

# **FACTORS INFLUENCING THE PERFORMANCE OF GRADUATE STUDENTS IN NATIONAL EXAMINATIONS IN BRAZIL**

**Maria Beatriz de C.M. Lobo\***

**Roberto Lobo\***

## Abstract

In this work the authors study the influence of cultural and behavioral proxy variables, namely English Proficiency and Weekly Study Hours, on the performance of graduate students in the Brazilian general higher education examination, ENADE. To show the influence of entrant students' background on graduate students' performance, the probability of graduate students reaching an average grade 1.5 standard deviations above the average is calculated as a function of freshmen' performance in the same examination.

---

## Introduction

Many factors influence the performance of higher education students in national examinations, such as home cultural background, intelligence, previous academic experiences, motivation, dedication, quality and interest on the part of the professors, and several other variables.

For that reason, the coefficient of determination ( $R^2$ ) is small in the vast majority of regression studies, where external variables are assumed as causal factors for the final performance of students in national examinations.

In Brazil, it is not different.

In this study, we use the Brazilian national examination for higher education students, called ENADE [1], and the variables both

academic and social-economic to demonstrate two significant effects, which are probably common to similar results in other countries.

The first one, is the effect of cultural and behavioral components on the examination results, using proxy variables for both components, namely English Proficiency for cultural background and Weekly Hours of Study for academic behavior. The second relation is between the academic quality of entrant students and the performance of graduate students of the same courses.

---

The ENADE exam is performed annually for groups of courses, and is repeated for the same courses every 3 years. For Engineering the last personal students data was published in 2005, with 7938 students present.

The ENADE is an examination which covers two kinds of questions, namely, general knowledge and specific professional knowledge, part as multiple choice and part (made up of) as discursive questions. Both freshmen and graduating students take the examination for each profession. The students, as well as the course, receive a final grade, the grade of the courses being the average grade of their students.

Each student fills out another questionnaire regarding his previous academic experiences, his parents' educational level, the economic situation of the family, knowledge of English and computing, classes sizes and lab infrastructure, access to the library, weekly studies hours, and much more.

If a multivariable regression is performed taking all the variables present in the questionnaires, it turns out that two of them are the most important ones as far as the performance in the examinations is concerned: English proficiency as regards cultural background, and weekly study hours as regards the student's academic behavior.

Therefore, we decided to analyze these two more meaningful variables and to associate them to verify how much of the results they were able to explain.

The course chosen was Engineering. The data studied refer to the exam taken in 2005.

Both variables were correlated to integers from 1 to 5, 1 being the lowest and 5 the highest result. Study hours grade 5 means more than eight hours weekly and 3 means from 3 to 5 hours weekly.

The two variables put together would cover a scale from 2 to 10, which will be called V.

The results of the examination cover a scale from zero to 100.

The variable V was distributed into a set of integer values, V1 (from 2 to 4), V2 (from 5 to 7) and V3 (from 8 to 10). The grades were also sliced and for every slice the percentage of V1, V2 and V3 was calculated.

The results are very clear and indicate that although both factors are individually important, the combination of the two lead to a clear and decisive correspondence with the examination performance.

For example, only 5% of the students with grades above 72.5 were in V1, while 75% were in V3. On the other hand, 50% of the students with grades below 12.5 were in V1, and only 10% in V3.

To put it shortly, the combination of the most relevant indicator related to family culture and background, English proficiency, and the most relevant indicator related to academic behavior, weekly hours of study, is unavoidably connected with the success of graduating students in the national examination test, indicating that both factors are important for a superior performance. On the other hand, the correlation of English proficiency and weekly hours of study is only 0,07, showing that these two variables have weak correlation.

It is necessary to have both good background and dedication to achieve superior performance \*\*.

These are two of the three main factors related to academic and professional success (NASBITT [2]). The third is genetics.

The results are shown in Graphic 1.

If background associated with academic discipline is so important, in spite of the fact that higher education courses and institutions, with little qualified student demand, may endeavor to raise the level of their students, it is very hard to overcome the initial inferiority.

To observe the effect of the quality of freshmen students in the final performance of graduates we analyze the ENADE 2006 examinations for Administration courses.

There were 3874 courses of Administration whose students took the examination. The average grades for freshmen and graduates were shown for every course.

If a regression is performed [3], it can be shown that:

Graduating grade =  $15.87 + 0.57x$  Freshmen grade, with  $R^2 = 0.207$ . (Both grades from zero to 100).

Therefore, 20% of the graduating students' grades can be explained by the freshmen's performance.

Moreover, if we perform a Logit Regression we can establish the probability (P) of the graduating students of a specific course reaching grade 55 or above in the specific professional test (7% superior), meaning 1.5 standards deviation, if the performance of the freshmen in the general knowledge test was given.

The result is given by:

$$P(N) = 1/(1+\exp(-(a+bn))),$$

Where N is the average grade of graduates and n the average grades of freshmen in the same course.

The parameters obtained are:

$$A=-11.1 \text{ and}$$

$$B=0.18., \text{ with } R^2 = 0,92.$$

Form these parameters it is possible to draw the probability function.

As a result, for example, if the average grades of freshmen is 40, the probability that graduates reach an average of 55 or above is 10%, while for a freshmen grade of 45, the probability is about 35%, and for grade 50, is as high as 75%.

The probability curve is shown in Graphic 2.

It is very clear that it becomes very difficult to reach high standards if the new students have poor qualifications. Therefore, the institutions with problems of recruiting good students must plan carefully special projects to upgrade their graduates.

In spite of the fact that the freshmen and graduate students are different samples, the examination taken in the same academic year by both indicate the average preparedness of both populations as compared to national averages.

Conclusions: In this work two effects were investigated: the influence of students' background and academic behavior on the performance in national examinations, and the very strong influence of the quality of entrant students on the final performance of graduate students of the course.

#### Bibliography:

- [1] - INEP, Resumo Técnico 2005, MEC, Brazil;
- [2] - NISBETT, Richard E, Intelligence and How to Get It, W.W. Norton & Company, 2009
- [3] - HAIR, Joseph E; ANDERSON, Ralph E; TATHAM, Ronald L et al, Multivariate data analysis New Jersey, Prentice Hall, 1998

\*\* - The best combination of the two variables, calculated by the Principal Components technique, is 58% of English Proficiency and 42% of Weekly Study Hours.

\* - Instituto Lobo para o Desenvolvimento da Educação, da Ciência e da Tecnologia – Rua Jose Urbano Sanches 420, Mogi das Cruzes, São Paulo, Brazil