

# Tutorial Project in Engineering Education

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**Abstract** — The teaching of Engineering in Brazil has been changing because of the necessity that has occurred in the market of professionals, more creative and more inclined to adapt to the reality of the information era. They have the need to adapt itself to the moment of work, in search of new forms of relationship professor-student and new methods of learning. The process of teaching-learning has demanded from the teachers new methodologies, because the olds that now are used do not present the ideal results. To change requires an attitude of courage that demands time and a change in mentality. In this process the teachers had a very important action. The availability to find styles, discuss problems and make changes has caused the transformation of the basic structure of engineering.

One of the changes that have been suggested is the identification of styles of learning of the students for the adaptation of the methods to be used in the classroom marking the process of learning easier. We understand by learning the incorporation of new knowledge that is incorporated to the structure cognitive of the individual. This is not an easy process because has a need to relate with a new content and identify what is interesting for his cognitive structure (Novak, 1999).

The style of learning is the form that the individual perceive the knowledge and processes this new knowledge in its cognitive structure. If this style of learning will not be observed the knowledge will be perceived and many times it will not be processed. This is the main reason in the search of learning style of the students of engineering.

The objective of this work is to present an experience in the use of styles of learning in the best teachings of engineering.

**Index Terms** — *Tutorial, Learning, Engineering*

## INTRODUCTION

According to Waghid (2000) education is not only an amount of knowledge disconnected in the futures engineers' head, it is a process of acquisition of interconnected knowledge generating new knowledge through the application and search of explanations, relevance of those knowledge in your professional life and of citizen.

One of the problems that exist in the engineering courses is the high index of existent escape in the first two years. The students enter the very new university, tired due to the tiresome year of the vestibular exam and they don't know exactly the responsibility that is to enter in a university. That is not a fact that happens with all the students, but most has several difficulties in the first years.

To think in the first years of course is to help the student to form an idea of what it will be your profession and to help him/it to look for new knowledge early. But that task is not easy, because they are many students that begin the courses of Engineering and they usually do many disciplines.

The present work has for purpose to present a project that intends to accompany the students of 1st Semester of the courses of Engineering, the advantages of that process and the procedures for implantation of the project.

## TUTORIA AND LEARNING

Several theories exist on learning, like Behaviorist, Cognitive, Theory of Skinner, and Theory of Piaget. The learning definition will be used based on the theory of Piaget, because according to the work line adopted by the University where the project is being applied it is the most appropriate.

Second Carvalho (2002), the learning can be defined as being a process that happens because the individual enters in contact with the relationship with the middle. The individual needs to express freely, because through speaking it is possible to analyze your ideas and to mature them. He needs to be an active agent of the transformation of the middle where he is, therefore starting from that raisin for the assimilation process that is the first step of the learning. The individual needs to feel safe to get to express your inquietudes and your desire of changing. The individual needs to be stimulated to say that thinks and to be curious in the search of new knowledge.

The learning happens when the individual is stimulated and it gets to express of your form doubts without the fear of being recriminated or watched. Starting from that freedom it is possible to understand what the same does not understand and what can be made to improve that process.

He/she/you always happens with the performance of several factors, as the atmosphere where the individual is, the agent mediator (teacher) and the student that wakes up for new knowledge. That learning needs to be significant so that the individual can look for new knowledge.

Second Moreira (1999), Ausubel sees the storage of information in the human brain as being organized, forming a conceptual hierarchy, in the which more specific elements of knowledge are linked to concepts more general, more inclusive. The concept of cognitive structure means a hierarchical structure of concepts that you/they are representations of the individual's sensorial experiences. The significant learning happens when the concepts pré-existent raisin to anchor new concepts, opening space for new information and new experiences.

The tutorial is an interesting practice, because it guides the student in decisive moments in your life. The tutoria is present in the graduation, in the master's degree, in the industry. It is a way to maintain the student or the apprentice in constant contact with somebody that knows your fears and needs, but that has enough experience to help him/it to make decisions and to face the inherent risks of the life.

## **THE PROJECT OF TUTORIA**

The students of first semester need support and orientation. Usually, they enter the very new university (between 17 and 19 years) (Monteiro 2004). THE academics atmosphere is new. It is the first step for adult life and to work with the freedom. That is interesting, but preoccupying when the taken decisions will harm the future. In the University of Fortaleza, they exist you vary forms of helping the student to know your professional future. As: lectures, introduction discipline to the Engineering, free access the coordination and the pedagogic consultant ship.

