they were from the control or the intervention group). Once this was done, an analysis of the distribution of the answers per question was done, which was possible due to the nature of the answers given by students (since the possible answers were given a value). This allowed an evaluation of the different levels in which skills were rated by the students. Finally, a comparison between the means (concerning all of the answers given for the questions) of the three different skills was done.

The later analysis was made for both, the surveys applied at the beginning of the semester and the ones applied at the end. However, once the results for the surveys applied at the end of the school term were analyzed, a comparison between the distribution of the answers for the different surveys was made. This comparison consisted of creating graphs that showed the distributions of the answers and the changes that the students presented throughout the semester.

Results

By the end of the semester, there were noticeable improvements in the skills learned by the students. There was a percentage change in the results of the intervention groups in comparison with the control group (even when the control group also registered improvements). These changes were measured with the most common responses of the same survey that was applied at the beginning. In one hand, the control group went from having most common answers overall of Sometimes (3) and Almost Always (4) to Always (5). On the other hand, the control group two competencies remained the same

and the third skill had a significant change from Almost Always (4) to Always (5). Overall, this analysis concluded that: the mentality i) problem analysis mentality before proposing early solutions, presented a greater evaluation in the 4 groups, with an average response of 4 out of 5. The competencies (ii) mentality of testing low-cost solutions before investing and (iii) making data-driven decisions, had an average of 3.3 and 3.8, respectively. As it can be deduced, the first competence shows a high average result in comparison with the other two mentalities. This means that the second and third competence could use more attention in the teaching and learning procedures. It is also important to mention that the registered answers at the end of the semester were less than the ones at the beginning of the study. The evaluation at the start of the study was applied to 89 students, while at the end, the evaluation was applied to only 80.

To further explain the results of the study, the answers were evaluated according to the questions made to identify each competence or entrepreneurial mentality: (i) problem analysis mentality before proposing early solutions, (ii) mentality of testing low-cost solutions before investing, and (iii) making data-driven decisions. Regarding the first mentality, the control group's most common response for all questions was Sometimes, which, for the intervention group, the most common answer was Always (accumulated count shown in Figure 1). From the collection of the last group, we gathered that most of the questions showed this answer (Always); in which the question "It is important to identify the root causes of a problem" had the highest count. The second most common response was Regularly, having the question "Before proposing a solution, I look for information from different sources to better understand the problem" being the one with the highest count of this response (Figure 2).

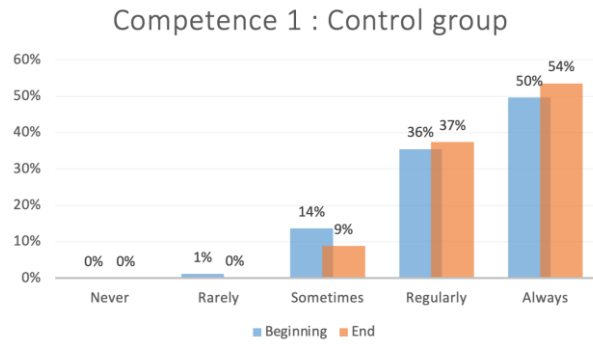


Figure 2. Comparative graph of the first competence regarding control group.

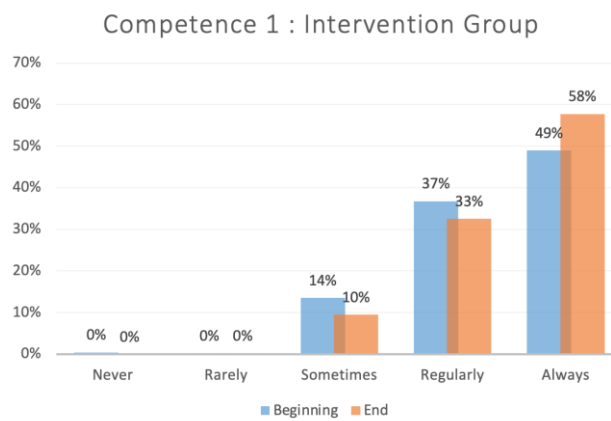


Figure 3. Comparative graph of the first competence regarding intervention group.

Following onto the second competence, the improvement of learning of the skill was more noticeable between the control and the intervention group. For the first group (Figure 3), the range of responses were between the minimum score (Never) and the highest (Always). The most common response was Always, and the second most common answer was Regularly, where the question that had the highest score was “I learn from the mistakes in order to develop better solutions to the problems”. The intervention group, on the other hand, also ranged from the minimum score (Never) and the highest score (Always). Unlike the control group’s responses, the Never response was registered in only 3/10 questions. In the Figures 3 and 4, the responses between the control and the intervention group can be appreciated more visually.

