© 2004 VŠB-TUO, Ostrava, ISSN 1562-3580

The Use of Learning Styles on the Plan in Engineering Education

Anna Cristina Barbosa Dias de CARVALHO
Universidad of Fortaleza, Av. Washington Soares,1321, Curso de Engenharia de Produção, Fortaleza-Ceará, Brazil, annacbdc@bol.com.br

Arthur José Vieira PORTO
Escola de Engenharia de São Carlos – EESC-USP, Departamento de Engenharia Mecânica – Laboratório de Simulação, Av. do Trabalhador São Carlense, 400 - São Carlos – São Paulo – Brasil CEP 13566-590, ajvporto@sc.usp.br

Renato Vairo BELHOT
Escola de Engenharia de São Carlos – EESC-USP, Departamento de Engenharia de Produção, Av. do Trabalhador São Carlense, 400 - São Carlos – São Paulo – Brasil CEP 13566-590
rvbelhot@prod.eesc.usp.br

KEYWORDS: *Learning, Style, Cognitive Structure, Engineering*

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 has 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.*

1 INTRODUCTION

In some disciplines of the basic cycle in the engineering courses as calculation, physics and algorithm exists a reproof index very loud. That fact is due to a series of factors as: it lacks of preparation in mathematics and physics in the second degree, I discourage of the students with the entrance in the university after the stress of the vestibular exam, problems with the teachers' didacticism, among other factors. That fact has been studied by a group of teachers four years ago in the courses of the University of Fortaleza.

Among the lifted up problems was observed among the form as the teacher it develops the content and the form as the student learns. That problem was observed along meetings accomplished with the teachers to evaluate the contents that were being given in room and the criteria of notes.

The objective of this work is presenting a simple instrument that teachers can work in the planning of your half-yearly activities gone back to the improvement of the student's learning.

2 LEARNING STYLES

Each individual possesses a form of learning. That happens because each individual characteristics. Some learn more writing; others learn more making somebody to do, some learn more reading a subject theoretically. The differentiated form of learning is linked the learning styles.

According to Kolb (2000) the learning process happens for the capacity to notice the knowledge and to process that knowledge. Four styles exist studied by Kolb. They are them the reflexive concrete is motivated by subjects, they need to be stimulated and they need to know in an effective way where they will apply the knowledge studied in the future; The second type is known as the abstract reflexive your characteristic principal is the organization and the systematic process of learning. The third type is called of abstract active your characteristic principal is to learn doing; he needs to accomplish an activity so that the knowledge can be processed significantly. The fourth style is the active concrete that is characterized by getting to apply the knowledge noticed in new situations and to develop new search points for perception of new knowledge.

Felder (1996) it also presents ten styles related with the form as the individuals learn. They can be: sensitive that it possesses as characteristic principal the orientation for procedures and facts, the intuitive possesses your characteristic principal the search for meanings and theories that explain the new knowledge; The visual your characteristic principal is to need of graphs, diagrams and outlines that it synthesizes the knowledge, the verbal he has as characteristic principal the need to express in several ways; The inductive gets to learn the process it be led of a condition it specifies for a widespread condition, the deductive learns from an opposite way to the inductive; The assets are challenged by new forms of accomplishing tasks in work groups, the reflexive needs to work alone so that the result of your processing is incorporated; the sequential needs to study of a lineal form and sequential. He/she sits down the need to study for parts, the global gets to notice the knowledge better it is gotten to see of form systemic the knowledge.

The two authors present complementally

Characteristics in the learning styles. Through the styles it is easier to understand some problems found in rooms of class of the engineering courses. To know the learning styles guides the teacher in the search of an improvement in the quality of the process teaching learning.

The student's understanding supplies the teacher, conditions of discovering the forms for resolution of the problems that come, even if in the attempt process and mistake where the teacher can notice which the road that that individual is thrashing to retain the knowledge. That perception of the teacher is fundamental so that the results of the construction of the knowledge can he/she becomes significant.

