Vlerick Leuven Gent Management School
the Autonomous Management School of
Ghent University and Katholieke Universiteit Leuven

Vlerick Leuven Gent Working Paper Series 2008/25

IMPACT ASSESSMENT OF AN ENTREPRENEURSHIP COURSE ON STUDENTS' ENTREPRENEURIAL COMPETENCIES: A CONSTRUCTIVIST PERSPECTIVE

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D/2008/6482/35

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ABSTRACT

This paper reports on educational issues of an entrepreneurship course, supported by a constructivist perspective. The study discusses the relevance of constructivism in entrepreneurship education. As a way of assessing this issue, a pre-test-post-test multiple-group quasi-experimental design was performed with the data collected during an academic term. Data were collected by using three instruments to examine the students' entrepreneurial competencies and self-efficacy levels; two of them were newly developed. Results indicate that an action-oriented instructional approach, fitting into the constructivist view, has a positive impact on the development of entrepreneurial competencies in undergraduate students. Furthermore, the findings reveal that students self-assessed higher on their entrepreneurial self-efficacy after the course completion. Discussion of the findings and implications for future research are presented.

Keywords: Constructivist Perspective, Entrepreneurship, Competencies, Self-efficacy.

INTRODUCTION

Today's world is experiencing rapid technology changes that make technological innovation and entrepreneurship be seen as the new forces for economic growth worldwide (Lalkaka and Abetti, 1999). Besides this assertion, political bodies around the globe have included the stimulation of entrepreneurship into their strategic goals and policies. The European Commission (2004a), for example, posits that entrepreneurship is one of the key components to be included in current educational systems in order to prepare people for successful participation in society. In fact, the contribution of entrepreneurship to the world economy is well recognized; nevertheless, there is still debate about whether we can teach students to become entrepreneurs (De Faoite, 2003; Fiet, 2000; Garavan and O'Cinneide, 1994a; Moro, Poli and Bernardi, 2003). If so, two questions need to be answered: what should be taught? How should it be taught? (Fayolle, 1998). From one side, the debate addresses the problem of a lack of uniformity in courses' content and approach and lack of theoretical rigor (Falkang and Alberti, 2000; Fiet, 2000). Certainly, entrepreneurship is considered as a complex subject to study in the context of teaching and learning because it depends on the individuals' self-regulated actions and on characteristics that may not be easy to influence (Pihkala and Miettinen, 2003). However, it is believed that entrepreneurship can be taught or, at least, certain features of it through socialization and formal training; hence, nothing genetically conceived (Chell and Allman, 2003; Falkang and Alberti, 2000; Kirby, 2002; Klandt, 1998; Kuratko, 2003). On the other side, debate is still underway due to a lack of a well defined method for assessing the effectiveness of entrepreneurship education (Moro et al., 2003; Clark, Davis and Hornish, 1984; and Falkang and Albert, 2000). Most of research has focused on course contents, pedagogical and audience characteristics. In this respect, we maintain that the effectiveness can be measured in terms of the competencies developed by students during the course of an educational intervention. This requires that researchers assess the target competencies before and after the intervention. This approach does not deny the possibility of making longitudinal studies to investigate actual behavior of trainees.

As we agree that entrepreneurship can be taught, new instructional approaches should address the development of students' knowledge, capabilities and attitudes. The European Commission (2004b) stresses that these aspects are crucial for personal fulfillment and development, inclusion, employment, and entrepreneurial mindset. Accordingly, we contend that current educational methods have to emphasize a more active involvement of students in constructing knowledge; a suggestion that aligns with the constructivist perspective (Crawford and Witte, 1999; Lord, 1998). By seeking to construct knowledge, people try to make sense of the world; thereby, meaningful learning can be achieved (Snowman and Biehler, 2003). People learn meaningfully when they get an understanding of the world by making a real connection of their prior knowledge to new information (Driscoll, 2005). Another distinctive feature of the constructivist perspective is the student centrality in the learning process (Brooks and Brooks, 1999; Snowman and Biehler, 2003). Students are called to govern their own learning process and the instructors play the role of facilitators rather than evaluators of performance (Lobler, 2006). Taking this perspective, teachers are expected to orient their practices as to create motivating environments and to get students engaged in the learning process (Crawford and Witte, 1999; Iran-Nejad, 1995).

The above discussion reveal that substantial changes need to be made in both the content and process of teaching and learning in order to develop and enhance the students' entrepreneurial capabilities (Kirby, 2002). To fill this gap, this paper proposes an action-oriented educational intervention that fits into the constructivist perspective. The intervention is aimed at instilling in students the development of entrepreneurial competencies and, in turn, an increase of their self-efficacy. This leads us to formulate the following research questions: 1) to what extent does an educational intervention based on a constructivist approach have an effect on students' development of entrepreneurial competencies?; 2) Does an educational intervention supported by the constructivist perspective help students internalize the acquired entrepreneurial competencies as to increase their entrepreneurial self-efficacy? By answering these questions, this paper presents the key features of an educational intervention and the extent to which it has an impact on the students' entrepreneurial development.

The study makes the following contribution to the entrepreneurship field: 1) we propose an instructional approach that has constructivism as a theoretical underpinning for teaching entrepreneurship to university students; 2) we present information for educators to help them adjust their course content and approach for the students' entrepreneurial development; 3) we provide initial evidence that a constructivist perspective helps students internalize the acquired entrepreneurial competencies as to enhance their entrepreneurial self-efficacy. The remainder of this paper is organized as follows. Section one introduces the definition of a competency and how it is related to entrepreneurship education. The conception of entrepreneurial self-efficacy is presented in section two. The constructivist perspective and how it supports entrepreneurship education is reviewed in section three. Next, the hypotheses of the study are formulated in section four. Section five describes the method of the study. Section six presents the results and discussion followed by some limitations and implications for future research.

