

The Academic, Social and Financial Profile of Mechanical Engineering Undergraduate Students at UFRN

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Abstract

This paper describes a survey on the educational, financial and social standard of living of Mechanical Engineering undergraduate students at UFRN University in Brazil. The Analysis of these aspects is very important for the future decision making processes which are related to academic affairs. Therefore, this survey can be regarded as representing an instant picture of the students' current academic situation as well as an evaluation of their social and financial background. Within this context, problems related to students who abandon their courses or those who simply fail to cope with their tasks are analysed. A correlation is made between, students' evasion and the economic and social aspects which have been mentioned before. Finally, the authors present some comments and suggestions in order to minimise these problems.

Keywords

Education , Academic Profile, Students' Evasion.

Introduction

The Mechanical Engineering Department at UFRN (Federal University of Rio Grande do Norte) in Brazil was founded in 1978. Since that time, increasing emphasis has been and will continue to be placed on quality undergraduate engineering education. In order to achieve this goal, the academic committee has been closely monitoring the emergence of modern technologies and as a result, new laboratories were created, programmes were restructured and new topics were introduced in the course's curricula. However, this set of actions alone does not seem to be very efficient in motivating the students and therefore, keeping students' evasion* level low. Actually, this kind of problem is further complicated [CABR92, CABR93].

According to Douglas [DOUG97a, DOUG97b] there are three important points to be considered regarding the preparation of future professionals now attending the academy: the students educational background, the tertiary educational system and, finally, the students social and financial profile. For these reasons, it is relevant to make a short comment on the students background within the Brazilian traditional school method of teaching context.

Firstly, a moving from school to university is not an easy step for any undergraduate student.

They have moved from a very controlled to a very free learning environment. At school, for instance, the students expect to be told exactly what and when to study. There are specified pages to read in the textbook and model answers. The students know there will always be punishment if they do not obey. Indeed they are encouraged to equate learning with memorisation, and this happens particularly when they are close to face the Brazilian University entrance exam, which is called "*Vestibular*". In short, Brazil has kept this sort of "spoon-feeding" primary and secondary school teaching method for quite some time.

This weak educational background is contributing to increase both the failing and the evasion rate among Brazilian University students [BARR92, RAMO95, TELE95, PERE97, PINT97, MAND97]. In fact the current scenario has been worsened by several new factors. In the past few years, many financial and social problems have arisen in Brazil due to the high unemployment rate caused by the world's economy globalization [SILV97, CHIG97]. This has actually become a crucial concern for most engineering students. Therefore, this context has added new dimensions to the challenge of keeping the students in the academy. Many students are opting for a part time basis as a way to avoid abandoning the University completely. Furthermore, the need to help parents with the family budget is now a matter of survival [RAMO95, PINT97].

The work presented here is motivated by the difficulties mentioned above. Therefore, the paper describes a survey on the educational, financial and social standard of living of mechanical engineering undergraduate students at UFRN. The evaluation of their social and financial background will support future decision making processes which are related to academic affairs. A correlation is made between, students' evasion and the economic and social aspects which have been mentioned before. Finally, the authors present some comments and suggestions in order to minimise these problems.

Methodology

This survey covers the period of time from January 1997 to January 1998. All the figures presented are representative of the whole set of students and not just based on a particular statistical sample. Currently, there are about 260 Mechanical Engineering undergraduate students at UFRN University and, each semester, there are 30 new students starting the course programme. The Mechanical Engineering

Department's lecturing staff is composed by 27 members.

The course duration of the Mechanical Engineering program is 4275 hours. It usually takes five years for a student to be awarded the degree of Engineer. The first two and a half years is heavily concentrated on basic subjects such as mathematics and physics. The second part of the course is focused on professional (technical) aspects. Finally, at the end of the course, it is required that the student spend at least one period of training in industry as a way to gain experience outside the university.