3 WORK CONTEXT

The University of Fortaleza possesses 7 engineering courses. They are them: Civil, electric, electronics, control and automation, production, mechanics and telecommunications. A year they enter in the engineering courses about 800 students, they run across with the disciplines of the basic (calculation, physics and algorithm) they begin not motivated in process.

In 2000 it was initiate a series of activities with the objective of improving the acting of the disciplines of the basic. They were lifted up the index of reproof of the calculation disciplines, physics and algorithm. The result consists in the illustration 1.

Those data were obtained of the results of the academic system. The teachers participated in the discussions of those results.

With the lifted up data meetings were accomplished with coordinators and teachers for us to try to identify possible solutions. Of those meetings, that became bimonthly, projects that are in process came out. As:

- I project of reinforcement for calculation and physics;
- I motivate the monitors in those disciplines;
- Development of recycle course on didacticism and methodology for the teachers;
- Lectures on subjects related to the engineering teaching as: teaching techniques, use of new technologies in the teaching, relationship of teacher and student;

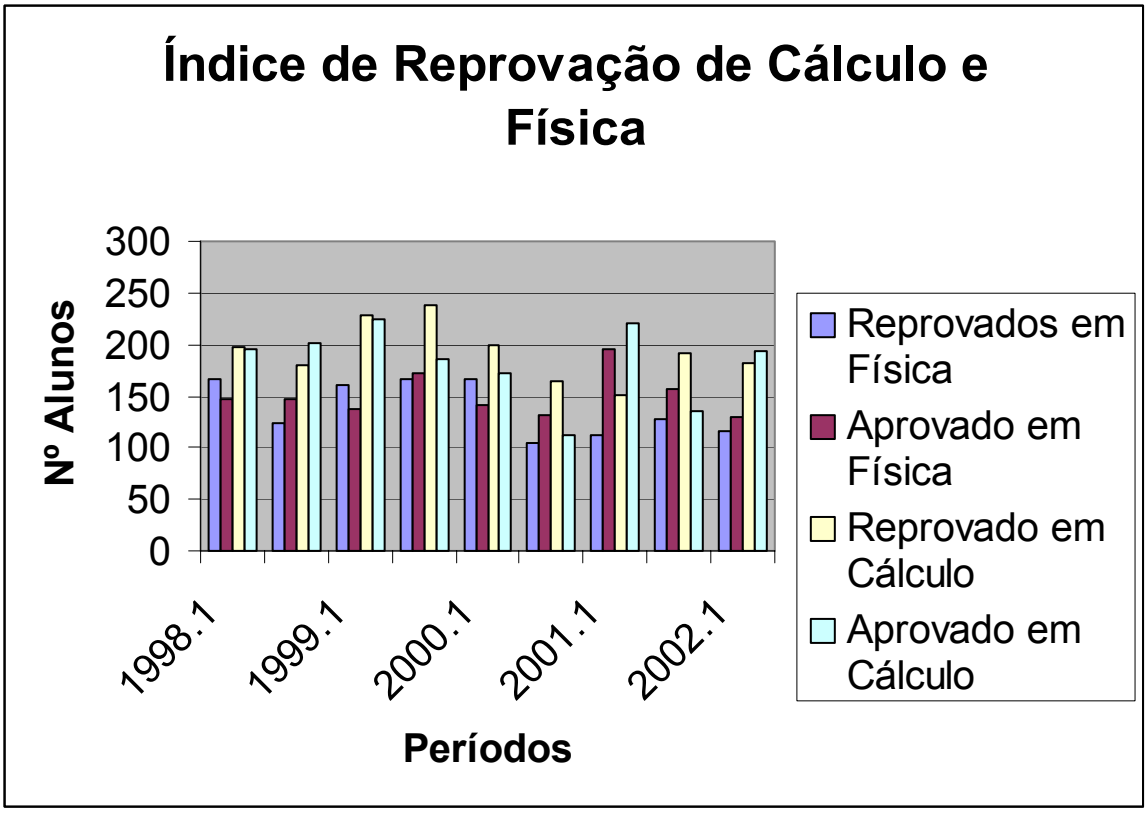

Figure 1 - accompaniment of the index of Reproof of Calculation and Physics

- Researches to identify the student's socioeconomic profile studying engineering;
- Discussions of content change;
- Discussions about content adjustment, evaluation criteria and proof application.

