



# Entrepreneurial Abilities Development at Universities: The Case of Polytechnic University of Zacatecas, Mexico

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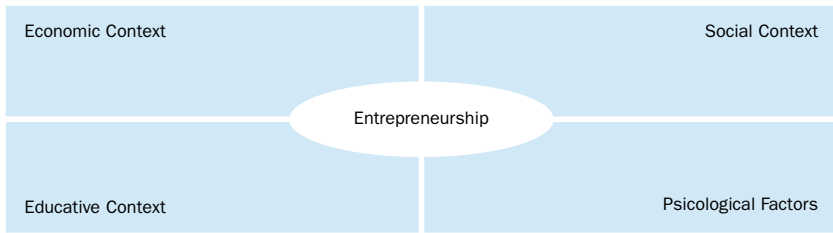
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The development of entrepreneurs is an issue that has attracted interest of higher education public institutions (HEIs); programs of entrepreneurial development, promotion of entrepreneurship, and entrepreneurial skills are certain aspects generated by this topic; however, very little attention has been given to the measuring of entrepreneurial abilities as an indicator of performance entrepreneur development programs. This study aims to measure the level of entrepreneurial skills of University students and compare them with the level of entrepreneur's skills in order to determine the impact of the program for entrepreneurial development on senior students of the Universidad Politécnica de Zacatecas in their career of administration and management of small and medium-sized enterprises.

*Keywords:* entrepreneurship; entrepreneur abilities; entrepreneur development programs; knowledge; learning; management

## Introduction

The development of entrepreneurs is a concept whose application has grown in recent years in higher education institutions (HEIs) in Mexico, similarly the number of HEIs and programs incorporating materials which foster business creation are also increasing. There has been a considerable change in linking HEIs with government agencies that direct resources to projects that emerge from classes or programs of entrepreneurship in HEIs, as is the SME Fund of the Ministry of Economy, which is responsible for the business incubator program. This program is mostly housed within the HEIs of the country with unique sections devoted to the development of entrepreneurs.



**Figure 1** Factors That Determine the Creation of an Enterprise

However, although some programs offered entrepreneurship training for skill development, the end result of these programs were business plans and investment projects based on the students' ideas. There are few programs that focus on the development of the entrepreneurial skills of students, which is of paramount importance if it is intended that young people's ideas would be realized through the creation of companies. Furthermore, in order for the companies to become even more successful through the years, it is necessary to form entrepreneurs, i.e. to develop skills in young people that enable them to create, develop, and maintain a competitive business.

The present research focuses on measuring the entrepreneurial skills of students attending the ninth term (lasting four months) of the career management and business management program offered by the Polytechnic University of Zacatecas (Universidad Politécnica de Zacatecas, UPZ). The objective of this research is to uncover the level of these skills; the results will serve as a basis for further research related to improving the entrepreneurial program development of UPZ, which aims to focus on the training of entrepreneurs.

This research report consists of five sections. The first describes the problem, justification and rationale of the research. The second section presents the theoretical framework of the development of the skills of entrepreneurs. The third section analyzes the contextual framework of the Technical University of Zacatecas. The fourth section sets out the methodology used to support the research and ensure the accuracy of the results. The fifth section presents the results obtained in the research.

### Background of the Problem

Within the HEIs, the entrepreneurial development courses are increasingly offered. However, certain non-academic factors are involved in the development of entrepreneurs, from the intrinsic personality traits of the individual to the environmental circumstances (Sharver & Scott, 1991). As shown in Figure 1, there are several factors that an entrepreneur must take into consideration to conduct a business.

Some HEIs are focused on the development of entrepreneurial programs from an academic viewpoint, namely the end result is the development of business plans. There are few entrepreneurial development programs (EDP) focused on gradual (in all grades) development of the students' entrepreneurial skills. This has given place and rise in the HEIs to have project banks that have very few students with the potential to be entrepreneurs.

### **Delimitation of the Problem**

Through the results of this research, the entrepreneurial skills of the undergraduate students of business administration and management of the Polytechnic University of Zacatecas (UPZ) will be measured and serve as a basis for further analysis of the integral development program of the UPZ. The research question is: How is the level of entrepreneurial skills of young students in ninth academic term of the degree in business administration and management of the UPZ compared with the level of entrepreneurial skills of young entrepreneurs in Fresnillo, Zacatecas?

### **General Objective**

The general objective of this research is to compare the level of entrepreneurial skills of young students in the career of administration and management of SMEs in the ninth academic term with the level of entrepreneurial skills of young entrepreneur.