Those works are important, because they complement the student's formation. The lectures give a practical vision than the market waits of the professional futures. The students have the opportunity to hear entrepreneurs and professionals of the area speaking about your experiences.

The discipline of Introduction to the Engineering has for purpose to guide the students on the course, the University, the disciplines, to present the laboratories, to do technical visits to the companies of the area. That discipline is obligatory, but it doesn't get to be prioritized by the students. As the University is paid, they prioritize discipline that you/they are requirements of other. Some students leave to only do her/it in the end of the course.

The students that participate in those activities are more informed and they know the area better in that will work and they reduce less motivation level. But they don't solve the problem of the escape. The students continue closely without accompaniment and being guided by the experience of the attempt and mistake.

Project of Tutorial has for purpose the students' personalized accompaniment. They are known by a professional of the area that knows the disciplines that the student is traveling. He/she/you knows your values, your way of thinking and your life history. A professional that wants to see him/it to grow and to grow.

The tutor cannot be somebody that simply wants to accompany the students. He has the following characteristics: to be a person that likes the education area, that likes to work with youths, he/she has a lot of patience, it is cheerful, optimist, resolved. It possesses experience in the professional area and he/she has empathy with the students.

He has the task of talking weekly with all the students of a course of Compatible Engineering with your area of performance. Those weekly sections are a form of the tutor to know the student indeed. He makes interview on your family, on your hobbes, your values, your fears and about your difficulties in the disciplines and in the course. Besides hearing the student in moments of personal difficulties.

The tutor is a facilitator between the opportunities and the student's needs and the reality. He identifies the problems or difficulties and together they try to arrive to a solution. Developing the capacity to take decision and analysis. The identified problems for the tutors are a very rich material to trace new strategies inside of the Center of Technology to help the future Engineer to trace your future from I begin him/it of the course.

The students are presented to your tutors in I begin him/it of the semester, where they are defined the days in that happened the weekly encounters. Initially a resistance of the students exists for non rebelliousness or for fear of they be watched. After a time of coexistence that fear disappears and the systematic of the tutorial starts to work without problems.

## **APPLICATION OF THE PROJECT IN THE ENGINEERING**

The tutorial project has been developed two years ago for the Center of Sciences of the Health. They got to reduce in 30% the escape level that existed in the first years of the courses that you/they are part of the center. In the Center of Technological Sciences, the process is in process.

In the first semester of application only 20 students were accompanied they were accompanied. It was interesting to observe the students' curiosity in relation to that will be done. They were lifted up the disciplines and the notes of each one. They were chosen for they are with problem in Calculus I disciplines and Physics I. The teachers of those disciplines they made a previous selection and it was directed for the tutors.

The tutors accomplished an interview to identify the principal problems of the low notes. After that initial interview it was elaborated, with them, a systematic of study accompanied by the monitors of those disciplines. Every week the students needed to frequent the monitory to remove doubts and to do exercises. When that didn't happen, the tutor was informed and in the interview of the week it identified the lack.

The results were very good. The students noticed the importance of they study and the responsibility that had for the profession that you/they chose. The students commented during the weekly interviews the all it had gotten better and as they were your notes. Of the accompanied students 10 passed in the disciplines and they are developing if. The 10 that didn't get said that had problems and they preferred to lock the discipline to do the following semester.

The new tutors are being workout for us to participate in the program that should involve all the courses of the Center of Technology, but it is already noticed that teachers and students find the interesting project. Some interviews were accomplished with them and we verified the will of participating actively of the program. Some students commented the fact of they have not had that opportunity and consequently they lost disciplines for lack of maturity. Those interviews reinforced the interest for the project.

## **FINAL CONSIDERATIONS**

The teaching of Engineering is going by a series of changes provoked by the new technologies, for the job market and for the student's profile that is changing. They are necessary more discerning observations and development of researches that aid the courses of Engineering they form her/it more active professionals and actuates in the market.

New experiences generate insecurity, but they are necessary so that the process of teaching learning is efficient. The experience of the Project of Tutorial has been teaching to the educators Engineers that other areas that need to be studied besides the technical area exist. That awakening opens a fan of alternatives for recicly works and training of educational.

The project is still in the initial phase, but fruits already exist inside of the courses of Engineering that certainly became professional actuates and responsible.

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