DEFINITION OF A COMPETENCY AND ITS RELEVANCE TO ENTREPRENEURSHIP EDUCATION

A competency is defined as an underlying characteristic of a person, which results in effective and/or superior performance in a job (Boyatzis, 1982; Spencer and Spencer, 1993). Entrepreneurs' jobs should not be understood in the traditional sense, instead, as those tasks involved in pursuing and running a new business (Bird, 2002; Bhide, 1994; Bruderl and Preisendorfer, 1998; Heunks, 1998; Olson, 1985; Reid, 1999). The roles and tasks performed by entrepreneurs are those that are relevant for their personal and venture success. The model proposed by Boyatzis (1982) involves five types of competency characteristics: 1) motives -- refer to what drives a person's behavior toward certain goal.; 2) traits -- include both thoughts and physical characteristics that are expressed in response to any general category of events; 3) self-concept -- is a less visible set of characteristics that include attitudes, values and self-image; 4) knowledge -- refers to information a person has in specific content area to perform his or her function; and 5) skills -- are the abilities to perform effectively in a given task.

The use of this model has been acknowledged for its predictive power on a person's behavior in a wide variety of situations and job tasks (Spencer and Spencer, 1993). In the case of entrepreneurs, these tasks are related to what is required to start and run a new enterprise.

Although the conception of a competency has been used as the guiding principle of analysis (Chandler and Hanks, 1994; Chandler and Jansen, 1992; Man and Lau, 2000), studies have been mainly oriented to link managerial or entrepreneurial competencies with firm-level performance. In an educational setting, on the other hand, our main interest is in individual-level competencies as we attempt to help students become more skilled and motivated to start and succeed in new ventures (Bird, 2002). In this respect, we maintain that the definition of a competency is relevant in the entrepreneurship domain as it provides the framework for developing proper content and approach of an educational intervention. Acknowledging that some competency levels are likely to be developed through formal training is an important starting point in delineating the in- and out- class activities in a given intervention. For example, those competencies at the motive and trait level reside in the inner part of an individual; therefore, to some extent hidden, deep, and central to personality (Spencer and Spencer, 1993). As these competency levels are based on an individual personality, they are more stable and difficult to influence (Bird, 2002). On the other hand, competencies at the skill, knowledge, or behavior levels are the most easily observed and possibly changed in the short term through an educational intervention (Bird, 2002).

THE CONCEPT OF SELF-EFFICACY

Self-efficacy refers to "people's belief in their capabilities to mobilize the motivation, cognitive resources, and courses of action needed to exercise control over events in their lives (Wood and Bandura, 1989, p. 364). One of the reasons for a generalized interest of the study of self-efficacy is that it appears to strongly affect a variety of behaviors (Snowman and Biehler, 2003).

It is not enough to possess certain skills but being able to use them well and consistently under a variety of circumstances, especially the most difficult ones. Wood and Bandura (1989) explain that beyond the required skills to be successful, a person must also have a strong belief in his or her capabilities to exercise control over events for the achievement of a desire goal. If a person perceives that certain behavior goes beyond his or her ability, the person will not act, even in the case of a perceived social demand for that behavior (Boyd and Vozikis, 1994).

Factors that affect self-efficacy

According to Bandura's theory, there are four ways by which people develop and strengthen beliefs about their efficacy: (1) mastery experiences (or past performance); (2) modeling; (3) social persuasion; and (4) judgments of their own physiological states (Bandura, 1982). Mastery experiences are considered the most effective way individuals develop a strong sense of efficacy. That is, people develop a sense of what they are able to do or not by thinking about how well they have performed in the past on a given task. The second source of influence is modeling or what Bandura refers to as vicarious experience (Bandura, 1982), which means that people partly judge their capabilities in comparison with others. Self-efficacy may also be influenced by social persuasion that takes place when we frequently try to give realistic encouragements to other people. The last source is related to physiological states from which people partly judge their capability, strength, and vulnerability (Bandura, 1982).

The concept of self-efficacy has been subject of extensive research as it has important implications in management science and entrepreneurship (Boyd and Vozikis, 1994; Krueger and Brazeal, 1994; Wood and Bandura, 1989). Prior research, for example, identified a positive effect of entrepreneurial self-efficacy on the likelihood of being an entrepreneur (Chen, Greene, and Crick, 1998). Moreover, Boyd and Vozikis (1994) proposes that self-efficacy is influential in the development of entrepreneurial intentions and, hence, the likelihood that those intentions will result in venture creation.

THE CONSTRUCTIVIST PERSPECTIVE TO ENTREPRENEURSHIP EDUCATION

As discussed, competency models are useful when designing an educational intervention for the students' entrepreneurial development. We can specify what activities can be used and the level of competencies that we pursue to influence in students. The extant literature has stressed that some competency levels are possible to be changed in a relatively short term, which enables the possibility of an educational intervention (Bird, 1995; Man, Lau & Chan, 2002). However, how a given set of competencies can be developed through formal training is a question that needs to be answered. In this regard, we contend that teaching entrepreneurship through lectures and reading texts does not encourage students to be active in their learning process; hence, it does not promote the development of entrepreneurial competencies. In contrast, we maintain that an alternative paradigm is the constructivist view of education. Under this paradigm, education is driven by basic principles (Lobler, 2006) that include: 1) having students being central to the learning process and teachers being facilitators of learning rather than disseminators of information; 2) letting students achieve their learning goals while giving them support; 3) discussing with students what content to be covered and the competencies to be developed; 4) avoiding the use of tests to evaluate students' performance, instead facilitating their learning through relevant activities that mimic real-world situations; 5) allowing interaction among students and group work while receiving feedback from teachers; 6) allowing students to solve problems on their own while leading to find solutions by asking motivating questions.

The constructivist perspective of learning can take one of two forms: one has a cognitive focus, and the other emphasizes the role of culture and social context (Snowman and Biehler, 2003). Even though these two variations emphasize different aspects of learning, they are not incompatible and both have an important role in meaningful learning. The cognitive perspective, on the one hand, does not deny the possibility of learning in groups, and the social approach, on the other hand, does not disprove the value of working independently of others. This compatibility can occur, for example, among people that play musical instruments in an orchestra (Snowman and Biehler (2003).

