

ENTREPRENEURSHIP EDUCATION IN SUB-SAHARAN AFRICA: RESULTS OF A CASE STUDY IN SENEGAL

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ABSTRACT

The number of entrepreneurship education programs has grown worldwide in the last two decades. This has helped consolidate a fruitful line of research focusing on measuring the impact that these programs have on participating students' entrepreneurship potential. However, to date, these programs have almost exclusively centered on more developed countries. The present work, on the contrary, analyses the impact of an entrepreneurship promotion program carried out for a period of three years in the socioeconomic and cultural context of a less developed country: Senegal. Specifically, the program was aimed at students on different degree programs at the University of Gaston Berger. Theoretical approaches of effectuation and bricolage were applied and students' enterprise potential was tested ex ante and ex post. The results show that students had a significant improvement in their entrepreneurial potential, thus reflecting the effectiveness of entrepreneurship education in these contexts.

Keywords: Cultural Differences, Entrepreneurship Education, Entrepreneurial Intention, Less Developed Countries, Socioeconomic Differences.

INTRODUCTION

Since Myles Mace taught the first entrepreneurship course at Harvard Business School in 1947 (Katz, 2003), the number of programs designed to instill entrepreneurial spirit and ultimately boost new firm creation has continued to grow, leading one author to claim that “the younger generation of the 21st century is becoming the most entrepreneurial generation since the Industrial Revolution” (Kuratko, 2005, p. 578).

Along with this proliferation in educational programs to encourage entrepreneurial spirit, known as Entrepreneurship Education (henceforth EE), a productive field of research has emerged in recent decades that aims to analyze the impact these EE programs have on participating students (Fayolle and Liñan, 2014; Byrne et al, 2013).

Overall, the results of these analyses of EE point towards positive effects in terms of improving entrepreneurial potential. However, some contradictory results have been observed that are likely due to a lack of analysis of the context or the non-inclusion of moderators in studies (Martin et al, 2013; Fayolle, 2013).

Bearing in the mind the above, as well as the fact that nearly all studies related to EE have been carried out in the social, spatial and institutional contexts of developed countries (Isaacs et al, 2007); this work describes and analyzes the impact that an EE program has had on entrepreneurial potential in a developing country such as Senegal, with its particular cultural

(Ross, 2008) and socioeconomic characteristics (World Bank, 2013). This program was designed and applied with a focus rooted in an entrepreneurial bricolage and “effectuation process” approach, characterized by flexibility and experimentation (Baker and Nelson, 2005; Sarasvathy, 2001, 2008; Chandler et al., 2011). Thus, it attempts to fill another gap in EE programs that have, up till now, mainly adopted a “business planning approach” (Fayolle, 2014).

This paper begins with a review of the current academic situation of EE and its main avenues of research. Subsequently, the cultural and socioeconomic characteristics of Senegal are outlined: the developing country where the EE program was carried out. In the section after, the intervention program, its methodology and the results are described. The paper ends with the main conclusions and implications.

ENTREPRENEURSHIP EDUCATION

As a necessary corollary to the growing maturity of EE (Katz, 2003), authors have tried to determine its impact on students’ enterprise potential, generating an extensive body of literature over the last three decades (Fayolle and Liñan, 2014; Byrne et al, 2013).

In the meta-analysis of the EE outcomes, made by Martin et al (2013), analyzing 42 studies ranging from 1979 to 2011, they concluded that EE is positively associated with entrepreneurship-related human capital assets (knowledge, skills, positive perceptions of entrepreneurship and intentions to become an entrepreneur). EE is also associated with entrepreneurship outcomes (new venture creation and entrepreneurial performance).

Among these studies on the impact of EE programs, it is possible to recognize two main approaches. One group of studies tries to measure the effect of entrepreneurship education on students’ future intention to start a business. These studies consider not only entrepreneurial intentions, but also desirability and feasibility of starting a business and students’ degree of contact with entrepreneurial experiences in their environment (Paço, Ferreira & Raposo, 2016; Souitaris et al., 2007; Peterman and Kennedy, 2003). A second group of studies takes a different approach and tries to measure the impact of entrepreneurship education on attitudes associated with entrepreneurs. These studies try to determine the extent to which these attitudes change as a result of the educational experience (Athayde, 2009).