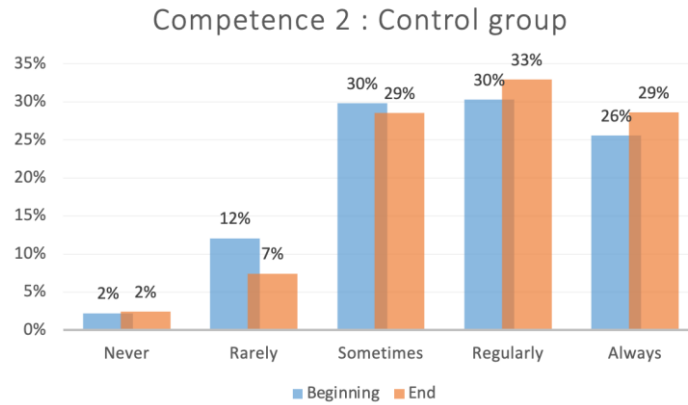


Figure 4. Comparative graph of the second competence regarding control group.

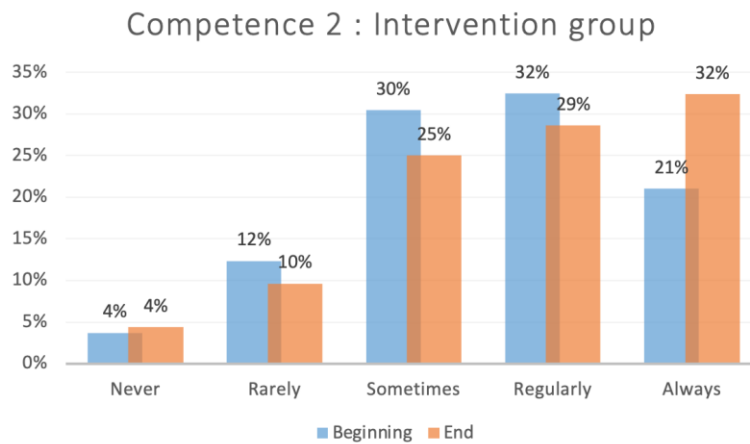


Figure 5. Comparative graph of the second competence regarding intervention group.

For the last competence, there was a slight improvement between the control and the intervention group. In the control group (Figure 5), the most common answer was Always, and the second most common response was Regularly (whose count was close to Always). For this mentality evaluation, the question with the highest response was “I feel comfortable using different sources of data, either qualitative or quantitative”. Moreover, the intervention group showed similar results (Figure 6): the most common response was Always and the second most common was Regularly. The question that had the highest response for this mentality was “I like to ensure my response by looking at different sources”.

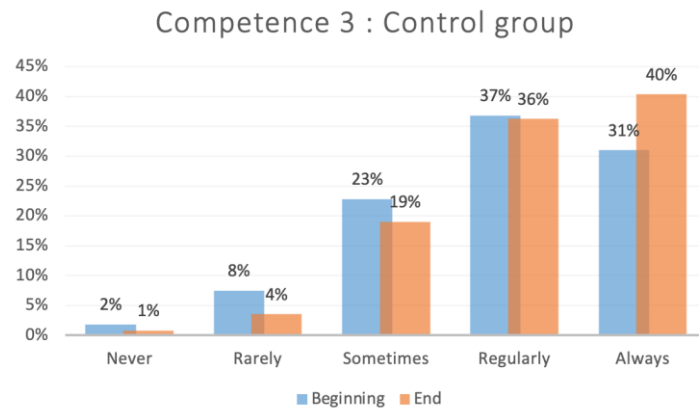


Figure 6. Comparative graph of the third competence regarding control group.

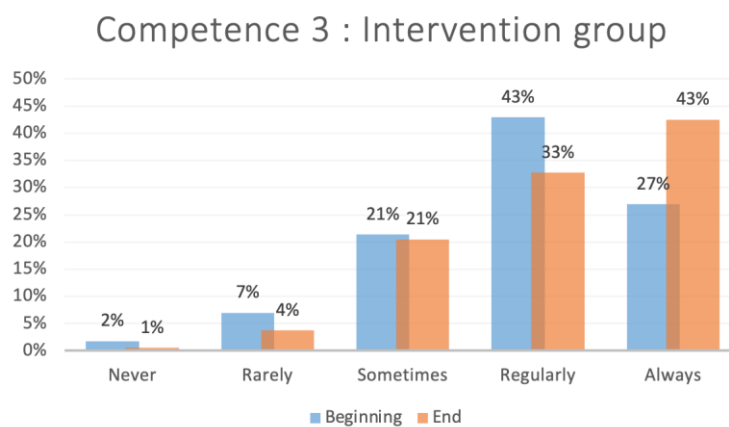


Figure 7. Comparative graph of the third competence regarding intervention group.