They usually practice individually or in a group because there are some things that are best learned by themselves that include breathing, fingering, or bowing or, otherwise, as part of the orchestra. The cognitive view focuses on the mental processes that occur within individuals. According to Piaget's theory (Piaget and Inhelder, 1967, 1969), children invent and reinvent knowledge as they develop and interact with their surrounding environment. This means that individuals acquire knowledge through their actions as they approach their environments. The social form of constructivism takes into account that people's arguments and points of view have a relevant effect on meaningful learning (Snowman and Biehler, 2003). The social context plays a crucial role in what and how knowledge is acquired (Vygotsky, 1986); hence, activity in groups is central in human social and work behavior (Smith, 1978). According to Vygotsky's ideas, individual development and learning are facilitated as people are embedded in social activities. In this line, cooperative groups can be an effective strategy for learning (Whicker, Bol and Nunnery, 1997).

Although the relevance of constructivism has been acknowledged for it provides more comprehensive understandings of the entrepreneurial process (Karp, 2006), little has been done to integrate the constructivist view into entrepreneurship education (Lobler, 2006). Some of the reasons for not having a more generalized application in entrepreneurship education may be that constructivist techniques are often more time consuming than are media-based or lecture-based teaching practices. Usually, constructivist learning experiences require high cognitive demands on students and they may not respond well to the challenge (Perkins, 1992). Furthermore, Lobler (2006) argues that constructivism has been overshadowed by objectivism as the latter gives place to the implementation of mechanical processes which make it be efficient and functional. It means that students are commonly led to memorize and repeat newly presented information. On the other hand, constructivist teaching practices are well recognized as they help students internalize and reshape, or transform new information (Brooks and Brooks, 1999). The resources, commitment and cognitive processes that entrepreneurs are expected to handle to identify opportunities, evaluate and exploit opportunities (Shane and Venkataraman, 2000; Venkataraman, 1997) provide a good argument to justify the appropriateness of the constructivist perspective in entrepreneurship education.

Human reality is constantly being constructed, described and developed by individuals (Karp, 2006). Following this assumption, we contend that preparing students under the constructivist perspective fits well into what is needed for encouraging entrepreneurial behaviors. Some of crucial entrepreneurial behaviors include exploring and exploiting business opportunities, developing and using networks, taking initiatives, being able to take calculated risks, and persevering to achieve a goal (Karp, 2006). Going in this direction, entrepreneurship education has to take into account who entrepreneurs are and what they regularly do when facing an entrepreneurial venture. In this regard, Lobler (2006) argues that a crucial consideration for designing entrepreneurship programs is the openness of the learning process. This implies that entrepreneurship education should be oriented to instill in students the development of competencies commonly exhibited by entrepreneurs. They are frequently observed in young children and involve: exploring the surrounding environment, trying different avenues to get insights of how things are, being creative, and being impatient (Lobler, 2006). Through an adequate intervention, we maintain that students can form their mental structures that drive them to become more entrepreneurial. That is, individuals can be enabled to create mental maps that support commitment and mental structures associated to the necessary skills, knowledge and capabilities to new venture creation (Mitchell, Smith, Morse, Seawright, Peredo, and Mckenzie, 2002).

HYPOTHESIS DEVELOPMENT

We have argued that the constructivist view of education is appropriate for entrepreneurship education. The extent to which this perspective is supportive in facilitating students to achieve learning and to become more entrepreneurial is a major concern in this study. The next section presents the hypotheses formulated in this study.

The Constructivist perspective as a supportive approach for competency development

Knowledge, skills and understanding are all three commitments of most teachers (Perkins, 1998). This entails that teachers are expected to assist students in learning of knowledge as well as their understandings and intellectual skills (Reigeluth and Moore, 1999). Learning entails not only the knowledge that people posses but what they are able to do with what they know (American Association for Higher Education, 1992). That is, knowledge is something of value when an individual can deploy it with understanding (Perkins and Unger, 1999). Understanding implies that a learner can go beyond rote and routine thought and action (Perkins, 1998). In this regard, active engagement in learning may lead to better retention, understanding, and active use of knowledge (Perkins, 1999); features that are in line with the constructivist perspective. An instructional approach supported by the constructivist perspective yields significant better acquisition of scientific conceptions than a lecture-based instruction (Akkus, Kadayifci, Atasoy, and Geban, 2003). This can happen because the former refers to understanding where the later refers to facts and knowledge to be transferred to students (Lobler, 2006). "To understand a topic means no more or less than to be able to perform flexibly with the topic – to explain, justify, extrapolate, relate, and apply in ways that go beyond knowledge and routine skill" (Perkins, 1998, 42). This means that when students achieve understanding, they become more competent in what they are able to do as they can apply learnt concepts in different situations. Hence, they are more likely to successfully perform a job or task by properly applying possessed knowledge and skills. Based on the above discussion, the following hypothesis is formulated:

H1*: Students who have been exposed to entrepreneurship training that follows a constructivist approach will exhibit higher levels of entrepreneurial competencies by proper application of knowledge and skills in settings that mimic real-world situations after the course completion.*

Team learning and the development of entrepreneurial competencies

As learning is a social and an individual process, knowledge and understanding are co-constructed in dialogue with others (Perkins, 1999). Working in groups is a useful strategy, especially when problem-solving exercises involve realistic situations (Crawford and Witte, 1999). This strategy prevents students from getting frustrated when working individually in complex tasks. When working in groups, learning is facilitated as students have the opportunity to assume different roles, to observe and interact with their peers, and to have debates on issues that complement one another (Gardner, 1999). Previous research emphasizes that working in teams is more beneficial than doing individually, especially for low achievers (Hoogveld, Paas and Jochems, 2003). Furthermore, other studies confirm that a cooperative learning strategy have resulted in higher achievement in mathematics education compared to working individually (Whicker, Bol, and Nunnery, 1997). This view of education aligns with Vygotsky's ideas in that individual development and learning are facilitated as people are embedded in social activities (Vygotsky, 1986). This implies that a social context plays a crucial role in what and how knowledge is acquired (Vygotsky, 1986); therefore:

H2*: Students who follow an instructional approach in which term projects are developed in teams will exhibit higher levels of entrepreneurial competencies after the course completion than students who work individually, which is evidenced by proper application of knowledge and skills in settings that mimic real-world situations.*

Linking the students' entrepreneurial competencies and their self-efficacy beliefs

The concept of self-efficacy is of great relevance in the entrepreneurship field as it presumably affects intentionality towards becoming an entrepreneur (Boyd and Vozikis, 1994 which, in turn, is important because it may influence actual behavior (Bird, 1988). Self-efficacy is the perceived personal capability to perform a given job or task (Wood and Bandura, 1989). While possessing the necessary skills for performing a certain task is essential, people also need to have a resilient self-belief in their capabilities in order to succeed in accomplishing certain goals (Wood and Bandura (1989).