Both these approaches start from the conviction that personality traits are static, however, theories based solely on traits underestimate the influence of specific situational factors on EE (Ajzen and Fishbein, 1977). In this sense, enterprise skills are not fixed personality traits but can be learned and developed through experience (Gibb, 1993, 2000). In this context, another approach emerges that is based on attitude theory and leads to the Entrepreneurial Attitude Orientation Scale (EAO) (Robinson et al., 1991) and subsequent work by McCline et al. (2000). The idea is that the concept of “attitude” is more dynamic than that of “trait” because attitudes are responsive to external objects and are capable of change.

Entrepreneurial Intentions

Krueger and Brazeal (1994) distinguish between the latent entrepreneurial “potential” of individuals from their “intention” to become entrepreneurial, which is a reaction to a displacement event (something that occurs to cause a change in behavior). According to Shapero (1975) and Shapero and Sokol (1982), a person’s intention to start a business is influenced by perceived desirability, perceived feasibility, and propensity to act. These three variables are presented as direct antecedents to entrepreneurial intention. Shapero (1975) suggests that a

person's attitude toward entrepreneurship could be indirectly influenced by his or her prior exposure to entrepreneurship through previous work experience and the existence of role models.

Krueger (1993) tests this model, incorporating breadth and positiveness of prior experience to capture previous exposure to entrepreneurship. Likewise, Peterman and Kennedy (2003) measure the changes in desirability and feasibility of starting a business in a way that is appropriate for young people still at school, who are unlikely to have immediate "intentions" to become entrepreneurs. Using a pre-test and post-test control group design, these researchers find that the entrepreneurial experience at school has a positive impact on pupils, who record significant improvements in their perceived desirability and feasibility of starting a business after taking part. Thus, the change in students' entrepreneurial intentions, their perception of the desirability and feasibility of starting a business, and their prior experiences relating to entrepreneurship represent an accurate and valid way to determine the impact of entrepreneurship education. Several studies have continued to apply this perspective to determine the effectiveness of a range of EE programs (Paez, Ferreira & Raposo, 2016, Kusmintarti, Thoyib, Maskie & Ashar, 2016, García-Rodríguez et al., 2015, Kaltenecker, Hoerndlein, & Hess, 2015).

Attitudes toward Enterprise

Athayde (2009) finds that definitions of the successful entrepreneur often center on a collection of behaviors underpinned by certain skills and attributes. She designed a latent enterprise potential construct with five dimensions that are consistently associated with theories of entrepreneurship and that have been measured in empirical studies to assess entrepreneurship. Eighteen items were created for each construct that reflected cognitive, affective, and behavioral manifestations, making a total of 90 items. After the reliability testing process, Athayde (2009) developed a refined measure of Attitudes Toward Enterprise for Young People (ATE Test), which consists of five factors: creativity, leadership, achievement motivation, personal control and intuition.

Creativity is a key factor for promoting innovation and central to the concept of entrepreneurship, especially relevant in entrepreneurship education (Timmons and Spinelli, 2004) and particularly in the current competitive context (World Economic Forum, 2009). Additionally, leadership is a key factor in starting a new business (Vecchio, 2003), comprising a large number of attitudes that are critical to the success of the venture (Timmons and Spinelli, 2004). Moreover, a large number of studies point to achievement motivation as being strongly linked to entrepreneurs (Caird, 1991; Robinson et al., 1991; Durand and Shea, 1974; Morris and Fargher, 1974). Personal control, understood as "the extent to which a person believes they have control over their life" (Athayde, 2009, p. 485) is also a central dimension in theories of entrepreneurship (Robinson et al., 1991). Finally, there is intuition. This factor has been less commonly associated with entrepreneurship than the others. However, it can be associated with the ability to cope with uncertainty and unstable circumstances, which are often characteristic of enterprise creation (Athayde, 2009). Thus, evaluating how the attitudes defined by these five constructs evolve in the participating students is a second way of evaluating the impact of entrepreneurship education in terms of improved entrepreneurial potential.