All those actions are still being accomplished, however starting from them the teachers' doubts appeared on the process teaching and learn. Those doubts were positive, because starting from them new ideas appeared and the most important happened was change of the teacher's posture in relation to the student and to the process teaching and learning.

One of those changes was the need that the teachers felt of identifying the reasons for the students don't get to reach to absorb the knowledge that is being developed in room

4 PROJECT

With the teachers' sensibilization we are able to do fast meetings every fifteen days and formal meetings every two months to trace plans for us to be applied in the improvement of the process ensino/aprendizagem. Besides the meetings researches were accomplished to identify theories or actions in other communities.

He/she/you appears the project of the academic tutorial then that has as base a work already developed in the same university, but in the area of Health.

The project consists of identifying in the calculation disciplines, physics and algorithm students with difficulties. That identification is made teacher and pedagogic consultant ship together. The criteria used initially for that choice they were the notes and the observations done by the teachers in room.

As they are around 400 students per semester in those disciplines we chose two calculation groups, one in the schedule of the day and other in the nocturne that were with difficulties of growing and that the teachers were disposed to collaborate.

The objective of that project is to identify in the students with difficulties which your learning style, as that style is influencing in your revenue and that facts contribute to the improvement process.

The project possesses the following flow:

a) The students' access - the students were identified and registered in a database for accompaniment. In that access it consists all the student's personal data, the disciplines that are traveling, which the course, accompaniment of the lacks, visits the monitory and notes;

b) The students will receive a letter invitation to talk with the pedagogic advisers. In that letter it consists the reasons of the invitation and the schedule, day and place where he should attend;

c) In the visit it will be explained the project and ear better the student and your needs. It is make agenda it visits fortnights for the student the pedagogic consultant ship it attends until the end of the semester;

d) In the following visits they are lifted up the styles of the student's learning using the instrument developed by Kolb. They are applied questionnaires about your motivations and difficulties, besides the informal chats on the day by day of the discipline;

e) The same instrument of Kolb is applied in the teacher to identify your teaching style;

f) At the end it will be made an evaluation with the students and I profess him/it for us to define changes.

5 PROJECT SITUATION

The students are being registered. The teachers are being informed as well as the coordinators on the pilot project so that the same ones can accompany and to suggest procedures or changes until the end of the semester.

He/she/you is it is an adjustment phase where is necessary to observe as the students and teachers react to the activities that will be developed.

They were already lifted up the students' notes so that they can be accompanied during the whole semester.

6 END CONSIDERATIONS

The engineering teaching needs to update technologies, contents and teachers' training. It is necessary there to be an updating in the form of acting of the teachers as citizens.

The use of the learning styles is a fundamental tool for the teacher to know your students and make your planning half-yearly or annual of activities.

REFERENCES

BARREIRO, Aguida Celina De Méo. Estudo Do Processo De Ensino Da Unidade, *Área Das Figuras Geométricas*. Mestrado: UFSCar, 1987.

CARVALHO, A C B. D. UCHOA, A R. MALVEIRA, *V T Mudança na aprendizagem de Cálculo e Física In*: Congresso Brasileiro de Ensino de Engenharia, Piracicaba – SP, 2002.

CORREIA, A. M. A. CHENG, L. Y. *Aprender a aprender a ensinar*. In: Congresso Brasileiro de Ensino de Engenharia, Piracicaba – SP, 2002.

FELDER, R. *Learning and Teaching styles in Engineering Education*.In Engineering Education, June, 2002;

FELDER, R. *Matters of Syle. ASEE Prism*, 6(4), 18-23, Dezembro, 1996.

KOLB, D. *The Kolb Learning Style*. http://www.css.edu/users/dswenson/web/PAGEMILL/Kolb.htm, 2000

NOVAK, J. D., GOWIN, D. B., *Aprender a aprender*, Plátano, Lisboa,1999;