That is, to be successful a person must possess strong self-efficacy beliefs as it will stimulate their motivation and problem-solving skills. In other words, a person's belief in regard to whether certain goals can be achievable is affected by their self-efficacy beliefs (Boyd and Vozikis, 1994). In consequence, a person will not act if he or she perceives that certain behavior or desire outcome goes beyond his or her ability. It is not enough to influence in students the development of entrepreneurial competencies to be prepared for an entrepreneurial career but also to foster their self-efficacy beliefs. As Krueger and Brazeal (1994) argue, promoting self-efficacy is more than merely teaching competencies. To really enhance self-efficacy, people must fully internalize those competencies through perceived mastery. This means that students will exhibit higher self-efficacy levels when they have internalized the acquired/developed competencies as to become part of their behavior and thinking. We posit that entrepreneurial self-efficacy enhancement can be achieved by an educational intervention supported by the constructivist perspective. According to the above discussion, we formulate the following hypothesis:

H3*: Students who exhibit higher levels of entrepreneurial competencies will self-report higher levels of entrepreneurial self-efficacy after the course completion.*

METHOD

Current section describes the method used to test the forgoing hypotheses regarding the effect of an entrepreneurship course, serving as the educational intervention, on the students' development of entrepreneurial competencies. First, the educational intervention is described followed by the research design.

The Educational Intervention

An entrepreneurship course, serving as the educational intervention, provided the setting of this study. This course is mandatory for all undergraduate students, being offered halfway in their curricula and delivered on a time schedule of fourteen weeks totaling 56 hours of class sessions.

Educational Framework

The educational framework relies on the belief that entrepreneurs are not born, they develop (Garavan and O'Cinneide, 1994a; Krueger and Brazeal, 1994; Hisrich and Peters 2002). The underlying assumption is that competencies are changeable and learnable, which enables the possibility of an educational intervention (Man, Lau and Chan, 2002). On the basis of this assumption, the course followed an action-oriented approach in order to promote significant learning experiences, as suggested by Fiet (2000). Exposing students to relevant activities is a crucial step in challenging them to develop entrepreneurial competencies through practice. This approach aligns with the constructivist perspective in that learning is essentially active, which implies that a person who is truly passive is incapable of learning (Abbott and Ryan, 1999). By actively participating in achieving their learning goals, students are expected to work better if they feel good about their learning. When learning something new, a person brings to that experience all previous knowledge and current mental patterns (Abbott and Ryan, 1999). This means that the new experience is integrated into an active web of understanding already existing in that person's mind.

Structure, content and teaching approach

This course is supported by a learning management system (LMS) tool similar to Blackboard ® or WebCT ®. The goals of the course are fourfold: 1) having an impact on students' awareness in future entrepreneurial career perspectives; 2) providing students with insights into the entrepreneurial process; 3) confronting students to competencies commonly exhibited by entrepreneurs; and 4) letting students explore their own entrepreneurial competencies and motivations. Overall, the course is divided into six basic units: a) entrepreneurship and its contribution to the world's economy; b) creativity and its link to the innovation process; c) identification and evaluation of business opportunities; d) review of entrepreneurial competencies; e) issues related to new venture creation; and f) development of a feasibility study or an early stage business plan as we interchangeably use in this paper.

All class sessions are structured in such a way that students exercise activities on an individual or group basis. Next, an open discussion is carried out among students about their findings.

Thereafter, the instructor presents the underlying theoretical concepts and gives feedback as related to the exercised activity. Finally, the instructor opens a plenary discussion to draw final conclusions on the learnt concepts. The implementation of this course approach is supported by the use of a mix of techniques in a flexible way to promote meaningful learning. Moreover, this approach seeks to confront the students' beliefs, traits and capabilities with real-world situations, frequently faced by entrepreneurs when starting and running an enterprise.

The class sessions and learning techniques are intended to let students deal with uncertainty, independent thinking and doing, and working with others to solving problems. Thereby, they are exposed to challenging situations that allow them to learn by doing and to develop entrepreneurial awareness and competencies. Role playing, for example, is one of the relevant techniques used to drive students through learning experiences that foster their knowledge building and demonstrate it with understanding performances. One of the role playing activities is a business game entitled "Buyers and Sellers", in which a group of students are the buyers and the others are the sellers. Each of the groups is given basic instructions allowing them to build upon such instructions as creatively as they can. Buyers play one of the three roles: innovators, mainstream, or laggards. The various groups of sellers are asked to specify the characteristics of an innovative digital camera and to sell it to the three types of buyers. The complete task is carried out in a cycle of two rounds. By using this game, students are exposed to concrete experimentation. In between the two rounds, students are allowed to sit back from the experience and review the drawbacks on the first round. The two-round business game gives students the possibility of modifying their strategies and trying them again to be competitive. The relevance of this activity is that it allows students to experience with a business that simulates real-world conditions related to value proposition and customer knowledge. Also, it gives the opportunity for open discussions among students and feedback from their peers and instructors.

The use of cases and videos are also important components of the proposed intervention. Six cases and eight short videos that portray real-world entrepreneurial endeavors are included for analysis and discussion either in-class sessions or via virtual forums. Two of the cases and six videos have been taken from the experiences of Ecuadorian entrepreneurs.

We contend that having contact with or listening to the testimony of local entrepreneurs is important for including a situated learning experience into the course activities. Situated learning is understood as learning that occurs when knowledge is presented in settings and applications that would normally involve that knowledge (Lave and Wenger, 1991).