Nevertheless, despite the numerous studies on these attitude and intention approaches, there are still important gaps and challenges to cover in the field of EE (Fayolle, 2014), among which is the prevalence of the business plan approach (Honig, 2004; Dale, 2011). Business plan writing is the most widely used pedagogical approach in what Neck and Greene (2011) call the

“process world”, in which entrepreneurship is presented and taught in a linear fashion that involves identifying an opportunity, developing the concept, understanding resource requirements, acquiring resources, implementation, and exit. This has led to a potential gap between what we teach in entrepreneurship and what entrepreneurs actually do (Edelman, Manolova, and Bruch, 2008), making new approaches necessary that are rooted in entrepreneurial bricolage (Baker and Nelson, 2005). These approaches try to tackle challenging environments by creating a context that enables behaviors and capacities such as creativity, improvisation, and various social and networking skills (Paço, Ferreira & Raposo, 2016). Likewise, these new methods can also be understood from the so-called “effectuation process” in venture creation, characterized by flexibility and experimentation (Sarasvathy, 2001, 2008; Chandler et al., 2011). By contrast, the more classical business plan approach, understood as a rational process that tries to predict the future results of a venture creation by gathering and processing information at the present moment in time, could be said to be rooted in the so-called causation process. This consists of taking a set of means as given and focusing on selecting between possible effects that can be created with this set of means (Sarasvathy, 2001).

The Importance of the Cultural and Socioeconomic Context: The Case of Senegal

Up to now, different studies on entrepreneurial intention and its antecedents and entrepreneurship attitudes have been carried out in transitional economies (Iakovleva, 2011; Naktiyok et al, 2010; Shook and Bratianu, 2010). However, there is an important lack of data on less developed countries in general, and specifically in the African context (García-Rodríguez et al, 2015; Isaacs et al, 2007).

This scarcity is even greater in EE, to the extent that according to Welter’s (2011) classification of contextual dimensions, the majority of studies on EE have been performed in the social, spatial and institutional context of the most developed countries. This prevents us from understanding to what degree EE has the potential to improve entrepreneurial activity in less developed countries. In particular, there has been a historically strong focus on the individual entrepreneur, which has been another important factor contributing to frustrating efforts to generalize results across very heterogeneous settings within and across studies (Wiklund et. al, 2011).

Additionally, as Martin et al. (2013) indicate, some contradictory results can be observed in studies analyzing EE, which could be related to the non-inclusion of moderators or specific contextual features. Thus, the context of a developing country would be a totally new direction in which to advance in the process of consolidating research on entrepreneurship education.

Among these specific features, cultural differences are particularly relevant (Gamage & Wickramasinghe, 2014). Empirical studies have demonstrated how the cultural specificities of a region can affect entrepreneurial intention even more than economic variables (Liñán et al, 2011; García-Cabrera & García-Soto, 2008; Hofstede et al. 2004; Wennekers et al. 2007): the former tend to present a more permanent character than the latter. For Mueller & Thomas (2001), the concept of “culture” is associated with the system of fundamental values and principles specific to a particular group or society that, at the same time, give rise to certain personality traits and individual motivations that are not reproduced in other societies. Hofstede (1984) distinguishes four dimensions when analyzing cultural differences among countries or regions: power distance, uncertainty avoidance, individualism-collectivism in a country, and masculinity-femininity. Later, Hofstede (1991) added a fifth dimension: individuals' short or long-term orientation.

These five dimensions are very useful when having to identify to what degree the cultural specificities of a country are related to the entrepreneurial intentions of its population (Kirkman et al 2006; Thomas & Mueller, 2000), although the dimension that refers to individualism-collectivism is for Triandis & Suh (2002) the most representative.

Senegal has a very specific cultural and socioeconomic context (Ross, 2008). This makes it of great interest to investigate the factors that may affect the impact of EE programs, particularly if we take into account the significant differences detected in the configuration of entrepreneurial intention among its younger population (García-Rodríguez et al, 2015).

Socioeconomic Context

Senegal is located in Sub-Saharan Africa with a surface area of 196,722 km² and is considered a stable country from an economic and political perspective in Western Africa. According to the World Bank (2013), Senegal is among the second group of the poorest countries on the planet (lower middle income) with a Gross National Income per capita based on purchasing power parity of 1,880 dollars in 2012 (the world average was 12,186 dollars). The level of poverty is so pronounced that in 2011, 56% of population lived on an income of less than 2 dollars a day. Senegal's economic structure is mainly based on the primary sector, which represents 17% of GDP and employs 77% of the population. In 2012, the country had a population of almost 14 million inhabitants, with a predicted population of 20 million by 2020. This is based on its high birth rate. However, Senegal's life expectancy in 2011 was just 63 years old (the world's average stood at 71 years old in the same year). With respect to its demography, Senegal has a predominantly young population with 44% under 14 and 72.5% under 30 years old.