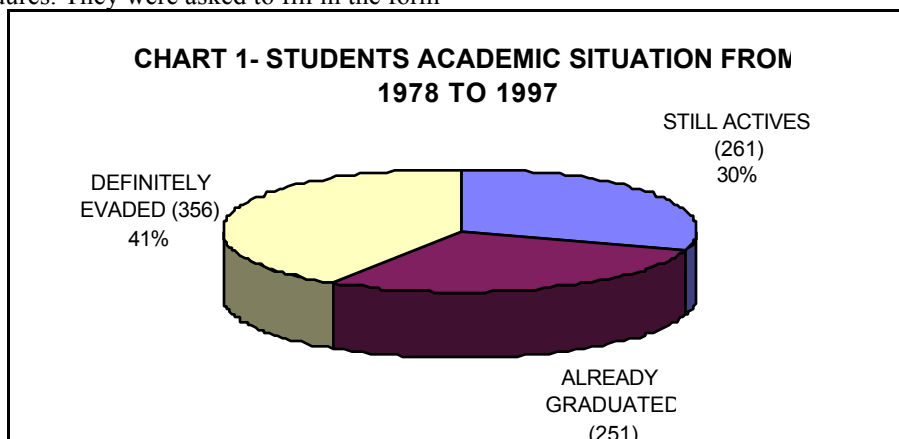
The first step taken by the academic committee, in collecting the necessary information for this survey, was to devise an inquiry form with a view to academic, social and financial aspects. Questions related to the financial aspects, particularly those for checking the students' need to have a part time, or even a full time job, were emphasised. However, the inquiry form was designed to cover a much broad horizon of aspects.

In the next step, the students were given a general explanation about the form's contents and filling procedures. They were asked to fill in the form

under the supervision of a tutor who was ready to answer any possible doubts raised during this filling activity. The small number of persons attending the course made it possible for the committee to reach each and every student. Finally, in order to generate some tables and graphics, all the information collected was processed. The results were analysed and some of the comments are presented in the following sections.

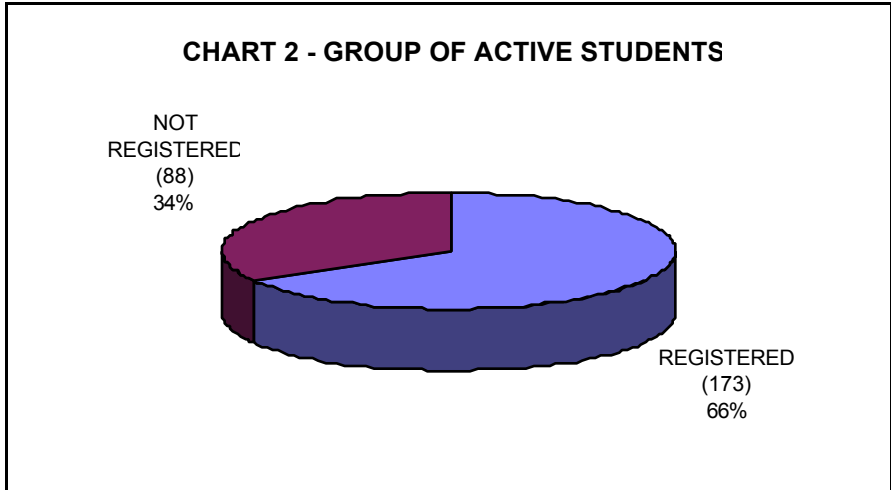
The Data Collected from the Survey

Chart 1 refers back to the course's foundation (1978). According to this chart, over the period 1978 to 1997, the number of undergraduate students doing mechanical engineering totalled 868 persons. There are nearly as many *active* students (i.e. still doing the course) as *graduated* ones (i.e. those who have already been awarded the degree of engineer). The number of students who have definitely evaded from university made up the largest percentage of the total, about 40%.