Two other activities that provide the means for active experimentation are: 1) a mini-enterprise initiated and run for about a week by students enrolled in the course; and 2) a term project, in which students are committed to develop an early stage business plan. The first is aimed at challenging students to issues that an entrepreneur has to deal with when creating and running a new venture. This activity is relevant for entrepreneurship education as it helps to create an entrepreneurial culture among students (European Commission, 2004a). For developing the mini-enterprise, students gather and manage resources and time in order to develop product or service to be offered within the university campus. Advice is given to students not to use class time, nor to run any illegal business, nor to cause any disturbance to the university community. Their goal is to obtain the largest profits during the week time schedule. Mini-enterprises compete among each other for a prize. A three-page report must be written and used for discussion and reflection on the experiences gained by the students.

In the term project, students develop a feasibility study, doing a preliminary market research with limited resources (Sarasvathy, 2001), which is usually the case of entrepreneurs (Hisrich and Peters, 2002). Rather than only presenting the whole document at the course completion, students are asked to present the progress on their feasibility study in several class sessions. The progress of a specific stage is usually presented the week that follows the session where the underlying concepts were discussed. Fourteen from a total of 56 hours of class are devoted to review and discuss the various sections of the term project. Again, the mini-enterprise and the term project developed in and out-class sessions are oriented to expose students to complex situations, such as lack of information, uncertainty, development and use of personal contacts, search for advice from experts, and so on.

In sum, all the techniques described above are intended to expose students to meaningful learning experiences. “Meaningful learning refers to the process of relating potentially meaningful information to what the learner already knows in a non-arbitrary and substantive way” (Driscoll, 2005, 116).

This means that a person gets an understanding of the world by making a real connection of his/her prior knowledge to the new information acquired.

Pre-test-Post-test Multiple Group Quasi-experimental Design

The research was conducted as a multiple group pretest-posttest quasi-experimental design. A population of 470 undergraduate students enrolled in the entrepreneurship course was separated into two groups. From this population, 236 students were selected for the study, 202 were exposed to one of the two instructional treatment conditions and 34 to the other. The first experimental group was exposed to one of the two treatments in which students had to work on a term project in teams of 5 students whereas for the second treatment, they had to do it individually. As the subjects in the latter group were asked to voluntarily work on their term projects at the individual basis, a bigger group was difficult to reach. A control group of 38 students who did not receive any treatment at all answered the same questionnaires as the experimental groups did. Ages of the students ranged from 17 to 53 years with an average of 23. Fifty five percent were male and 45 % female.

MEASURES

Entrepreneurial competencies

By reviewing the extant entrepreneurship literature, several competencies that entrepreneurs are presumed to exhibit on their entrepreneurial endeavors have been identified. Particularly, this study focused on four competencies as we think they are crucial in the entrepreneurial process: identification and evaluation of business opportunities, networking and communication competencies. The pursuit of opportunities has gained attention as central to understanding the phenomenon of entrepreneurship. According to Shane and Venkataraman (2000) and Venkataraman (1997), the field of entrepreneurship refers to the study of how opportunities to produce future goods and services are discovered and exploited, by whom, and with what consequences (Shane and Venkataraman 2000; Venkataraman 1997).

Consequently, entrepreneurship "involves the study of sources of opportunities; the processes of discovery, evaluation, and exploitation of opportunities; and the set of individuals who discover, evaluate, and exploit them" (Shane and Venkataraman, 2000, p. 218). Entrepreneurs identify opportunities by a continuous scan of their environment looking for information that may lead to new business opportunities (Kaish and Gilad, 1991). Next, they make an evaluation – sometimes referred to as due diligence – that involves collecting information on the potential opportunity, in an effort that attempts to quantify the intuition or gut feeling (Lindsay and Craig, 2002). Thus, the identification and evaluation of a feasible economic opportunity are essential initial steps of a new venture creation (Baron, 2004).

In regards to the networking competency, previous studies have stressed the importance of entrepreneurs' social network for their entrepreneurial success (Larson, 1991; Johannisson, 1988). Networking refers to the ability to establish linkages with other business people and stakeholders for mutual learning and collaborative working aimed at achieving common objectives (Onstenk, 2003). When starting a business, the social relations can play an important role. This can happen because discussing with the entrepreneurs' personal contacts about the new venture can give them some ideas, for example, on where to obtain resources such as information, property, capital, and credit (Greve and Salaff, 2003).

Finally, the communication competency has also been identified as a relevant for entrepreneurial success (Onstenk, 2003; Hood and Young, 1993). Entrepreneurs have to be able to persuade and discuss with various stakeholders such as customers, clients, suppliers, competitors and service providers issues involved in their ventures (Onstenk, 2003). Communication is also crucial when looking for financial resources to launch a business. A clear and persuasive presentation of a business model is expected to gain interest of investors and other stakeholders. In this respect, communication both written and orally was one of the most frequently mentioned in importance as essential for entrepreneurial success (Hood and Young, 1993).

Measurement Instruments

Two instruments were used to measure the students' entrepreneurial competencies at the knowledge and skill level. Specifically, we were interested in examining whether students were able to properly use their entrepreneurial knowledge and skills in situations that mimic real-world settings. The main inquiry of the first instrument required that students choose the best alternative among five options in a set of four very short real-world-type cases (see the appendix for an example). This instrument was intended to make a more objective measure of student learning than what self-ratings can do. The equivalent-forms method was used to calculate the reliability coefficient for the first instrument as its format involved a multiple-alternative type test (Fraenkel and Wallen, 2003).