Cultural Context

According to Ross (2008), Senegal has a very specific cultural context and presents multiple and important cultural differences compared to more developed countries. For example, Senegal's social structure today is still marked by deeply embedded distinctions of caste and slave ancestry. These distinctions are inherited from one's parents and are fixed at birth, which makes social mobility all but impossible, at least theoretically. Furthermore, Senegal is a Muslim country, and though it is a secular state, Islamic institutions and practices dominate the public sphere and public space; although many Senegalese hold a number of beliefs related to the spirit world that are quite distinct from the religious practices and observances transmitted through organized religions. Furthermore, Senegalese families are both large (the average Senegalese household has between 9 and 10 members) and extended twofold (polygamy is widely practiced). Finally, Senegalese society can be described as traditional: both African and Islamic traditions shape family life, gender relations and the socialization of children. The Wolof term *kër* means both "house" and "family"; one carries one's *kër* with one, wherever one goes. Whatever an individual might do, especially in public, he or she must refrain from dishonoring the family.

Despite these cultural differences, Senegal presents a political and economic context characterized by stability. It is probably the Sub-Saharan country least affected by the so called "resource curse", which suggests that resource-rich countries tend to obtain poorer economic and social results than their resource-scarce counterparts due to the lack of transparency and the undemocratic nature of their institutions (Sachs and Warner, 1997).

EMPIRICAL WORK

The Intervention Program

One of the key challenges for the future development of EE is the consolidation of approaches and methodologies used to promote the link between entrepreneurship and education (Fayolle, 2013). Additionally, the scant number of studies of EE in developing countries motivated us to develop an EE program in a Senegalese university from January, 2011 to December 2013, specifically in the University of Gaston Berger. This university, established in 1990, is located in the north of the country, 10 km from the city of Saint Louis and had 5,347 students registered in the academic year 2010-2011.

The intervention program is based on an entrepreneurial bricolage approach (Baker and Nelson, 2005) and effectuation process in venture creation (Sarasvathy, 2001, 2008; Chandler et al., 2011). According to Chandler et al. (2011) and Fayolle (2013), these approaches need further testing following several previously promising results that indicate their efficiency (Souitaris et al., 2007). Over the three years that the Senegalese program lasted seven actions were carried out in three phases performed consecutively: Motivation, Implementation and Dissemination.

The Motivation Phase involved motivational sessions in class, consisting of interventions in classes corresponding to subjects in the final year of the course. In these interventions, students were asked about their future work strategy, and the idea of entrepreneurship was suggested as an alternative and information given about the Implementation Phase.

The Implementation Phase provided students with an itinerary so that they could envisage the possibility of creating their own businesses. This consisted of three actions that were introduced progressively, though did not need to be carried out in succession. The first of these actions was called *Capsules of Business Idea Generation*, aimed at people who were predisposed towards entrepreneurship, yet without a business idea. Guidelines were given on how to detect ideas by carrying out fieldwork to identify needs and deficiencies in their immediate surroundings and to look for a product or service that could satisfy these needs. Subsequently, there was an exchange of experiences and reflections on the chances that a product and/or service proposed could be commercialized. Additionally, the *Laboratory of Business Ideas* consisted of training – motivation, in which students worked on developing the initial analysis of the feasibility of the business ideas identified. This began with an assessment of aspects of leadership and motivation and continuing with concept and feasibility of the ideas. Interaction was encouraged in an informal, relaxed atmosphere in groups. Finally, a *Business Initiatives Workshop* was instigated with the aim of supporting the participants in the process of developing their business, having come up with a sufficiently mature business idea. The methodology used attempted to combine practical work in the classroom with various individual tutorial sessions aimed at providing personalized orientation and monitoring of each business project.