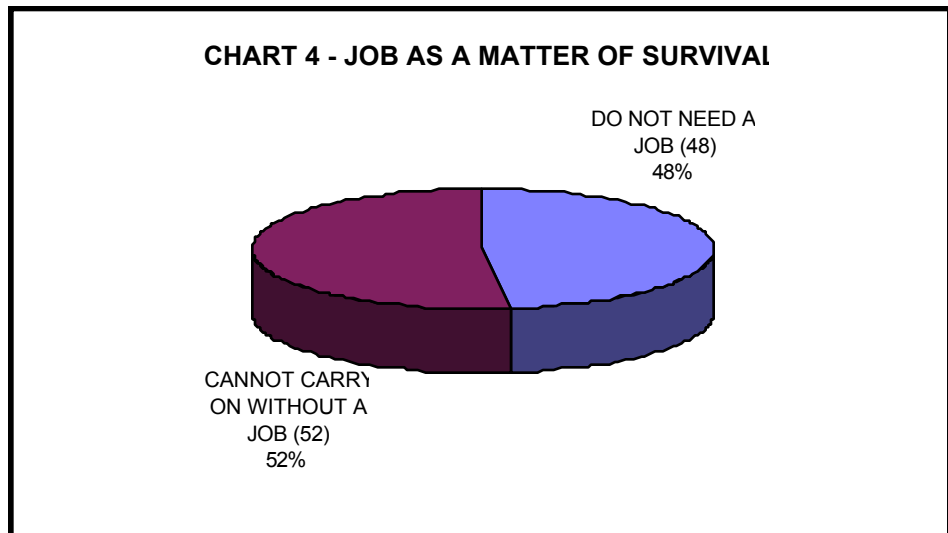
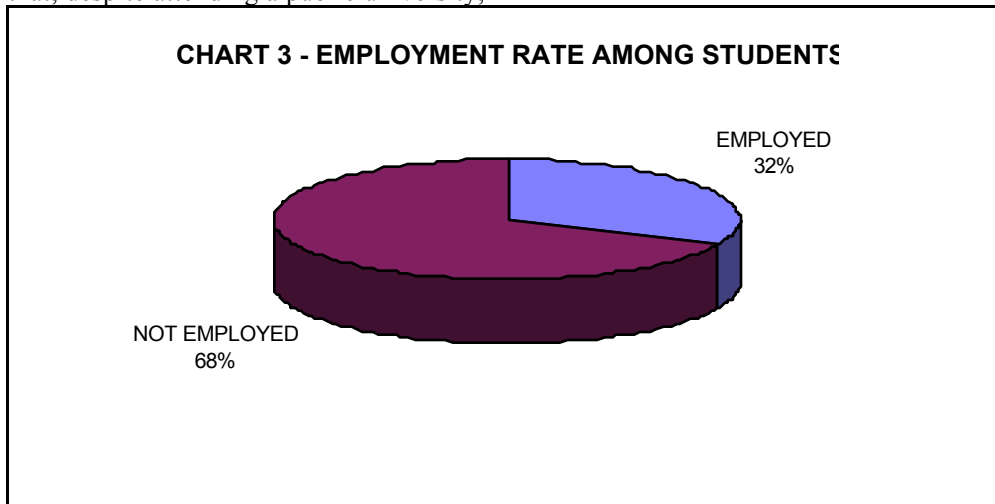
This survey is focused on the *still actives* slice of the pie graph shown in chart 1. This slice represents the current group of undergraduate students. It was detected an alarming figure within this group. Approximately 35% is not coming to register to take all the available regular subjects. Sometimes they register only for one or two subjects. Chart 2

illustrates this point. It is important to mention that the Brazilian law guarantees the link between the university and the student to be kept for almost 9 years. Upon successfully facing the "vestibular" (university entrance exam) it is up to the student to keep registering every semester or not.



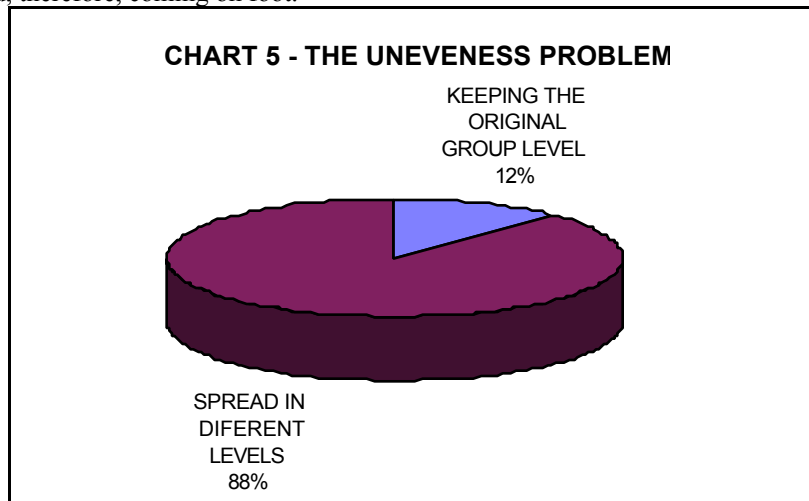
The number of active students who have a job while studying at the university is very high, making up 32% of the total. These figures are presented in chart 3. It can be seen from both chart 2 and chart 3 that the total number of students at work is nearly as great as that of those not being registered. The most alarming aspect is that, despite attending a public university,

52% of the active students answered that, in case they do not find a job within a very short period of time, they would no longer be able to carry on studying. This means that, beyond those already working there is another 20% desperately searching for a job (see chart 4).



