

# The Influence of Present Unemployment on Engineering Courses

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**Abstract:** Unemployment, mainly a consequence of lack of investments in research and education is analyzed as an important factor which is establishing a series of remarkable changes in Brazilian Engineering courses. The study also describes the main reasons for engineering unemployment and how it is affecting the engineering students. The main conclusions are that engineering courses are now trying to provide more flexible syllabus, to provide more adequate training, and also that independent institutions are offering a variety of specialized training courses to overcome the problem.

**Keywords:** Engineering Courses, Unemployment, Syllabus, Training.

## 1. Introduction

During the eighties and nineties, the world economy was hit by a sequence of events which left many countries and economic groups in a most unfavourable situation. The consequences were particularly felt in Brazil, a country where the engineering sector had reached high standards. In fact in recent years, with the severity of the economic crisis, being a qualified engineer in Brazil no longer guarantees a good job [1]. Some sectors are faring now better than others, and the Brazilian Aeronautical Industry is now a good example of a prosperous activity. Unfortunately some activities have not fared so well, and with the nearly doubling of the country's population since the seventies [2], accompanied by a shift in the economical activities, which has changed the direction of the industrial targets [2], it is now a simple conclusion why it has become difficult for engineering graduates to obtain a job.

A previous research [1] was carried out comprising a group of Universidade Federal de Ouro Preto engineering students, having as one of the main objectives the association of training efficiency with economic related aspects. One of the important conclusions of this research was that motivation of the students could be clearly associated with economic related causes [3]. Figure 1 shows how the students' outlook of their job future perspectives, was influenced mainly by economic reasons.

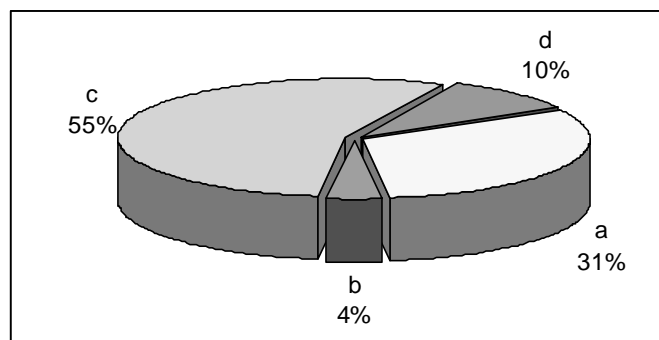


Fig. 1 - Perception of the students with regards to their future professional activities: a) take post-graduate courses, because additional training is required, b) take post-graduate courses to avoid unemployment, c) remain unemployed, d) run one's own business

It is possible to see that many students believe that it is important to take further training to improve one's chances in the professional market, and that a very large number believe their chances of getting an engineering job are flimsy. A small number still dream of becoming an independent professional. It should be stated that this

research was carried out at a good university having one of the top employment rates for their graduates.

The previous research [1] also presented another factor closely associated with training efficiency and the students' perception of one's professional role, namely the motivation of the students during their course. Figure 2 illustrates how the students judged their motivation during their courses.

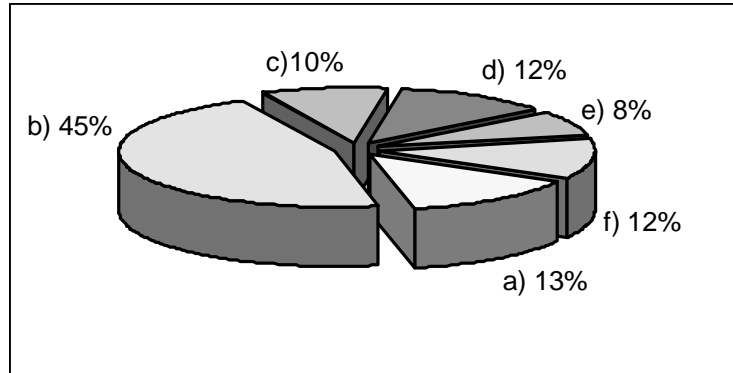


Fig. 2 - How the students' motivation changed during their engineering courses: a) oscillated because of personal reasons, b) oscillated due to course related problems, c) remained associated with job perspectives, d) remained constant, e) started high and dropped gradually towards the end, f) started low and increased towards the end.

