Creativity and Talent Applied To The Structuring Of Industrial Engineers At The Escuela Colombiana De Ingenieria “Julio Garavito”. A Case: Introduction to Industrial Engineering.

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Abstract - In the course of Introduction to Industrial Engineering offered at the Escuela Colombiana de Ingeniería the students are shown the basic characteristics, objectives, goals and fields of application of the discipline according to the Proyecto Educativo Institucional (Institutional Educative Project). Initially the course was offered as a course common to all the different branches of Engineering which didn’t help to generate a sense of belonging to the chosen branch by each student. This motivated the design of a specific course to Industrial Engineering which was intended to allow students to identify the focus of their career by means of practical activities that facilitate the assimilation of the basic theoretical concepts of Industrial Engineering and which also promote the development of their creativity and talent abilities. On this article we show how the course grew, the methodology used and the results obtained with the new orientation of the above mentioned course as well as some future possibilities of development on this new paradigm of teaching at the Escuela Colombiana de Ingeniería.

Index Terms – Skills, Competitions, Introduction to Industrial Engineering, Creativity, Work in group.

INTRODUCTION

The Program of Industrial Engineering of the Colombian School of Engineering is conscious that a course of Introduction to the Industrial Engineering must present the historical precedents and the evolution of the Engineering across time, as Paul Grech presents it in [1] and, additional, he must develop in the students certain basic and indispensable competitions for his future professional exercise. The principal competitions that one seeks to develop in the students are: the capacity of analysis of a problem, the design of strategies or alternatives managerial thought to solve it, the team work, among others. Related to this topic of competitions, there are known throughout the world Mc Clelland's works [2], as well as those of Chomsky's linguistic competitions [3] and of Management of Levy-Levoyer's competitions [4].

Everything explained previously, he motivated the creation of an proper subject of the program that was presenting to the students the different topics involved in his formation as Industrial Engineers, beside developing the identity, the sense of belonging towards the career and the competitions previously mentioned. In this article, they present so much the work developed as the obtained results, with the design and putting in march of the course of Introduction to the Industrial Engineering in the Colombian School of Engineering. In the first section the current condition of the course appears, in the second section one presents the methodology used in the subject, in the third section they start knowing each some of the results obtained with the application of this methodology and finally there appear the conclusions and the perspective of the work to future to support or to improve till now achieved.

CURRENT CONDITION OF THE COURSE

Introduction to the Industrial Engineering seeks to present to the students the profile of formation of the Industrial Engineer of the Colombian School of Engineering developing in them competitions related to those type Civil and Generic Professional, specially with cognitive, communicative and of integration, which are defined in [5] and among which it is
possible to emphasize the creativity, the work in team and the skills to communicate in oral and written form.

To achieve a perfect harmony between the philosophy of the course and the reality of the same one, there has conformed from the year 2000 a team of teachers, composed by six industrial engineers, which work permanently in the update and design of new activities that allow to develop in the students the looked competitions. The work coordinated of the teachers, joined the maturity and quality of the group shaped by these, and allows guaranteeing the standardization of the formation given to the students.

Every semester new activities and playful workshops are designed for the development of the wished competitions and there join to the course topics of major current importance in the field of the Industrial Engineering.

**METHODOLOGY OF THE SUBJECT**

The subject develops of theoretical - practical form, using two weekly meetings of 1.5 hours each one. The size of the groups of classes is exactly 24 students, for being this multiple number of 2, 3 and 4, which facilitates the work in group for the development of workshops, practical activities and evaluations. One possesses, in every group, a titular teacher and a monitor, student of industrial engineering of minimum sixth semester.

The theoretical bases are dictated in the first session of the week by teachers of the Program or external professionals to the same one, which are invited to magisterial classes; 92 students get together maximum, in order to share with the students experiences related to there area of specialization and professional practice, to give the students a global vision of the matters and proper fields of action of the career. Inside the topics to treating in the magisterial ones they can be mentioned: design of product and of process, products and processes in the area of services, structure organizational, analysis of industrial operations, costs of manufacture, design and distribution of plants, simulation, hygiene and industrial safety, quality, optimization, management of projects, ethics and values among others.

The practical component removes to end by means of workshops, managerial visits and a work in group realized along the semester. The workshops, which constitute the second weekly session, are related to the application of the knowledge’s acquired in the magisterial ones; in the managerial visits every student comes to a company and compares the reality of the same one with the theoretical frame known in the magisterial class; and with the development of a work along the semester in which there is looked that the students introduce a product or service and simulate the creation of a company devotes itself to manufacture or to give it. This work is presented to the academic community in the frame of the week of industrial engineering, specifically inside the Fair of Ingenuity Primíparo which arose as result of the course in the period 2005-1.

