

**Learning to Start Starting by Learning**  
**(Aprendiendo a Emprender Emprendiendo en el Aprender)**

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“Love, work and knowledge are the  
sources of life

They should also govern it”

Wilhelm Reich

(In the 50<sup>th</sup> anniversary of his death)

**ABSTRACT**

*The paper introduces an entrepreneurship teaching approach aimed at transforming the learning process in itself in a start up designed, managed and led by the student. This method has been developed and used in the School of Engineering and Science at the University of Chile over the last 5 years as a key element in the undergraduate courses “Introduction to Industrial Engineering”, “Development of Entrepreneurship Skills” and “Development of Leadership Abilities”. This method, based on a radical constructivist approach, emphasizes also the synergetic relationship between meaning and passion.*

**1. Brief History and Context:** The School of Engineering at the University of Chile accepts around 600 new students annually, all of who belong to the top 1 percent with the best results from Chile’s national university entrance examination. Around 30 percent of them choose to specialize in industrial engineering, a professional career that ranks among the best paid in the Chilean labor market. Each graduate from this specialty at the University receives, on average, four job offers, normally well before they have completed their degree. However, only a small percentage of graduates (less than 10 percent) proceed with their own initiatives after graduation.

The restoration of democracy in 1990 brought with it the revision and transformation, led by the Industrial Engineering Department in the field of entrepreneurship and innovation, of the pedagogical model and the curriculum. In 1990 the Department created the course IN 505, “Development of Entrepreneurship Skills,” as an elective course for students from all engineering specializations. In 1997, the course “Introduction to Industrial Engineering”, with a focus on the development of autonomy and entrepreneurial spirit, became an obligatory first year course for students of this specialty.

Both courses were designed by a group of researchers and teachers that, based on the pioneering works of Humberto Maturana and Francisco Varela in the field of the biology of knowledge, saw the possibility of simultaneously increasing the efficacy, efficiency and satisfaction of engineering students’ learning process by means of linking the development of entrepreneurship capabilities to improvements in learning skills and the general process of learning to learn .

A key contextual factor to understand this option to teach entrepreneurship is the fact that the Engineering School is part of the Faculty of Physical Sciences and Mathematics at the University of Chile, probably the academic unit closest and most loyal to the model of the ‘Research University’ in Chile. This implies that the majority of the academic staff has a clear orientation toward publishable research in internationally accredited media. Neither teaching

quality nor entrepreneurship formation are, therefore, priorities for academic evaluation and for academics work.

To approach the development of the students' capacities in this area by attempting to change the motivation and orientation of academic staff would, in this context, be to condemn the project to failure. On the other hand, a high percentage of students achieve neither good results nor reasonable levels of satisfaction from the traditional pedagogical model.

## **II. The Pedagogical Model:**

A pedagogical model, taking these contextual antecedents into account, was designed so that the student is invited very early on to understand:

- The crucial importance of entrepreneurship skills in the work of industrial engineers. A sample of 10 percent of graduates, undertaken in 1999, showed that this capacity was considered to be the most relevant for their work performance. (4.7 on a scale from 1 to 5)<sup>1</sup>
- The fact that entrepreneurship is a generic skill, relevant in all labor situations and not only for those that opt for business starts-up.
- The relations between entrepreneurship spirit and skills and the levels of autonomy, design and management of a person's own life in its fullest sense.
- The possibility of the student to take a proactive role in the process of learning, transforming it in a significant and transcendent start-up.
- The synergetic relationship between the mission assumed by an entrepreneur and the passion that the chosen mission is capable of generating.
- The basic practices of entrepreneurship behavior and the way to learn them.

## **III. The Epistemological Model:**

The invitation to students to strengthen their entrepreneurship capacities by means of transforming their studies in a start-up is supported by a radical constructivist epistemological model which emphasizes the following elements:

- The observer's participation in the construction of the reality he or she lives in.
- The role of paradigms, moods and focus in the process of building up reality and inventing oneself.
- The power to invent and change reality derived from the level of consciousness achieved and the capacity to modify paradigms, harmonize moods and control the process of focusing attention.