Discussion

The main research objective of this paper is testing the intervention of “cases studies developed by students”, in order to measure if it has an impact on the improvement of three attitudinal/soft skills: i) problem analysis mentality before proposing early solutions, ii) mentality of testing low-cost solutions before investing, and (iii) decision-making based on data rather than intuition.

The results from this study lead to conclude and agree with what author Kassean (2015) who stated in: a more practical and reflective education approach with real cases or practices, will create greater intentions of entrepreneurship in students. Results from an education based on cases proved to strengthen the three mentalities proposed. However, Data-driven decision-making mentality rather than intuition appears to be the one with most values gained. In addition to this, a clear contrast is present in the mentalities of students that belonged to the intervention groups and those of the control group. Meaning that the mentalities evaluated in the control group remained practically the same (only significant increase was observed in third mentality: 9%), whereas the intervention groups proved to have an increase of up to 29% in the third mentality, followed by the second mentality’s increase equivalent to 26% and in the first mentality a 6% increase

Taking the results into account, it can be observed that through the experiential teaching method (that was applied to the intervention group), has shown to accomplish the development of soft skills in a more noticeable way. This means that students nowadays tend to have other types of abilities and it is important to consider this when creating an academic syllabus.

This paper contributes with previous literature in different ways. First, previous research has not tested the intervention presented here and or was not been framed in experiential learning literature. Mojab (2011) wrote that the study should be made from other perspectives, thus not only observing the effects on the entrepreneurial competencies in IT students: initiative, ambition and, critical and analytical reasoning. This study held at Tecnológico de Monterrey managed to undertake students from different B.A. Moreover, the competencies presented by Mojab, resemble the ones from this work; nonetheless, this study resembles most to Mojab's third mentioned competency. This is because all three competencies proposed in this research were in fact what an entrepreneur should have in order to develop an analytical and critical mindset to successfully address when decision making is at stake.

Second, we contribute with an important stream of research which have analyzed different methods or models to teach entrepreneurship or develop entrepreneurial competencies (Gielnik *et al.* 2015; Zhang *et al.* 2014 Arias *et al.* 2018; Curth *et al.* 2015; Conchado *et al.* 2013; etc). We present clear evidence that this intervention works in developing soft entrepreneurial skills.

For practitioners and professors, this paper may give them a new practice to be implemented in their curricula.

Conclusions

Tecnológico de Monterrey is a Mexican higher education institution that has recognized in the past couple of years for creating a new educational model to meet the students' needs, expectations and prepare them for their future, which is why model TEC21 was established and implemented. This study's main purpose is to demonstrate that the reformulation of how entrepreneurship is taught at this university can in fact favor the students' entrepreneurial attitude.

To do this, one control group and three intervention groups formed by university students taking an entrepreneurship course were chosen as a sample. These groups were homogenous and had a randomized composition, in the sense that specific students belonging to each group were not selected by the participants in this research study. As for the intervention groups, the study plan and educational model were modified; from traditional education to a model based on experience and self-learning. Such model was based on the notion of students working on the elaboration of a case study, based on dialogues and research with actual entrepreneurs.

At the beginning of the course, students in the four groups were asked to answer a preliminary survey in August 2019 to evaluate three sets of mentalities that successful entrepreneurs have proven to have: i) problem analysis mentality before proposing early solutions, (ii) mentality of testing low-cost solutions before investing, and (iii) making data-driven decisions. And, once the term was almost over, the same survey was applied to the students from all four groups. It is relevant to mention that, from this experiment, factors such as the capabilities of a teacher to motivate and inspire students were not taken into consideration; as well as the external experiences that students might have had.

An interesting next step would be to analyze groups the same way as in this research but with the same teacher in all sample groups.

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Annex 1: Survey

C1. Problem analysis mentality before proposing early solutions

- A. Seek information from primary sources and support to better understand the problem or opportunity before proposing a solution
- B. See the problem or opportunity from different perspectives
- C. Identify who is affected and involved in the problem or opportunity
- D. Identify the magnitude of the problem or opportunity
- E. Identify the causes of the problem or opportunity
- F. Take into account all information recovered from analyzing the problem or opportunity to propose solutions

C2. Mentality of testing low-cost solutions before investing

- A. Does tests or experiments to proof solution ideas
- B. Proposes different solution ideas
- C. Generates low-cost tests to validate solutions
- D. Considers that tests don't have to be perfectly finished to proof an idea
- E. Evaluates test results to adjust the proposed solution
- F. Evaluates different types of tests and evidence obtained through them

C3. Data-driven decision-making mentality rather than intuition

- A. Makes decisions based on qualitative and quantitative data, whether that is primary or secondary
- B. Gives more value to qualitative or quantitative than people's opinions
- C. Reflects upon different people's perspectives but still makes a data-driven decision