The second instrument asked students to self-report their entrepreneurial competencies along the four constructs described above. To do so, a self-reported measurement instrument was developed as suggested by Chandler and Jansen (1992) and Chandler and Hanks (1994). Self-reporting was performed since evidences indicate that self-perceived competencies are appropriate measures of actual competencies (Gist, 1987; Chandler and Jansen, 1992). According to Chandler and Jansen (1992), self-perceived measures can be useful when certain conditions are met, including: 1) the existence of a structured rating instrument; 2) they are used as a tool to discriminate across performance/skill dimensions; 3) individuals are working in isolation or have uncommon skills, and 4) they are utilized as a self-development tool. All of these conditions were met in the proposed instrument. The validation of a first version of this instrument was done by local experts in the field of entrepreneurship. As recommended by Chen et al. (1998), the instructions on this questionnaire emphasized the importance of honesty for self-assessment in order to reduce social desirability. The variables were measured by the use of a seven-point Likert scale, being 1 "Strongly disagree" and 7 "Strongly agree." A total of 14 items were used to measure self-perceived competencies along the four entrepreneurial competencies put forward in previous sections. After the first run of factor analysis, one item was eliminated, and a second run grouped these items in four factors. An example of these items is: "One of my greatest strengths is the ability to perceive unresolved problems that lead me to formulate a business idea." Four items were used to measure opportunity identification and three for the other constructs.

The pre-test of the instrument was conducted among 135 undergraduate students from ESPOL who were half way on their careers. The Cronbach's Alfa coefficients for each of the subscales were close to the 0.7 cut-off point, and three of them exceeded this point, which is an acceptable value for newly created scales (Nunnally, 1978).

Entrepreneurial Self-efficacy

The instrument developed by De Noble, Jung, and Ehrlich (1999) was used to measure entrepreneurial self-efficacy. The reliability coefficients of this instrument were reported to be close to the cut-off point of 0.7 for all the seven scales of the measure and four exceeded this value. The instrument was translated from English to Spanish and back-translated for accuracy reasons as recommended by Behling and Law (2000). To pre-test the Spanish version of the instrument, 135 undergraduate students were selected from ESPOL. The overall Cronbach's alpha coefficient for the instrument was 0.94.

RESULTS AND DISCUSSION

This section presents a summary of results on the educational experience delivering the proposed intervention to undergraduate engineering students. The main findings are described next followed by a discussion section.

Main findings

Table 1 shows means and standard deviations for the pre-test, Cronbach's alpha coefficients intercorrelations among the study variables of interest.

Insert Table 1 About Here

As can be noted, some variables were significantly correlated with one another. However, these correlations were not so high as to suggest that they were not different; therefore, all variables were included for further analysis.

To test the effect of the educational intervention on the students' entrepreneurial competencies at the knowledge and skill level, the general linear repeated measures model (GLM) technique was performed. The scores of the students for the two instruments – the short-case type test and the self-ratings – were considered.

The multivariate tests showed that one or all the dependent variables changed due to the education intervention, as the significance values for the variable "T" was less than 0.01 (see Table 2). Contrarily, the EXCG variable that identifies the three groups of the study was not significant at the 0.05 level, indicating that the means of the dependent variables between the subjects were not different. While this is especially true for the two experimental groups, differences did exist compared to the scores on the dependent variables for the control group. That is, students in the control group reported lower scores than those in the two experimental groups as it was expected because they did not receive the entrepreneurship training. We can also notice that the interaction between time and groups (T*EXCG variable) is significant at the 0.01 level, which is indicative of an effect of the intervention on the entrepreneurial competencies among the two experimental groups.

Insert Table 2 About Here

When performing the tests of within-subjects contrasts, we found that all the dependent variables had significance values lower than 0.05. This means that the significant results of the multivariate tests presented above are due to the effect of the educational intervention on the entrepreneurial competencies. This result, however, is true for the experimental group1 as seen in Table 3.

The differences in score means from the pre-test (T1) to the post-test (T2) can be observed in the summary of the estimated marginal means (see Table 3). This table shows that the score means associated to the dependent variables for the two experimental groups are higher on the post-test than on the pre-test and higher than those of the control group as expected. However, no significant differences are observed in the score means for all the self-perceived variables in the experimental group 2. Certainly, more research is suggested with a larger sample in this second group to confirm or refute the results reported in the present study.

On the other hand, the positive impact of the proposed intervention on the students' entrepreneurial competencies at the experimental group 1 is a promising result. In other words, these results are initial evidence that an educational intervention supported by the constructivist perspective positively affects the students' competency development.

Insert Table 3 About Here

Summarizing the results presented in Table 3, we can say that the significant differences observed in the dependent variables for the experimental group 1 gives support to hypothesis 1. That is, exposure to entrepreneurship training that follows a constructivist approach will result in higher levels of entrepreneurial competencies at the knowledge and skill level after completion of the intervention.

For testing hypothesis 2, we used the data regarding the "knowledge and skills" variable for the two experimental groups. The Levene's test was performed to observe whether the data on both groups had equal variances because the sample sizes were considerable different. This test resulted in equality of variances as the significance value was well above the 0.05 level (sig. = 0.694). Next, we performed the t-test and we found that the score means for the two groups were close to each other; hence, not significant differences existed (p=0.626) (see Table 4). That is, the two treatment conditions did not make any difference in the students' performance based on the short case-based test. This result does not give support to hypothesis 2, which is an unexpected result. Previous research has shown that individuals working in teams on somewhat difficult tasks perform better than those doing individually (Crawford and Witte, 1999; Hoogveld, et. al., 2003; Whicker, et. al., 1997).

Insert Table 4 About Here

We tested hypothesis 3 by regressing the aggregate measure of entrepreneurial self-efficacy (ESE) indicators as the dependent variable on the five predictors of the study. The data on these variables included the post-test scores on the short case-based test, and the self-ratings for the four entrepreneurial competencies of interest.

Since the two experimental groups were exposed to the entrepreneurship training and no significant differences existed in any of the explanatory variables, we considered the data set altogether. Three of the five variables resulted significant at the 0.01 level (see Table 5). When checking for potential problems of multicollinearity, no serious collinearity among the predictors existed as all the variance inflator factors (VIF) were below 2 (Hair, Anderson, Tatham, and Black, 1995). According to the regression model, higher scores on any of the three predictors yield higher levels of entrepreneurial self-efficacy since all the coefficients were positive. This result gives support for the hypothesis 3.