### **Justification**

Determining the level of entrepreneurial skills of the students will serve as the basis for an assessment of the comprehensive development system of the UPZ. These entrepreneurial skills show various aspects of students (psychological, social, economic, educational, etc.) in order to analyze the entrepreneurial program and also to propose a methodology that provides greater entrepreneurial skills development. At this point, it is considered that the results of the research can significantly support, not only the academic, but also the economic environment considering that developing effective entrepreneurial skills of young people will lead to a positive impact on the economic development or the environment (Crissien Castillo, 2006).

### **Theoretical and Conceptual Framework of Entrepreneurial Skills**

The term 'entrepreneurial skills' includes a review of the concept of entrepreneurship and the main related theories. In this section, these concepts and theories are presented. Beginning with the concept of entrepreneurship, followed by the development of the use of this term through history, and finally an analysis of the theories and empirical development of entrepreneurial skills.

### ***Chronology and Entrepreneurial Concept***

The word entrepreneur comes from the Latin root *prendere*, meaning take. For many authors, including Martinez (2008), the word entrepreneur comes from the French word 'entrepreneur,' which means to undertake; however, the concept of entrepreneurship has been changing over time. Below are the most important theoretical contributions to entrepreneurship and entrepreneurial concepts:

### ***The Concept of Entrepreneurial Development Programs (EDP)***

The first courses in entrepreneurship development are rooted in the business development courses at the Harvard Business School (Katz, 2003). Starting with this moment, the addition of these courses in other universities has expanded considerably. For Lerma et al. (2007) the entrepreneur program attempts to implement, integrate and put in practice the knowledge acquired by students of various academic fields in order to generate innovative solutions that enable them to succeed in the business world and are the foundation of entrepreneurship. Yet, there are other lines or models of entrepreneurship development, as noted by Sandercock (2001):

- Creating centers to advise the entrepreneurs with researchers specializing in business areas;
- Interdisciplinary programs and entrepreneurial world recognition;
- Testing program business opportunities;
- Simulators of real environment risks and benefits;
- Implementation of technology for building consumer products;
- Developing of competitive skills for the business world.

### ***Entrepreneurial Skills***

Entrepreneurial skills are first mentioned by Jean Baptiste Say, who recognizes that an entrepreneur must be a person with perseverance and judgment of the world. Later, Marshall notes that the skills an entrepreneur must have can be acquired or developed (Rodríguez and Jiménez, 2005). Knight (1947) noted more skills such as: the capacity to plunge to risks and uncertainties, tenacity, indomitable energy, optimism, a lot of faith and confidence, creativity, imagination, achieving effective benefits, change innovation, money (as their main motivation), and knowledge of the sector in which a company is going to be created.

### ***Empirical Results on the Entrepreneurial Skills***

There are several studies that have been developed for the measurement of entrepreneurial skills. For the purpose of this study, the analysis was performed with a tool developed by Management Systems International (Wash-

**Table 1** Evolution of the Concept of Entrepreneurship

Author	Contribution
Richard Cantillon	Entrepreneur is ‘the person who buy means of production at prices that are uncertain at the moment that they are committed to their costs.’ The author also recognizes the economic activity that takes place and highlights the elements of direction and speculation somehow entering the business activity (Rodríguez, 1999).
Jean Baptiste Say	First mentioned the skills of entrepreneurs, describes them as people who must have judgment, perseverance, great knowledge of the business and the world, and possess the art of supervision and administration, also uses the term ‘entrepreneur’ in many of his works.
Johann Heinrich von Thünen	The entrepreneur could have the dual characteristics of individual risk taker and is extremely intelligent (Rodríguez and Jiménez, 2005). Entrepreneurs must have an income to compensate for the risk assumed. An entrepreneur is an explorer, discoverer and inventor of his/her field of activity.
John Stuart Mill	The entrepreneur must be paid for their work, as it is responsible for the commercial and industrial operations. He mentions that the entrepreneur has an ordinary skills compare to the rest of the team (Mill, 1951).
Hans von Mangoldt	Author of <i>The science of profit of enterprise</i> , a book that talks about the income of entrepreneurship.
John Bates Clark	Notes that the profits obtained by an entrepreneur are a form of salary paid to the entrepreneur for his vision and leadership skills (Formaini, 2001). He was the first to link the benefits of the entrepreneur with the introduction of technological, commercial and organizational advances in the economic process.
Alfred Marshall	He made moral contributions to entrepreneurship in relation to the question whether the entrepreneur accumulates wealth through legal or fraudulent mechanisms; furthermore, he noted that the skills the entrepreneur needs to have can be acquired and developed.
Knight Frank	Notes that an entrepreneur takes risks and says this is the entrepreneurship spirit, recognizes certain characteristics in the entrepreneur: the ability to plunge to risks and uncertainties, tenacity, indomitable energy, optimism and a lot of faith and confidence, creativity, imagination, achieving effective benefits, agent of change and innovation, money as the highest motivation, knowledge of the sector in which a company will be created. He mentions that entrepreneurs are born and that success depends on many factors.
Joseph Schumpeter	The entrepreneur is the innovator who helps economic growth by transforming an innovation (product, process, procedure, etc.) to a practical product, also defined as a person who gathers resources, organizes and provides leadership talent for commercial success (Shumpeter, 1984)
Carland	The difference between an entrepreneur and a small business owner is that the former creates a business to make it grow and profit, using concepts and techniques of strategic direction while small business owners create businesses for personal benefit (Galan, 1994).