As for the evaluation there develop partial practical and theoretical, that allow the students should apply the knowledge acquired in magisterial and theoretical sessions, stimulating the development of the competitions before mentioned. In some cases the partial ones involve the construction of products designed by the students which are destined to be dedicated to foundations without spirit of profit, infantile gardens or colleges of low strata by the end to expire with the vision of the School " ... it will encourage in permanent form the active participation of the academic community in the study of the Colombian reality, in such a way that multiplier has an effect and helps to solve the basic needs of the country ... " [6] and to develop limits of social projection which is understood like " ... I happen for whom the institution spreads the application of the knowledge to put it to the service of the society, particularly in the solution of the fundamental needs of the country " [7].

To facilitate the communication between the students and the teachers, a web page has been designed, where week after week the information appears related to the development of the course, this page is available in http://ecinfo2.escuelaing.edu.co/asignaturas/industrial/cquinter/iini/index.htm

Finally it is important to highlight that the development of this methodology needs of an equipment of teachers that they are employed at group, which they are compromised by the same one and which they are ready to devise, in every academic period, different tests and workshops to bring the student over to what it will be his future academic and professional life.

**RESULTS OBTAINED**

The results obtained by the application of the methodology, before described, in the course of Introduction to the Industrial Engineering, not only are academic type but besides they are related to the integral formation of the students and the improvement of the quality of teachers who accompany this process.

It brings over of the academic results it is possible to say that the rate of desertion in the Program of Industrial Engineering descended in the last years, when 2000-1 pass from 5.96 % in the period where there existed 1593 students registered to 3.20 % in the period 2003-2 with 1186 registered students, according to the Office of Record of the Colombian School of Engineering.

On the other hand, the average notes of students happened from 3,3, under the previous approach of the subject, for the period included between 1994-1 and 2000-1 where the same one was dialed by 2207 students (all the programs), to 3,6 with the new methodology during the period 2000-2 to 2005-2
where she(it) was dialed by 1674 students (only Industrial Engineering).

In the semester 2005-1 one took to end the first Fair of Ingenuity Primíparo. In her (it), the students of the subject presented the projects of entrepreneurship developed along the semester. This activity is the opportunity that the students have, first, to show to the community their work for what they must tune their skill of speaking publicly and, second, to be able to face a healthy competition that allows them to measure the quality of the developed work. One speaks about competition since as result of the fair there is obtained a winning project, which is qualified under certain parameters, the design of the process of manufacture or of service, prototype, managerial organization, between others. In numbers we can say that, up to the period 2005-2, for the Fair of Ingenuity Primíparo have happened near 500 students, 200 projects and the same number of prototypes.

In view of the success of the Fair of Ingenuity Primíparo, the deans of Industrial Engineering, requested a group of teachers for the subject, the development of a week of activities which aims was to foment the integration of the whole university community and to present the results of the work advanced by students and teachers. This week is known as the Week of Industrial Engineering.

The previous activities allow the development of competitions like: the creativity across the design of the product and the process of the different goods and services, the teamwork in the development of the activities in groups and the skills to communicate orally and written by means of the presentation of written reports, and the participation in the fair, among others.
Another result of this work is related to the group of teachers who every period renewed the courses and who are taking this methodology to other subjects got out of a jam themselves. From the first period that implemented the methodology up to date, the group of teachers who are employed at the subject of Introduction to the Industrial Engineering passed from 1 to 6 members.

The same philosophy of theory and practice like the way to bring the student over his profession was adopted as other Programs of Engineering of the School obtaining excellent results like the Industrial Engineering has obtained.

Additional the Program of Industrial Engineering in its zeal to generate spirit of innovation and starting inside its pupils he has taken this methodology as a tool of a space adapted for the development of competitions in its pupils who future define them as professionals capable of generating company and autochthonous answers to the different problems of the society in the one that will be developed.

**PERSPECTIVES TO FUTURE**

From the previous semester the group of teachers is developing the methodology in the subject of introduction to the administration, belonging to the same study plan. On having finished this semester it is planned to develop in the Week of Industrial Engineering an activity that allows to connect both subjects using objects designed and constructed by the students as tools in the construction of social conscience in children of depressed groups of the society.

For the future he is opened as way of investigation to determine what percentage of the decrease in the desertion was propitiated by the good results obtained in the course of Introduction to the Industrial Engineering, since this course is the first approximation of the future engineers to his academic life in the Colombian School of Engineering.

The approximation, from the first semesters, of the future engineers to the community for which they were working to the moment of his graduation, allows that they sensible and they identify the problems that they afflict to the above mentioned community and there use the knowledge acquired in the university for the construction of autochthonous solutions to the above mentioned problems.

**REFERENCES**