The Dissemination Phase aimed to disseminate the results of the program, not only to improve the visualization of the projects developed by the participants but also to promote potential entrepreneurs and entrepreneurship among the other students and the university community. Thus, in the *Project Presentation Forum*, eight projects developed through the program were presented to the rest of the university students, teaching staff and socioeconomic agents. These eight projects were the ones that had achieved the greatest degree of maturity and innovation and the three best were awarded various prizes, according to a panel of judges and the audience. In the *Business Creation Forum* talks and roundtables were held with experts and local and international entrepreneurs. Finally in the *Inter-University Forum* common entrepreneurial

experiences from several European universities were discussed and compared with the program carried out at the University of Gaston Berger. Additionally, in this forum, the award ceremony for the three winning projects from the *Project Presentation Forum* was held.

METHODOLOGY

A structured questionnaire combining the two main psychological approaches to EE was developed to measure intention and attitudes associated with entrepreneurship.

Regarding Entrepreneurial Intention, this work uses the scales of Perceived Desirability and Perceived Feasibility proposed by Kolvereid (1996) and later adapted by Peterman and Kennedy (2003). In this way, we contribute to keeping the model as parsimonious as possible. Entrepreneurial Intention is measured by two items related to the probability and preference of starting up a firm compared to working as an employee.

To evaluate the dimension of Personal Attitude, the authors have used Athayde's test to measure Attitudes toward Enterprise (ATE). Definitions of a successful entrepreneur were taken that focused on a collection of behaviors underpinned by certain skills and attributes. A construct was designed which was associated with theories of entrepreneurship and that has been used in empirical studies to assess entrepreneurship. The measure of ATE for young people consisted of 21 items, identifying five factors (leadership, creativity, achievement, personal control and intuition). In addition to personal factors, demographic factors and others related to previous experience were included as control variables that could have some influence on the factors that predict entrepreneurial intention: age, gender, professional and personal experience of entrepreneurship.

The scales were largely based on the work of several researchers such as Kolvereid (1996); Peterman and Kennedy (2003) and Athayde (2009). Table 1 shows the dimensions and items used to build the scales to measure the impact of the entrepreneurship program. The questionnaire was adapted to the Senegalese context and translated into the French, the language of the study's sample population.

This work focuses on university students, specifically the University of Gaston Berger (UGB) in Senegal. The participating students were studying different degree programs, which was considered as being an added variable and classified into three generic areas: Sciences; Social Sciences, Law and Humanities and Engineering and Architecture. The questionnaire was completed by all the students who took part in the intervention, specifically in the motivational sessions in class, the opening activity of the program. Similarly, students who finished the program completed the questionnaire again in order to compare the variation in their entrepreneurial potential.

To gain access to students at the beginning of the program, the lecturers in charge of the final year subjects were contacted and the aims of the study explained to them. In all cases, a favorable response was obtained to attend the first or second day of class of the second semester of the 2011/2012 academic year. The final collection of data was carried out at the beginning of the first semester of the 2013/2014 academic year, having finished the final activity of the intervention program.

Initially, there were 483 students that participated in the first activity of the program and 128 in the final one. To determine the impact of the EE program only the questionnaires of the students that had completed the program were used and therefore fulfilled the initial and final questionnaire. The main characteristics of the sample are summarized in Table 2.