**Notes** Own elaboration adapted from Chamorro (2007) and Campos and Vargas (2011).

ington), in which a test is performed to determine the degree of development of the following skills:

- Initiative
- Persistence
- Commitment
- Efficiency
- Risks
- Goals
- Information
- Planning
- Persuasive
- Self confidence

### **Contextual Framework of the Polytechnic University of Zacatecas (Universidad Politécnica de Zacatecas, UPZ)**

The UPZ was formed on September 2 of 2002 under the decree issued by the Government of the State of Zacatecas. It is headquartered in Fresnillo, Zacatecas and is one of the forty-three higher education institutions in the country, founded and incorporated into the Polytechnic Universities Subsystem. Their main sources of funding are the Zacatecas State government and the federal government. The Polytechnic Universities subsystem is a pioneer in implementing a model of competency-based education in higher education level. This model is designed to fully form and train its students by taking them to a world-class labor competition.

The organization is committed to targeting its services to the satisfaction of its customers, making efficient use of resources in the implementation of academic and administrative processes, continuously improving our Quality Management System. The Quality Policy is: 'At the University of Zacatecas we are committed to providing quality in higher education through comprehensive training focused on learning, based on job and professional competences, spreading universal values and assuming a social commitment.'

The offered courses are technology-oriented. There are currently five engineering and two administrative career programs.

- *Engineering*: Mechatronics engineering, Industrial engineering, Computer systems engineering, biotechnology engineering and energy engineering.
- *Administrative careers*: Bachelor degree in international business, management and administration of small Business.

The Bachelor in Management and Administration of SME's started in January of 2003 with 52 students enrolled in the same year. Additional 85 students were enrolled in the month of September. The numbers increased in the following year with 143 young people willing to continue preparing professionally. In September of 2005, the program reached 235 new registrations and in September 2006 the enrollment reached 296 students; the numbers continued to increase each year, with 302 students in 2007, 360 new students in 2008, and additional 381 students in September of 2009; consequently ranking as the career program with most enrollment at the institution.

The Bachelor of Management and Administration of SME's had 305 graduates from inception to December of 2011. Today, the development of entrepreneurial skills is a part of all career programs, including engineering, as a part of human development at UPZ.

### Methodology

In order to obtain the level of entrepreneurial skills of the students of ninth academic term of the degree in administration and management of SMEs in the ninth semester of UPZ, the test CEP of international Management Systems was performed on 41 students. The test group included 13 men and 28 women, who were pursuing the entrepreneurial development course. These results were compared to the test performed on 10 young entrepreneurs in the region, whose companies have been created one year ago.

### Analysis and Interpretation of the Results

As a first step in analyzing the results, the information was collected and coded in order to obtain the average scores of young people skills; thus, obtaining the results shown in Table 2. It should be noted that the results were taken on average dividing male and female students, in order to collect any data that reflects whether gender interfered with the development of some of the skills. Likewise, the bar marked as average combines the average of all students (male and female combined).

The maximum value of skill development is 25. In this first stage of analysis, it is evident that, on average, the more developed skills are commitment, goal setting, and self-confidence. Among the less developed entrepreneurial skills are skills such as less power to persuade, planning and measuring risks. As for the difference in abilities between men and women, no significant distinction was found, since they only vary by 1 or 2 points.

As part of the survey methodology, surveys were also performed with young entrepreneurs in order to compare the development of skills between the two groups (Table 3).

**Table 2** Level of Entrepreneurial Skills in Students

Group	Initiative	Persistence	Commitment	Efficiency	Risks	Goals	Information	Planning	Persuasion	Self confidence
Average	16	17	19	16	15	19	17	15	15	17
Men	16	17	19	16	14	19	17	17	16	16
Women	16	18	18	16	16	19	18	15	14	17

**Table 3** The Level of Entrepreneurial Skills in Entrepreneurs

Group	Initiative	Persistence	Commitment	Efficiency	Risks	Goals	Information	Planning	Persuasion	Self confidence
Average	23,6	22,7	22,5	22,9	22,7	22,7	22,7	22,7	22,6	23,1
Men	23,4	22,6	22,2	22,6	22,6	22,4	22,6	22,2	22,4	22,8
Women	23,8	22,8	22,8	23,2	22,8	23,0	22,8	23,2	22,8	23,4