## **IV. The Operational Model**

Some of the specific activities at present in use in two of the courses based on this approach are:

*a) Course: "Introduction to Industrial Engineering".*

An obligatory curriculum course that acts as the gateway to the discipline of industrial engineering, with the main objective of "expanding awareness of him(her)self and to the world

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<sup>1</sup> Hetz, Rodrigo, "La vinculación de los exalumnos de la carrera de Ingeniería Civil Industrial de la Universidad de Chile" (The relationships of Industrial Civil Engineering graduates of the University of Chile) Professional Thesis, 1999.

and local environment, as a first step to appropriate of the process of learning and becoming and Industrial Engineer'. The course has around 90 students on average.

**Activity 1:** Mood setting practices: “Tuning in” and “Stretching”

**Description:** Each class begins with a five minutes individual exercise intended to investigate the moods, the preoccupations and the questions that students bring along to each class. In the last five minutes of the class, each student answers the “stretching” exercise, to identify the ending mood, the most significant learning points and an evaluation of the class and of his(her) involvement in the class.

**Objectives and Results:** The main goals of these two activities are to increase student’s capacity to observe and change their moods and the relationship between this skill and the quality of the “learning reality” that each student is capable of producing. Most students end up the course with a much higher consciousness of the role of moods and their capacity to actively participate in the building up of each class. These exercises are weekly used also to asses and redesign the activities of the course.

**Activity 2:** The generation, design and development of an action-learning project.

**Description:** Each student should select a “breakdown”<sup>2</sup> and present it in one minute in front of the class (for this activity the course is divided in two), and then using the Web support from *U-cursos*, each student votes for the three most significant “breakdowns”. On this basis the students are formed into different work groups throughout the semester to generate, design and develop an idea, product or process to transform the “breakdown” into an innovation. The first classes are oriented to stimulate initiatives and skills to work in teams in order to develop projects. A one day workshop entitled “Learning to Learn and to Start”, usually run on a weekend, has been designed to support this activity.

**Objectives and Results:** Every semester they achieve important initiatives including some that students continue beyond the regular academic course time. Examples of these have been: the “*expendepecil*”, a machine that issues pencils/pens and other articles for school and universities and “*juntas on line*”, a training and web system to strengthen participation in neighborhoods councils (*juntas vecinales*) in Santiago.

b) Course: “Development of Entrepreneurship Skills”

This is an elective course opened to students in the last two (of six) years of the curriculum plan. Its main goal is to immerse them in a real experience of designing and attempting a start-up project. On average there are around 20 students per semester.

**Activity 1:** “Individual design of the course as a start-up”

**Description:** As a way of producing an initial shock that allows them to quickly abandon the classic cognitive way of learning, students are asked to design the objectives, methods and evaluation system for the specific course each one of them is going to go through. They are invited to generate the program of the course based on the following main questions: What do I think it is to be an entrepreneur?, What specific skills do I want to strengthen?, What are my passions?, What sort of entrepreneur I would like to become? What do I think are the practices I should go through in order to achieve my goals?

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<sup>2</sup> A distinction used to distinguish an opportunity to start something new. Most engineering students are trained to solve problems but not to think of starts-up or innovate based on them.

Results: Usually, around a third of the students abandon the course at this stage, absolutely incapable of understanding the preparation of the program of the course as a means to train themselves as entrepreneurs. For the surviving students this very confusing initial phase is very useful for assuming the objective and the method of the course.

**Activity 2:** “Group generation of a start-up”

Based on a search of breakdowns that they can take care off in the horizon of a semester, students are invited to design and run a project in groups of three to six people. They are asked to relate this projects to the previous investigation on passions and desired skills.

Results: Students begin their initiatives from things that make them enthusiastic or resume projects that they once had; as examples, the firm *nocancela* which produces rock music events in Chile with a level of professionalism greater than the national standard; or the most popular (most visited) educational web site in Chile, [www.escolares.net](http://www.escolares.net). Some student comments about the course are, “*A different course, that allows our skills to develop and which is not possible in other regular curriculum courses*”. “*It allowed me to look at my decisions from another point of view. It allowed students to develop in other professional areas that were not simply technical;*” and “*Really this course has been one of the most important to me as an engineering student. It is practical, destroys paradigms and opens up possibilities for our students to the point that initiatives become a lifestyle*”.

**V. Conclusions**

Linking entrepreneurship teaching to learning to learn has been a very successful way to generate interest and skills related to entrepreneurship among students, especially in those that had not previously develop interest nor good habits with traditional teaching methods. But it also helps to validate entrepreneurship teaching among academics that benefit from more autonomous, active and participative students. We suggest that this approach is particularly adequate for research oriented universities.