Now, motivation is a key issue to efficient training. It can certainly be improved by using adequate pedagogic tools, but for most students taking specialized training, a course is rated by its ability to guarantee a job. The exceptions to this role are probably groups a) and f) which in any case represent a minority.

## 2. Unemployment and Level of Education in Brazilian cities

As in any other part of the world, education is a key factor to obtain a good job. However, regional differences do exist and it useful to consider the employment profile found in Belo Horizonte, a typical industrial centre. Figure 3 shows the influence of education on the chances of obtaining a job [4].

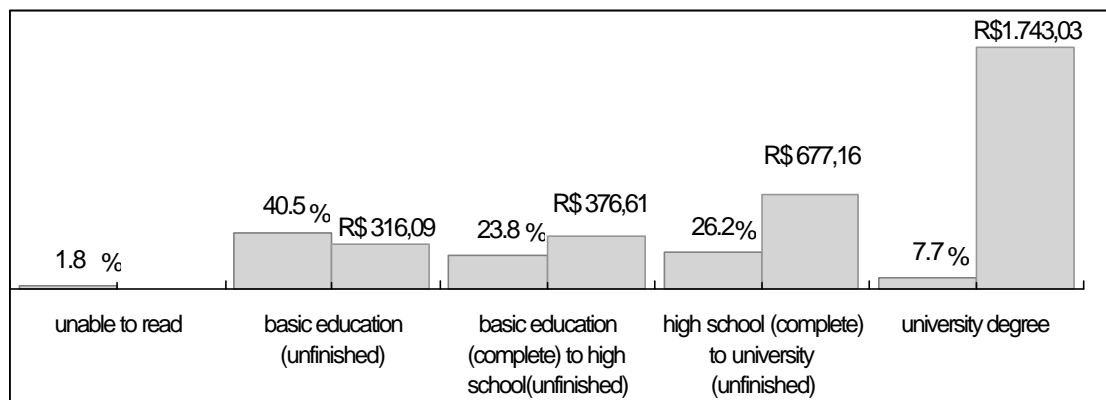


Fig. 3: Level of Education and official employment figures in metropolitan Belo Horizonte [4]

The left hand columns indicate the percentage of people which according to the official statistics are employed. The right hand column indicates their average monthly earnings ( US\$1.00  $\cong$  R\$1,80 ). A few explanations have to be added.

It is worthwhile to add a few details which are not so apparent. Figure 3 indicates the people which are officially employed. However, a significant percentage of people in the less educated group are part of the so-called "informal economic group". This expression means they are active workers, but carried out their activities without formal registering which is equivalent to say they do not pay taxes, they do not enjoy the benefits of retirement and social

security, etc. This is more common than one would expect, mainly because of two reasons: 1) to be able to support themselves they have to choose an activity where could not or would not be able to pay taxes and social security (such as selling small goods in free fairs or the in the streets), or 2) Brazilian social security charges are steep, and sometimes employers are not too keen to register their employees formally. This is a situation which has in recent years become a source of concern for the Brazilian authorities. In fact there has been a long discussion during the past years about the pertinent legislation between the several involved organizations, such as: syndicates, government, legislators, etc.

At the other end of the scale are the university trained graduates. A percentage of these people run their own businesses and therefore are not officially employed. These people have exchanged the security of a job, for a better income. After all in the present situation a job does not offer the same security as previously.

As far as the present work is concerned, the important point to be obtained from Figure 3, is that well paid university jobs only represent a small percentage of the total job offer. This fact is hardly surprising, but the main point is that other categories have incomes which are barely sufficient to support the employee. Therefore, most people are very keen to get a university degree, if only for economic reasons.