Insert Table 5 About Here

Discussion

This paper addressed the relevance of the constructivist perspective to entrepreneurship education. Fitting into the constructivist paradigm, an action-oriented instructional approach was proposed as it encourages students to govern their own learning (Lobler, 2006) and to learn by doing. An important feature of the suggested approach is that it exposes students to motivating experiences, such as constructing understanding of concepts, exploring new ways of doing things and finding relevant information to solve real problems. As we have discussed, the pertinence of constructivism in entrepreneurship relies on how individuals' perceptions of reality influence their actions (Karp, 2006). Under this perspective, individuals are constantly constructing their own reality of the world. Mapping this thoughts to individuals' behavior, we can portray entrepreneurs are those who construct mental frameworks regarding resources, personal contacts and assets required to engage in entrepreneurial activity (Mitchell, Smith, Morse, Seawright, Peredo, and Mckenzie, 2002). Furthermore, entrepreneurs are seen as individuals who have thoughts and mental maps that support commitment, as well as mental structures associated to the necessary skills, knowledge and capabilities to new venture creation.

I alignment with the above discussion, we consider that entrepreneurship education needs to be oriented to enable students to govern their own learning, self-discovery and self-development.

To this commitment, we maintain that the constructivist perspective is very appropriate for entrepreneurship education as it goes away from traditional teaching. Students are central to the learning process and teachers become facilitators of learning rather than disseminators and evaluators of performance. Students are seen as thinkers rather than passive individuals that memorize and repeat newly presented information. Students are allowed to interact with their peers while teachers are invited to post motivating questions and to give feedback.

As a way of assessing the issues discussed above, this paper reported the students' performance and perceptions about their achievement in an entrepreneurship course. We found initial evidence that an instructional approach based on the constructivist perspective of education has a positive impact on the development of entrepreneurial competencies in university students. In fact, the findings revealed that subjects who were exposed to the entrepreneurship training exhibited higher level of entrepreneurial competencies at the end of the intervention. The score mean for the control group was lower than those on the two experimental groups as expected since the former did not receive entrepreneurship training. We, nevertheless, have to admit that the impact of the intervention was not as considerable as we expected. This result is not surprising in the sense that an intervention delivered during one academic term seems to be insufficient for trainees to achieve higher levels of entrepreneurial development. Entrepreneurship is a complex subject to study in the context of teaching and learning because it depends on the individuals' self-regulated actions and on characteristics not easy to influence (Pihkala and Miettinen, 2003).

Certainly, more research is needed to confirm or refute these findings. To our knowledge, not previous research has reported whether a longer period of exposure to entrepreneurship training can help students develop to greater extent entrepreneurial competencies. On the other hand, the significant differences found in students' entrepreneurial competencies at the knowledge and skill level across time are an initial indication that such competencies can be measured and changed through formal training. In addition the proposed intervention seems to be promising as it was well accepted by students (Izquierdo, Caicedo and Chiluiza, 2006) and they demonstrated great enthusiasm in performing all the in and out-class activities. For instructors, it was also worthwhile because it challenged them to design and implement relevant activities that simulated real-world situations.

In contrast, the findings revealed that hypothesis 2 was not supported by the data collected on the two experimental groups. This hypothesis states that students working in teams in a term project activity outperform students who work individually in similar projects. This was not an expected result since usually people learn more effectively when working in groups than doing at the individual basis (Gardner, 1999). This can happen because in a group setting students can have the opportunity to assume different roles, to observe and interact with their peers, and to have debates on issues that complement one another (Gardner, 1999). A plausible explanation for this result is the fact that students exercised all the activities, except the term project, most the same as the others did, i.e. the only different activity in the overall intervention was the term project. In addition, this assignment was progressively developed and reviewed in several class sessions as new concepts were introduced, which allowed students to receive feedback from the instructor and their classmates. This way, they had the opportunity to grasp underlying concepts and to reflect on their mistakes in the project. Therefore, this sole activity did not account for distinguishing the students' performance in the course.

Another important result of the study is that students who self-reported higher levels of entrepreneurial competencies exhibited higher levels of entrepreneurial self-efficacy. As Krueger and Brazeal (1994) emphasize, fostering self-efficacy beliefs goes beyond teaching competencies because students and trainees must fully internalize those competencies through perceived mastery. Accordingly, we think that individuals may possess certain competencies; nevertheless, they may not deliberately exploit them unless these competencies become part of their behavior or thinking. Thus, the observed increase of ESE provides initial indication that the proposed intervention helped students internalize the acquired entrepreneurial competencies. That is, the intervention had a positive impact on enhancing the students' ESE. These findings are consistent with previous research that perceptions of formal training account for the enhancement of ESE among students concentrating in business-related majors (Zhao et al, 2005).

Limitations and Implications for Future Research

The study has some limitations. Although one of the instruments is a more objective measure of how students react on circumstances that mimic real-world situations, it is not an assessment of real behavior of students when confronted to an entrepreneurial endeavor. A more objective instrument, for example based on observations, is clearly needed for more accurate and better interpretations of the findings. Another limitation is associated to subjectivity because two of the instruments are only based on perceptions. A second source of data is desirable for the variables defined in this study with the exception of the self-efficacy construct because it is conceptualized as a self-reported measure. A third limitation has to do with the fact that the study was conducted in only one university. Respondents from other universities may have different views on the issues involved in entrepreneurial ventures. It is reasonable to expect that other institutions of higher education use instructional approaches that differ from the one proposed here. Students being educated at these institutions may be led to have different perceptions on the acquired competencies during the course of the intervention.

As we elaborated on the principles of the constructivist perspective, we furthered the link between theory and practice by proposing an action-oriented approach for instilling in students the development of entrepreneurial competencies. Taking into account that the constructivist view demands a shift in the way we seek to educate students, future work is recommended for refining the activities proposed in the study. In this direction, it is suggested that the in- and out- class activities to be considered in entrepreneurship courses should be in close link to the competencies that we pursue to instill in students. By doing so, we think that we can prepare students to face the challenges that an entrepreneurial career demands.

Despite of the promising results, a follow up research study is needed for a better understanding of the potential benefits offered by the proposed instructional approach. It is advisable to conduct further research in order to have more refined instruments to assess the effectiveness of entrepreneurship education in terms of students' development of specific entrepreneurial capabilities. It is also desirable to conduct experimental research in which one of the treatment conditions uses a constructivist approach and the other does not.

