## Session

# FACTORS INFLUENCING THE PASS RATE OF COURSES IN THE FACULTY OF SCIENCES AND TECHNOLOGY OF THE UNIVERSITY OF COIMBRA(PORTUGAL) 

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#### Abstract

The different courses of the Engineering "Licenciaturas" taught in the "Faculdade de Ciências e Tecnologia da Universidade de Coimbra"- Faculty of Sciences and Technology of the University of Coimbra, Portugal- show a large variation of the pass rate. It varies from a few percent up to one hundred percent. To understand the real reasons of the lower values is important in order to implement policies which can contribute for the students' success. The "Conselho Pedagógico"- the Pedagogic Council -of the Faculty is engaged in promoting a study to correlate the pass rate to different factors and parameters. The philosophy and structure of such a study are presented. One the points to be clarified consists in getting evidence whether there is any relation between the rate of failure and the kind and type of assessment.


Index Terms-Assessment, pass rate, students' success

## INTRODUCTION

The Faculty of Sciences and Technology of the University of Coimbra (Portugal) offers ten "licenciaturas" in different areas of Engineering. A "licenciatura" can be considered similar to a master degree. More than five hundred of semester courses are taught showing a large variation of pass rates. This variation goes from a few percent up to one hundred percent. The retention rate of the students is very high in some of the courses, mainly in those of the first two years. The Statutes of the Faculty imposes that for a course with an anomalous rate of failure, the reasons of such a bad result must be investigated in order to improve the global success of the students. All these courses have been subject both to a process of evaluation by the Foundation of the Portuguese Universities (Fundaçao das Universidades Portuguesas)and a process of accreditation by the Professional Association of the Portuguese Engineers (Ordem dos Engenheiros). Recommendations have been issued in order to diminish the lack of success of the students. So, there is general and widespread concern for
the low pass rates observed in quite a number of courses. The Pedagogic Council ("Conselho Pedagógico") of the Faculty has delibered to promote an inquiry which can support the understanding of the reasons and conditions influencing the pass rates of the different courses, which, as it is been said, show a very large disparity.
The aim of this paper is to present the inquiry which is now under way and to listen from the colleagues here at the Congress suggestions and comments which can improve our exercise.

## Ideas Informing The Inquiry

Before presenting the inquiry, itself, it seems appropriate to expose some of the ideas which have supported the queries laid down in the questionnaire.


#### Abstract

About Learning Learning is related to the mastery of fundamental principles, concepts and laws which can be used to understand and transform situations in the world of Nature and Society. This concept is in accordance with that adopted by Marton and Ramsden [1] :

Learning should be seen as a qualitative change in a person's way of seeing, experiencing, understanding and conceptualising something in the world rather than as as quantitative change in the amount of knowledge someone possesses. Learning techniques and instructional strategies are inextricably linked to subject matter and the student's perceptions.


Willis [2] summarizes, as a hierarchy, six student concepts of learning:

- increasing knowledge acquisition;
- memorizing and reproducing;
- applying;

[^0]- understanding;
- an interpretative process aimed at understanding;
- changing as a person.

The first three categories are related to a process involving the reproduction of information. The last three ones look at learning as a process to seek meaning from the material and to integrate it with previous experience
and knowledge.


#### Abstract

About Assessment All assessment practices are based on assumptions related to the nature of knowledge and the process of learning. It is very often said that assessment for certification has received a greater attention than the one as an aid for learning. Ramsden [3] considers the conventional view of assessment, consisting mainly of assigning grades, as instrumental in the development of students' "cynical and negative attitudes towards the subject matter and superficial approaches to studying it $\ldots$ an optimal recipe for surface learners". According to Hargreaves and Wallis [4], current assessment practices lead the students to think that their success depends not on "how well" they have learned but rather "how much". This favours surface instead of deep learning approaches. Many times it has been understood that assessment is more a means of getting a single score for comparative purposes and less an instrument to provide opportunities for a better understanding of the students. Sparkes [5] says that "in typical present-day exams in the UK, knowledge, intellectual skills and understanding are tested together in 3-hour exams which have a minimum pass mark around $50 \%$. It is, therefore, impossible to identify the kind of learning that students have achieved".


## Learning and Assessment

It is well accepted, without questioning, that the type of assessment gives an orientation and determines the way in which students learn, but very often it is not what we want. There is little doubt that assessment methods influence the learning attitude adopted by students and hence the desired outcome of any education process.
Assessment is very often used only for certification without taking into account that can be used as an aid to learn. As a rule, it is said, that facts are quickly acquired to meet examination pressures and afterwards quickly forgotten. Little attention has been give to the role of assessment in learning.
Teaching, learning and assessment are inextrincably linked. We should think of assessment more as a means of
providing opportunities for students to know and how much they understand.
Boud [6] takes a very pessimistic view on the connections between assessment and learning. He refers that assessment for certification has been given a greater attention than assessment to aid learning and it has been assumed that assessment measures learning, but does not influence it. Usual assessment methods force students into surface learning: facts are quickly acquired to meet examination requirements.
It is a common point of view that assessment methods can significantly influence the learning approach adopted by students and hence the desired outcome of an educational process. Assessment methods should therefore be used to measure what students can do with what they know, rather than what they know.
The way in which students are assessed is of paramount importance to shift them from mere memorizing facts towards analysing and discussing problems and issues, and consequently, from surface learning towards deep learning.