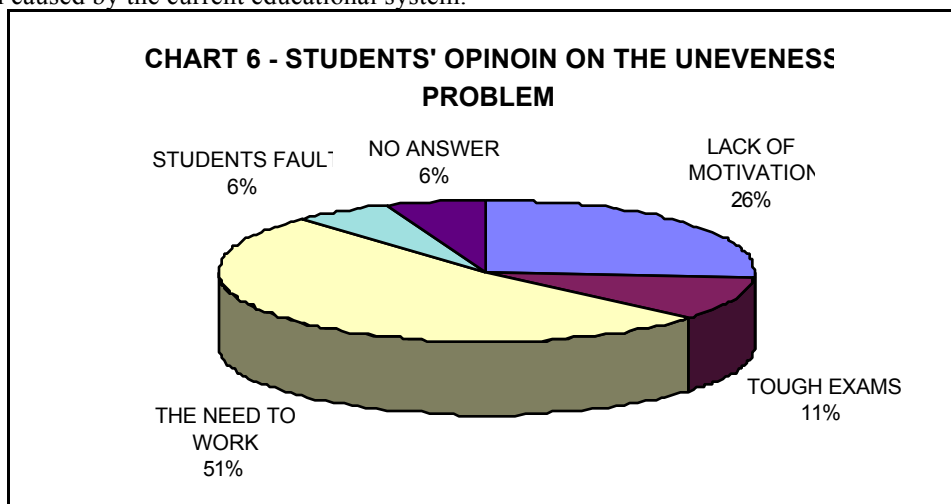
Likewise it happens in other countries, the vast majority of the students are male. Women students do not participate much, only about 2% of the total. As expected when dealing with teenagers, only about 6% of the students are married. Their age ranges mainly (about 80% of all students) from 18 to 24 years old. The means of transport used by the majority of the students to come to the university is either bus (67%) or car (24%). However, there is a small percentage of students who lives quite close to the university and, therefore, coming on foot.

This survey also detected that the unevenness among students is one of the most urgent problems facing the academic committee. A set of reasons such as exams' failing and the need to work, is spreading the students unevenly over different periods of the course. As shown in chart 5, the majority ends up in different group levels, almost 90% of the total.



The students' opinion concerning this problem is shown in chart 6. According to half of them, the main reason for this unevenness is the need to work while still attending the university. Approximately 25% of them blamed their lack of motivation caused by the current educational system.

Only 11% mentioned tough exams as being a problem. Finally, a small percentage were honest in saying they were not studying very hard. No answer was obtained from the rest.



Conclusions and Suggestions

This paper presented several interesting figures related to the living standards of mechanical engineering undergraduate students attending UFRN University in Brazil. Some academic aspects have also been presented. The survey immediately detected a very high students' evasion rate. The figures shown in chart 2, 3 and 4 have raised worries about the

course's future. Some of these problems are partly explained because of governmental measures in education and the budgetary aspects that put all Brazilian public Universities in a difficult financial position. Furthermore, due to difficulties faced by the students on present finances (see chart 4), the authors believe there will be a trend towards an increase in the evasion rate.

Both charts 3 and 4, when compared with chart 6, clearly show some correlation between social, financial and academic aspects. The students' need to have a job while still at university is increasing the unevenness problem. On the other hand, the lack of motivation figure, of about 25%, need to be carefully analysed. Actually this the point where the academic committee has the power to make important changes.

Two important measures are suggested as a way to motivate the students and reduce the evasion rate. Firstly, likewise it was done at Delft University [ERTS97] the lecturing staff of the Mechanical Engineering Department at UFRN have decided to use problem-centered learning method in the course [FONT97]. This approach was taken aiming at increasing the number of graduating engineers as at making the study more interesting to new potential students. The Mini-Baja project described in [FONT97] has well-defined learning goals. The students are guided by a tutor and work in teams building an off-road vehicle by themselves. The emphasis is put on the training of the abilities of students to analyse and solve problems. There is also a local and national race for supporting a competition among the project groups.

The second suggestion encouraged by the authors is the creation of group advisory as mentioned in [HAGB91, HAGB95, FUSI95 and BRAS96]. The academic committee has already created the advisory group and is starting to work with the undergraduate students on the unevenness problem.

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