This way, we would be able to make a better comparison that could lead us to generalization of the findings presented in this article. Although more research is certainly needed to validate our findings, the article is worthwhile as it provides initial indications about the effectiveness of a constructivist instructional approach.

Acknowledgement

We would like to thank Virginia Lasio, Jan Lepoutre, Guido Caicedo, and Katherine Chiluiza for their help in reviewing the first versions of this article.

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APPENDIX:

Put yourself in a hypothetical situation in which, besides you, local and international people are attending an important conference. This event is being held in two sessions with a break of ten minutes in between. During this break, you take one of the following actions:

a) You take a coffee and just wait alone for the start of the second part of the conference.
b) You see a group of participants talking to each other about different topics related to the conference. Then, you get closer to listen to the conversation.
c) After taking a coffee, you try to approach to other participants to introduce yourself to them and to exchange ideas and topics of interest.
d) You prefer not to have a drink, instead to contact by phone or by internet to your friends to talk about the topics of the conference.
e) You think that the conference is interesting although some topics were not clear for you and you prefer to wait until the end of the conference to get additional information.

TABLE 1

Descriptive statistics and zero-order correlations for the study variables of interest

	M	SD	Gender	Age	EKS	SPOIC	SPOEC	SPNWC	SPCOMC	ESE
Gender	-	-	-							
Age	23.2	4.82	-.351**	-						
EKS	13.3	3.96	.029	.033	(0.68)					
SPOIC	4.7	.72	.079	.081	-.018	(0.73)				
SPOEC	4.8	.66	-.006	.121	-022	.529**	(0.67)			
SPNWC	5.1	.80	.016	.087	.072	.481**	.424**	(0.76)		
SPCOMC	4.9	.79	-.051	.073	-.047	.367**	.404**	.378**	(0.66)	
ESE	4.9	.61	.045	-.015	-.021	.438**	.372**	.520**	.449**	(0.94)

N = 236; ** p < 0.01; Scale reliabilities are in parenthesis; **EKS**: Entrepreneurial knowledge and skills; **SPOIC**: Self-perceived opportunity identification competency; **SPOEC**: Self-perceived opportunity evaluation competency; **SPNWC**: Self-perceived networking competency; **SPCOMC**: Self-perceived communication competency; **ESE**: Entrepreneurial sefl-efficacy.

TABLE 2

Multivariate tests

Effect (Experimental groups 1 and 2 and control group included)												
	Between Subjects						Within Subjects					
	Intercept			EXCG			T			T*EXCG		
Tests	**V**	**F**	**p**	**V**	**F**	**p**	**V**	**F**	**p**	**V**	**F**	**p**
Pillai's Trace	.98	2811.0	.000	.06	1.7	.081	.10	5.9	.000	.09	2.5	.006
Wilks' Lambda	.02	2811.0	.000	.94	1.7	.081	.90	5.9	.000	.91	2.5	.006
Hotelling's Trace	52.6	2811.0	.000	.06	1.7	.082	.11	5.9	.000	.09	2.5	.006
Roy's Largest Root	52.6	2811.0	.000	.04	2.4	.039	.11	5.9	.000	.07	3.6	.004

V and F: Test Statistics values; p: significance value; T: time; EXCG: Identifier of the three study groups;
T* EXCG: Time and group interaction

TABLE 3

Estimated marginal means

		M		SE	
		T1	**T2**	**T1**	**T2**
EKS	**G1**	13.4*	14.2*	.28	.24
	G2	12.3*	14.3*	.68	.59
	Control	13.3	13.0	.64	.56
SPOIC	**G1**	4.7**	5.1**	.05	.06
	G2	4.7	5.0	.12	.14
	Control	4.6	4.7	.13	.14
SPOEC	**G1**	4.8**	5.3**	.05	.06
	G2	5.0	5.3	.11	.13
	Control	4.7	4.9	.14	.11
SPNWC	**G1**	5.1**	5.7**	.05	.08
	G2	5.3	5.6	.18	.18
	Control	5.1	5.1	.13	.17
SPCOMC	**G1**	4.9**	5.5**	.05	.07
	G2	5.0	5.2	.14	.16
	Control	4.8	4.8	.13	.15

N= 274; ** p < 0.01; * p < 0.05; **M**: Mean; **SE**: Standard error; **G1**: Experimental group 1 (N1 = 202);
G2: Experimental group 2 (N2 = 34); **CONTG**: Control group (N = 38); **T1**: Time at pre-test; **T2**: Time at post-test;
EKS: Entrepreneurial knowledge and skills; **SPOIC**: Self-perceived opportunity identification competency;
SPOEC: Self- perceived opportunity evaluation competency; **SPNWC**: Self-perceived networking competency;
SPCOMC: Self-perceived communication competency

TABLE 4

T-Test for the entrepreneurial knowledge and skills variable scores on the post-test

		Experimental group 1 (Team work) N=202	Experimental group 2 (Individual work) N=34	p
EKS (Post-test)	**M**	14.2	14.3	0.626
	SD	3.42	3.14	
	SE	0.24	0.54	

EKS: Entrepreneurial Knowledge and skills M: Mean; SD: Standard deviation; SE: Standard error of the mean

TABLE 5

Regression analysis result

	Unstandardized Coefficients			
Model	**B**	**SE**	**t**	**p**
(Constant)	2.892	.21	13.50	.000
EKS (post-test)	-0.01	.01	-1.09	.277
SPOIC (post-test)	.130	.05	2.68	.008
SPOEC	.212	.05	4.41	.000
SPNWC	.039	.04	1.06	.290
SPCOMC	.130	.04	3.43	.001

N = 236; Dependent Variable: Sum of ESE Indicators on the Post Test; **EKS**: Entrepreneurial knowledge and skills; **SPOIC**: Self-perceived opportunity identification competency; **SPOEC**: Self-perceived opportunity evaluation competency: **SPNWC**: Self-perceived networking competency; **SPCOMC**: Self-perceived communication competency; **R square** = 0.405; **Std. error of the Estimate** = 0.46