| Table 1 DIMENSIONS AND ITEMS OF SCALES | | |
|--|--|--|
| Variable | Dimensions/Items | Scale |
| Entrepreneurial Intention: Opinion about the intention to start up a business | | |
| EI1 | Do you think that one day you will start up a firm? | 1=I am absolutely sure, I will. To 7=I am absolutely sure I won't. |
| EI2 | Among your alternatives for future work. Would you prefer to start up a firm or work as an employee? | 1=I am very clear that I want to have a firm. To 7=I am very clear that I want to work as an employee. |
| Perceived Desirability^a: Positive or negative opinion of the individual on what attracts him/her to the idea of entrepreneurship | | |
| PD1 | Do you think you would enjoy starting up a firm? | 1=I am sure that I would enjoy it a lot. To 7=I don't think I would enjoy it all. |
| PD2 | What level of worry would start up a firm cause you? | 1=Yes. it would cause me a great deal of worry to 7=No. it wouldn't worry me in the least |
| PD3 | To what degree would the idea of starting up a firm make you enthusiastic? | 1=It would make me very enthusiastic to 7=It wouldn't make me enthusiastic at all |
| PD4 | What do you think about the people who startup firms? | 1=I admire them. they are an example to follow to 7=Total indifference |
| Perceived Feasibility^a: Perception of the ease or difficulty of entrepreneurship | | |
| PF1 | To what degree do you think it would be difficult to start up a firm? | 1=Very difficult to 7=Very easy |
| PF2 | To what degree do you feel sure about being successful with it? | 1=I'm totally sure I would be successful to 7=I am not at all sure about being successful |
| PF3 | Do you think starting up a firm would require a great effort? | 1=A lot of effort to 7=No effort at all |
| PF4 | Do you think you have the necessary knowledge to start up a firm? | 1=All that is necessary to 7=None at all |
| PF5 | To what degree do you have confidence in yourself to start up a firm? | 1=I am totally confident in myself to 7=I am not confident in myself at all. |
| Attitudes Toward Enterprise^b: Leadership. Creativity. Achievement and Personal control | | |
| L1 | I enjoy talking the class round to my point of view | 1=Total disapproval to 7=Total approval |
| L2 | I usually take the initiative on any project I'm involved in. | |
| L3 | I think I can easily carry my classmates with me when I have an idea. | |
| L4 | I enjoy taking responsibility for things in the classroom. | |
| L5 | I like taking the lead in projects at school. | |
| L6 | When we do a school project I'm right there at the centre of things. | |
| C1 | I believe that a good imagination helps you do well at school. | |
| C2 | I enjoy lessons where the teacher tries out different ways of teaching. | |
| C3 | Being creative is an advantage in lessons. | |
| C4 | I like lessons that really stretch my imagination. | |
| A1 | I have a lot more energy than most people at school. | |
| A2 | I like to get things off the ground when we're doing a project. | |
| A3 | I'm usually the "driving force" among my friends | |
| A4 | I like to have a role at the margins of a project. | |

| | | |
|------|---|--|
| PC1 | I like to get on with things in class rather than be taken through step-by-step by the teacher. | |
| PC2 | I usually get on with things in class rather than wait for everyone else. | |
| PC3 | I don't like lessons where we are left on our own to get on with our work. | |
| PC4 | I prefer to figure things out on my own rather than rely on a teacher to explain everything. | |
| Int1 | Making mistakes is a good way to learn | |
| Int2 | I don't like making decisions unless I have all the facts | |
| Int3 | I'll have a guess at a solution to a problem rather than give up | |

^A Kolvereid (1996) and Peterman & Kennedy (2003); ^b Athayde (2009)

| Table 2 SAMPLE CHARACTERISTICS | |
|--|-------------|
| Men (N) | 69 |
| Women (N) | 59 |
| Invalid | 3% |
| Average age (std dev.) | 21 (2.2) |
| Parents' entrepreneurial experience (Average/std. dev.) | 3.58 (2.31) |
| Others entrepreneurial experience (Average/std. dev.) | 4.55 (1.96) |
| Personal Entrepreneurial experience. (Average/std. dev.) | 2.92 (1.51) |
| Professional Experience (average/std.dev) | 2.69 (1.20) |

The responses to items PD2, PF1 and PF3 were inversely scaled (1=7, 2=6. etc.)

RESULTS

Measuring the Quality of Scales

As a prior step to the analysis of the impact of the intervention program, the quality of the questionnaire scales was checked to determine their level of adequacy. To do this, a polytomous Rasch model (Rasch, 1980) based on Latent Trait theory was applied. This model is an alternative to those based on Classic Test theory and is increasingly accepted among academic researchers (Wang, 2010).

In this study, the application of Rasch methodology is appropriate to evaluate the reliability and validity of the scales used based on two fundamental assumptions: specific objectivity or invariance and unidimensionality of the measures used.

Regarding the first assumption, the levels of reliability of Entrepreneurial Intention and Attitudes toward Enterprise were tested. The parameters of the model were estimated by the maximum likelihood method using Winsteps software (Linacre, 2013). In Table 3, the estimated statistics by the Rasch model are shown to determine the precision of the measures. Reliability index values for the items were above 0.9 in the scales of the two samples, as well as high separation index (>2). This result confirms that the measurement instrument discriminates correctly among those surveyed and, therefore, increases the precision of measures.