### **3. Training of engineers in the present days**

Training in any profession is a dynamic process, which changes according to market and other specific needs. The Brazilian situation at the moment is that engineering job offer is becoming insufficient, not only because more people are coming out of the universities, in their search for a better position, but also because there is presently an industrial retraction. Also, mainly because of new computer related technologies, engineering training has changed a lot in the last few years. MEC, the Brazilian Ministry of Education, has stimulated in recent years a series of discussions concerning the training of engineers. The first official texts to appear [5] are a direct consequence of the realization that engineering training in the modern world should be based on three basic principles, namely: 1) engineering training should be eclectic, with multidisciplinary skills, 2) engineering training should emphasize the understanding of basic phenomena (which does not change as technology does) 3) there should be a flexibility in the syllabuses to account for immediate and necessary changes in training, as the need arises.

The Brazilian top universities and its scientific community is now concerned about how to adapt their courses to this new reality. Unfortunately, even though both the scientific and the university community are fully aware that the only way to improve the standards of living is producing good quality goods and services, some sectors in the government have traditionally refused to support any initiative. In fact the only way to increase the production is to invest in research and education. Engineering being directly associated with production, is particularly affected by this blindness.

The other Brazilian problem is that in recent years many small companies and businesses had to be closed because they could not make a profit. Several of these small companies offered good opportunities to engineers, many of them not using the top technologies, but still able to produce useful goods, at a reasonable price. It is sometimes claimed that these small companies were less efficient, or had some other drawback such as environment aggression. While this was certainly true in some cases, are small businesses were just swallowed by the present government policies. The paradox is that while the government keeps saying that it is important to be efficient and to make use of efficient technologies, its investments in research and education are very timid, which are the crucial key to efficient production and hence, sufficient job offer and a good standard of living.

### **4. Complementary training**

Unemployed engineers and many companies are seeking to increase their competitiveness by taking additional specific training. The professionals because they believe they should improve their job chances with better training, the companies because they want to be more efficient in a market which is becoming more and more competitive. Figure 4 illustrates shows which professions are demanding further training.

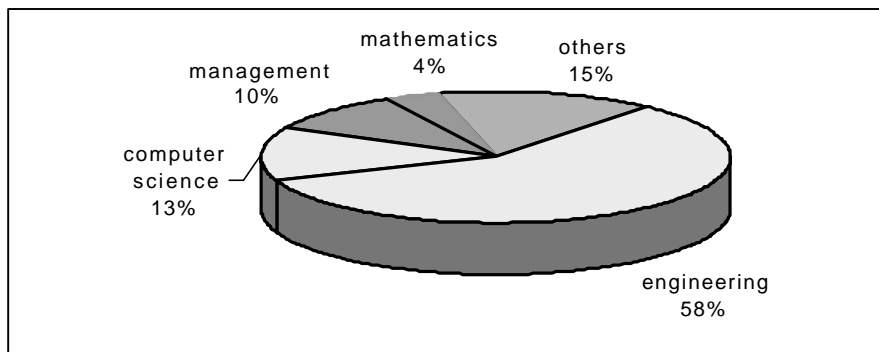


Fig 4: Profile of professionals investing in further studies, according to their original education [6]

Figure 4 was produced by an institute located in Belo Horizonte and specializing in further education and training. It is immediately apparent that engineers are the most important group seeking specialized training. These courses are all related to new technologies and/or their implementation.

A similar situation is happening at the universities. These institutions are now seeking to offer a wider range of courses, suited to specific needs of engineers who have already graduated. At the same time the universities are now offering a wider option of courses for their students, hoping they should become better professionals at the end of their courses.

## 5. Conclusions

Unemployment has brought a set of conditions not previously found into the Brazilian engineering scenery. Lack of engineering job positions is in fact a consequence of a series of policies, not all of them related to the situation of the world markets. Lack of investments in research and education, is one of the causes of the insufficient production of goods which should provide the necessary engineering job offer.

Because of the insufficient job offer, there is now a growing disbelief amongst engineering students in their future of professionals. This is often associated with a lack of motivation and a consequent training which is not fully efficient. The independent training institutes are trying to provide additional specialized training to care for specific needs of engineering professionals. The majority of people taking these courses are engineers, clearly showing the need for this activity. Universities, on the other hand, are trying to provide more flexible syllabuses, and are also offering a wider variety of post-graduate courses, in order to provide more suitable job qualification for their graduates.

The consequence of all these factors is that there is now a new philosophy in engineering training, which is being gradually implemented at different levels at both inside and outside the university.

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