## Inquiry to the Causes and Conditions Which Can Influence the Pass Rate of the Courses

Course :
Academic Year:
Total Nr. of Students :

Lecturers :
Licenciatura :

| Results | Assessed <br> Students | Pass | Fail |
| :--- | :---: | :---: | :---: |
| Partial Tests |  |  |  |
| Final Exame |  |  |  |

## ASSESSMENT/TYPE OF ASSESSMENT

Existence of Partial Tests during the Semester. Yes No

Percentage of the different types of assessment in the final mark:

| Exam/Test | $\%$ |
| :--- | :--- |
| Home work | $\%$ |


| Laboratory - Individual Assessment <br> Laboratory - Group Assessment |  |
| :---: | :---: |
| Multiple choice examination (\% final mark) |  |
| Expositive type of examination (\% final mark) | \% |
| Examination paper with questions completely new to the students |  |
| Open book examination |  |
| Formulas given to the students |  |
| Examination without any memory help |  |
| Calendar of examinations: |  |
| Number of days after the last exam |  |
| Position order in the exams of the |  |

## LECTURING/CLASSES

Number of attendant students at lectures:
Number of laboratory classes:
Type of given bibliography :
Interrelation between the theory and laboratory classes :
Total number of lecturing hours per week :

## TYPE OF CONTENT OF THE COURSE

Abstract, with concepts and laws
Descriptive and merely informative

## PREVIOUS PREPARATION OF THE STUDENTS

Pre-requisite courses :
$\%$ of the students with the pre-requisite courses passed :
Average number of credit units of the students:

## DESCRIPTION OF THE INQUIRY

The questions of the inquiry are presented in four sections: a) Assessment/Type of Assessment; b) Lecturing/Classes; c) Type of Content of the Course; d) Previous Preparation of the Students. We think that the main causes which influence the pass rate can be included in these four categories. Eventually other variables also influencing the success of the students will be found during the elaboration of the inquiry and the interpretation of the data. Let explain
and make short comments to what is meant and what we aimed at with the different questions.

## Assessment/Type of Assement

- It is believed that the existence of partial tests during the semester, approaching continuous assessment, favours good results.
- Some people think that evaluation based on laboratory work increases the pass rate.
- Eventually written examinations of the expositive type will show higher rates of failure.
- It is interesting to know whether the use of books and notes during the exam increases or not the success.
- It is interesting to know if the number of days, during the period of exams at the end of the semester, before the exam of the discipline in question, is relevant for the pass rate and which is the order of that discipline inside the calendar of exams.


## Lecturing/Classes

- It is supposed that the attendance at lectures has a direct and positive impact on the pass rate.
- Also it is believed that the greater is the number of laboratory classes the greater the students'success.
- The type of bibliography, books in English or in Portuguese, transparencies, notes, must in some sort influence the students'results.
- A good correlation between the theoretical lectures and the laboratory work must revealed beneficial.
- A too great number of lecturing hours must be detrimental to the students.


## Type of Content of the Course

- It is believed that courses the matter of which is more abstract, with concepts and laws in mathematical form, show a greater rate of failure.


## Previous Preparation of the Students

- It is quite expectable that the greater the number of the students with the pre-requisite courses passed the

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greater must be the pass rate observed in the discipline under scrutiny.

- It is supposed that students enrolled in more disciplines must show a lower performance.


## Some Final R emarks

The failing rate of the students reading Engineering Courses at the Faculty of Sciences and Technology (Faculdade de Ciências e Tecnologia) is, more often in the two first years, higher than the acceptable, which causes too much concern. Although it is widely accepted that one of the reasons lies, both in attitudes and knowledge, in the insufficient preparation that the students entering the University have, professors and academic authorities want to invert and compensate the situation. To identify better, based in more complete and objective information, the possible causes of such state of things is the main reason of the here described inquiry. In our specific situation at Coimbra it is recommendable to know how assessment influences learning, namely deep learning.
Another reason behind this inquiry is to investigate if different types of assessment lead inevitably to different values of pass rates: while some courses have only a few percent of successful students, there are others which can get one hundred percent. What are the reasons of such high
discrepancy? Can it be, for example, that courses with assessment based mainly or exclusively in laboratory practice show naturally higher pass rates? If so, one has to think about the kind of learning achieved by the students in the different cases.
A final question is to estimate in which measure all the different kinds of assessment have their own advantages and virtues and the real challenge lies on the way of combining them adequately.
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