The validity of the measures is evaluated with the analysis of the fits. Its objective is to identify the items and students that do not behave as expected by the model. To do this, the Rasch model provides the OUTFIT and INFIT analysis for each item and subject, and for each

sample studied. Both statistics correspond to the level of external and internal fit, respectively, given by students depending on the difficulty of the response to the items through the non-standardized index MNSQ (values between 0.5 and 1.5 are considered acceptable) and of the standardized ZSTD (values ± 2). The values obtained show a good level of fit and confirm the soundness of the results analyzed with the Rasch model. Consequently, comparisons between students who answered the questionnaire are independent of the items. Thus, the estimations of parameters are not influenced by the distribution of the sample (invariance).

As for the second fundamental assumption of the Rasch model, the determination of the unidimensional character of the scales, the variance explained by the measures is analyzed. This parameter reached a value between 56% and 63% in the two samples on the Entrepreneurial Intention scale. Regarding the measure, Attitudes Toward Enterprise, the explained variance was between 37% and 45% in the initial and final samples, respectively. Moreover, the eigenvalues of the unexplained variance are lower than 3. This allows us to confirm the unidimensional nature of the scale (Linacre, 2013).

| | Entrepreneurial Intention | | | | Attitudes Toward Enterprise | | | |
|--------------------------------------|----------------------------------|----------------|-----------------|----------------|------------------------------------|----------------|-----------------|----------------|
| | Before EE | | After EE | | Before EE | | After EE | |
| | Items | Student | Items | Student | Items | Student | Items | Student |
| Measure Mean | 0.0 | -0.39 | 0.0 | 0.41 | 0.0 | 0.18 | 0.0 | 0.51 |
| S.D. | 0.58 | 0.24 | 0.77 | 0.4 | 0.25 | 0.36 | 0.34 | 0.38 |
| OUTFIT MNSQ | | | | | | | | |
| Mean | 1.15 | 1.11 | 1.15 | 1.24 | 1.03 | 1.03 | 1.22 | 1.22 |
| S.D. | 0.56 | 1.51 | 0.44 | 1.41 | 0.34 | 0.57 | 0.9 | 1.06 |
| INFIT MNSQ | | | | | | | | |
| Mean | 1.06 | 0.99 | 1.03 | 1.08 | 1.03 | 0.98 | 1.03 | 1.13 |
| S.D. | 0.36 | 1.13 | 0.30 | 0.71 | 0.26 | 0.48 | 0.19 | 0.82 |
| Separation Index | 8.62 | 1.17 | 8.47 | 1.99 | 4.95 | 2.74 | 4.74 | 2.38 |
| Reliability | 0.99 | 0.58 | 0.99 | 0.80 | 0.96 | 0.88 | 0.96 | 0.85 |
| Raw variance explained | 56% | | 63% | | 37% | | 45% | |
| Unexplained var. 1st contrast | 3.0 | | 2.3 | | 2.7 | | 2.4 | |

Entrepreneurial Intention (14 items/128 students) Attitudes towards Enterprise (21 items/128 students)

Analysis of the Intervention Program's Impact

To determine the impact of the intervention program and check if there were significant differences in students' responses to the items of each of the dimensions related to promoting entrepreneurial spirit, the variance of data collected both at the beginning and at the end of the program was analyzed.

A summary of the statistical analysis is provided in Table 4 and shows the differences in the mean scores of the students for each of the dimensions of the EE construct. These differences were statistically significant in the items used to measure five of the dimensions in the questionnaire: Entrepreneurial Intention, Perceived Desirability, Perceived Feasibility, Leadership and Achievement.

| Entrepreneurship Education | Before program | After program | Sig. | |
|-----------------------------------|-----------------------|----------------------|-------------|-----|
| Entrepreneurial Intention | 2.2 | 1.6 | 0.000 | *** |
| Perceived Desirability | 2.4 | 1.8 | 0.000 | *** |
| Perceived Feasibility | 4.0 | 3.5 | 0.000 | *** |
| ATE | | | | |
| Leadership | 4.5 | 5.5 | 0.000 | *** |
| Creativity | 5.6 | 5.9 | 0.162 | |
| Achievement | 3.7 | 4.3 | 0.004 | ** |
| Personal control | 4.2 | 4.1 | 0.391 | |
| Intuition | 5.6 | 5.8 | 0.577 | |

Level of significance <0.01***; <0.05 **

The results show an improvement in the mean values of those surveyed in the other three dimensions of the model: Creativity, Personal Control and Intuition. However, the statistical analysis did not confirm the existence of significant differences between these values from the initial and final questionnaires of the program.