**Table 4** Comparison of Entrepreneurial Skills between Students and Entrepreneurs

Group	Initiative	Persistence	Commitment	Efficiency	Risks	Goals	Information	Planning	Persuasion	Self confidence
Students	16	17	19	16	15	19	17	15	15	17
Entrepreneurs	23,8	22,8	22,8	23,2	22,8	23,0	22,8	23,2	22,8	23,4

As shown in Table 3, the skills of entrepreneurs fluctuate between 22.5 and 24, and when compared with the results of the student survey, it can be said that the former are above the average of entrepreneurial skills of students, in some cases by more than 8 points.

Table 4 shows the difference between the development of entrepreneurial skills among young entrepreneurs and students. An important fact to note is that in all the skills employers fluctuate at the same point, while the fluctuations of the students have more than five points between them. With these results the entrepreneurial development program of the UPZ's career of management and administration of SMEs it can be contextualized, it should be analyzed to find areas of opportunity and propose improvements in order to allowing them to be a trigger for increased efficiency in the level of entrepreneurial skills of university students, and thereby encourage entrepreneurship to increase regional economic development.



**Table 5** Comparison of Entrepreneurial Skills between Students and Entrepreneurs by Gender

Group	Initiative	Persistence	Commitment	Efficiency	Risks	Goals	Information	Planning	Persuasion	Self confidence
Entrepreneurs										
Men	23,4	22,6	22,2	22,6	22,6	22,4	22,6	22,2	22,4	22,8
Women	23,8	22,8	22,8	23,2	22,8	23,0	22,8	23,2	22,8	23,4
Students										
Men	16	17	19	16	14	19	17	17	16	16
Women	16	18	18	16	16	19	18	15	14	17

Table 5 shows the skills skill comparison by gender; the results display no or very little difference between men and women; however, there is a difference between entrepreneurs and students, since the entrepreneurs, as noted above, have a higher degree in each of the skills tested.

**Conclusions**

As discussed in the course of this work, studies of entrepreneurship began many years ago and from the beginning it was noted that successful entrepreneurs have special features that allow them to develop competitive enterprises. Over the years, it has been observed that these qualities may be inborn or can be developed with the support of entrepreneurial development programs that enable the people involved in these programs to develop their skills in a way to better themselves in this field. However, when analyzing some of these programs, it can be concluded that not all of them have the same results. It often depends not only on the type of people involved, but also on the program itself, which might not adequately potentiate the qualities of each participant.

It can be understood that an entrepreneur is a person who changes the course and the circumstances of his environment by meeting the of needs his customers, suppliers, employees, partners and competition in an innovative way. Entrepreneur is a term that involves not only creating companies (entrepreneurs), but also applies to those who generate improvements within their firms leading them to be more competitive. These processes promote and foster the development of enterprises and thus become an essential element of an economic development of a region.

That is why the development of entrepreneurs is a model that has been applied increasingly more often in HEIs resulting in a change from the training of employees toward the training of professionals with entrepreneurial skills. Under this scheme, certain HEIs are applying entrepreneurial devel-

opment models and programs either throughout the carrier development or in the framework of a couple courses. Furthermore, the entrepreneurial development programs are offered as optional courses for students who might need them.

These programs are widely discussed; however, their effectiveness, as mentioned above, has not yet been accurately measured. In the specific case of the state of Zacatecas, there are no indicators or data demonstrating the efficiency of the entrepreneurial development programs. Within the academic context, it is considered necessary that programs with an impact on society should be evaluated their effectiveness improved based on obtained feedback. This is the reason for this research. As the starting point, it outlines the measurement efficiency of an entrepreneurial development program; namely to evaluate the level of entrepreneurial skills of students who have already taken this program. The entrepreneurial skills are measured by performing a test on the students and the results are compared with the level of entrepreneurial skills of a group of young entrepreneurs in the region, who participated in the same testing process. Through the comparison of their results, a parameter that enables the evaluation of the potential entrepreneurship skills of future graduates is obtained.

Based on the results obtained in this research, an analysis of the entrepreneurial development program of the UPZ is recommended for the following reasons: the results related to the entrepreneurial skills of the students were well below the level of skills of entrepreneurs; furthermore, students entrepreneurial skills are clearly not developed unilaterally, namely certain skills are more developed than others. Meanwhile, all the skills of young entrepreneurs range around the same levels, allowing to conclude that the application of the entrepreneurial development program does not have effective results, since it is not generating a sufficient level of entrepreneurial skills in order to have potential entrepreneurs to support the development both of the program and the region, considering that within the Mexican economy over ninety percent of businesses are MSMEs.

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