Consequently, the results demonstrate that following an EE intervention program, students showed a greater intention, desire, perception of feasibility of entrepreneurial activity and a better attitude towards entrepreneurship based on the higher scores on dimensions of the ATE measure.

CONCLUSION AND IMPLICATIONS

The results obtained in this study, in the context of a developing country like Senegal; show that entrepreneurship education has a positive and significant effect on young undergraduates' entrepreneurial potential. This conclusion coincides in both analyses, based on the two main approaches drawn from the literature: the one that evaluates entrepreneurial intentions, feasibility and desirability of starting a business (Kolvereid, 1996; Peterman and Kennedy, 2003) and the other that measures entrepreneurial attitudes (Athayde, 2009). In this paper, we measured the level of these variables after students' participation in an entrepreneurship education program.

Moreover, the results obtained also coincide with the majority of recent studies in the field of entrepreneurial education in the university context (Paço, Ferreira & Raposo, 2016, Kusmintarti, Thoyib, Maskie & Ashar, Rodríguez et al., 2015; Kaltenecker, Hoerndlein & Hess, 2015). However, these results are not homogenous for all the variables related to the entrepreneurial potential of participating students. Thus, though there is a substantial improvement in entrepreneurial intention and its antecedents (perception of desirability and feasibility), all the attitudes associated with an entrepreneur do not improve. For example, the improvements observed are not statistically significant in Senegalese students' attitudes to

creativity and intuition. These attitudes are perhaps more connected to the so called entrepreneurship by opportunity in a socioeconomic context distinct from the one analyzed here (Thurik and Wennerkers, 2004; Wennekers et al, 2005).

These results allow us to advance in our understanding of entrepreneurship, along the lines of Wright and Stigliani (2013) by determining how entrepreneurs' cognitive processes and learning based on their experience interact with different institutional environments and how growth-seeking opportunities differ between countries. This is especially relevant in the context of a developing country like Senegal. Previous studies (García-Rodríguez et al, 2015) have shown that cultural differences, compared to more developed countries, influence the antecedents that make up entrepreneurial intention in such a way that perceived feasibility is a more determining factor than perceived desirability.

It seems that the cultural specificities observed in the Senegalese context (Ross, 2008) and affecting the entrepreneurial process (Garcia-Rodríguez et al, 2015) are also shown in the EE process. Thus, aspects more linked to individual characteristics of the entrepreneur such as creativity, personal control and intuition do not register significant improvements. This fact could be rooted in the more collectivist character of Senegalese society, confirming the importance of the individualism-collectivism dichotomy pointed out by Triandis & Suh (2002) as the most important cultural dimension in determining the entrepreneurial potential of a particular country or region.

These results also contribute to filling some of the gaps in EE such as the contradictory results observed in a range of studies (Martin et al 2013), and the prevalence of the "business planning approach" in EE (Fayolle, 2013). Furthermore, the socioeconomic and cultural context of a less developed country, like Senegal, in which this long-term EE project was developed, has yielded highly positive results in terms of improving participants' entrepreneurial intention.

The above results are extremely interesting from an applied perspective to the extent that they highlight the efficiency of EE programs in developing countries as a tool for improving economic activity through promoting entrepreneurial activity. State institutions and development aid need to play a more active role in promoting these kinds of interventions. However, the results also point to the need to make certain adaptations in the design of the programs for countries with cultural specificities such as Senegal and take into account particular strategies for the development of attitudes linked to individualism.

Given the paucity of studies on EE in cultural and socioeconomic contexts like the one analyzed here, further research is needed to corroborate the results obtained in this work. In this sense, it would be necessary to determine to what extent developing countries' socio-economic contexts produce the same results in EE programs and how their cultural differences may determine different results. Specifically, it would be necessary to distinguish those countries in which, as in the case of Senegal, cultural collectivism is more present, compared to those in which individualism is the predominant attitude. Additionally, in the design of future analysis, it would be useful to include control groups that would allow the differences identified in students undergoing the intervention to be confirmed and isolated from external effects.

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