TEACHING STATISTICS AT A SUPERIOR SCHOOL OF BUSINESS MANAGEMENT REALITIES AND CHALLENGES

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This paper outlines the reality of the teaching of statistics in a superior school of business management in Portugal. We begin by presenting the difficulties that teachers encounter, resulting from a variety of problems. A major cause is the enormous heterogeneity of the level of knowledge that students have. We must point out that the introduction of the Bologna process has aggravated this situation. The assumption of reduced classroom hours and an increase in self-study is extremely penalizing for such students. There are many challenges we have to face: How to teach statistics to a class where half the students cannot interpret the basic concepts of mathematics? Is the approach of teaching statistics through software beneficial? Should the teaching of statistics be addressed in a practical way? Should we instill a critical thinking in the students, to enable them to use the knowledge acquired to solve problems?

INTRODUCTION

The reality that we are trying to transmit in this work is that, with the teaching of Statistics at a higher level, not only in terms of basic concepts, but also at a more applied level such as areas like the analysis of regression and the study of temporal series. Although in our opinion, the problems that we are going to expose are generally common to the Portuguese Polytechnic Schools/ Universities, which is where we are going to centre our experience. The institution that we teach at is in the urban periphery of the capital of Portugal. The socio-cultural asymmetry that is found in the group of students that attend the courses ministered in these schools also contribute to the problems found in the classes. Obviously, this problem is not directly linked only to the teaching of Statistics, but it is one of the factors that together with other more specific ones contribute to the underperformance that we are faced with at school at the moment.

We are specifically going to approach the difficulties found in the subjects that we teach in the Statistic area at the Business Management Superior School, although each one of us has the experience in teaching these subjects in schools of education and engineering, therefore enabling us to witness that the problems are all similar. It's thus, obvious that we are aware that although the problems are not the same, the realities and professional needs of the students are different, hence meaning that the solutions we present may not be the most adequate to all the situations.

In this way we expect to share our experience and try to collect ideas that may at some time contribute for the solution of the problems that we all encounter every day.

DETECTED PROBLEMS

Although the socio-cultural differences contribute to the problem of the underperformance in the teaching of Statistics (and in the underperformance in general), and is a problem that should be reflected, this is not the objective of this work. The specific problems inherent to the teaching of the subjects of Statistics are the following:

- Heterogeneity of previous knowledge in the area of Statistics, specifically, in general Mathematics.
- The pre-conceived stigma in relation to everything that is linked with Mathematics and consequently with Statistics.
- The difficulty that the students find in applying the knowledge "acquired" in practical situations; difficulty in the resolution of concrete problems.
- Class dimensioning; usually the theoretical classes, but especially the practical classes are over-dimensioned.

The combination of this set of problems transforms the teacher's work into a daily challenge. How can we get past all these obstacles so that each student may achieve the objectives

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that, in the end translate themselves into the acquisition of the fundamental concepts of Statistics and applied to real problems?

Each problem is on its own an obstacle very often difficult to overcome when several are put together and the most varied combinations are found, the obstacle then reaches dimensions frequently unsurpassable, which leads to high underperformance.

BOLOGNA–IMPACT IN STATISTICS TEACHING

The Bologna process that we were "made" to adopt, that although theoretically makes all the sense, in our specific case has made the situation worse. The feeling that we have, teachers and students, was that "a house started being built from the roof". The students are expected to be more and more autonomous in what concerns studying, have less and less classes attendance and can, *on their own*, perform a set of tasks, leaving the teacher with a tutorial role. But the reality that we are faced with is very different. The students get to the higher education with more and more serious deficiencies in the area of Mathematics and Statistics. In this situation we came across the first challenge: how can the teacher with less academic hours, teach the fundamental concepts of the Statistics and expect the student, alone, to apply those concepts to real or simulated situations, very often having to make use of software that they are not familiar with or have never used?

This challenge would be big if all the students were in the same conditions (in what concerns knowledge), but that does not happen either, in other words, in the same class the level of basic knowledge is very dissimilar which intensifies the problem and makes it more difficult to find solutions.

Still according to the Bologna process the degrees, which in Portugal took four or five years, were reduced to three. In our case as a consequence, the programmed contexts of two subjects were condensed into one, always in the presupposed of less classroom hours and more autonomous work from the student. Another consequence was the over-dimensioning of classes. Only as an example, the theoretical classes can be dimensioned for about 180 students and the practical ones for about 50 students. What can we say? Impractical! Even for students with solid bases!

HOW TO FACE THESE CHALLENGES–WHAT SOLUTIONS ARE REALISTIC?

Before these challenges, any teacher is tempted to solve them. Theoretically, some of the problems seem to be easy to resolve. The question is that from the theory to the practice there is a big gap. Many questions are asked. Before a class of big heterogeneity of basic knowledge how can we make the weaker students reach the defined objectives and on the other hand how can we motivate the students with more knowledge? Could a more practical approach relegate the more theoretical concepts to second plan, make sense? Is the use of software for students who do not dominate the theoretical concepts a good strategy? We believe that it could make some concepts easier to understand, but on the other hand, we get the feeling that we are "cheating" by transmitting the wrong idea to the student, that it can solve problems in a practical way with very little theoretical studying. Of course many of the students would like these type of solutions, but isn't it the teacher's role to develop critical spirit in the student? Stimulate him/her to study?

Below we introduce some ideas, which to a certain extent may answer some questions. Theoretically, we know that some of our proposals were easily feasible, however, and through our own experience, we also know that in practice it isn't really like that. For several reasons, lack of material and/or human resources and at times, lack of will from some higher authorities.

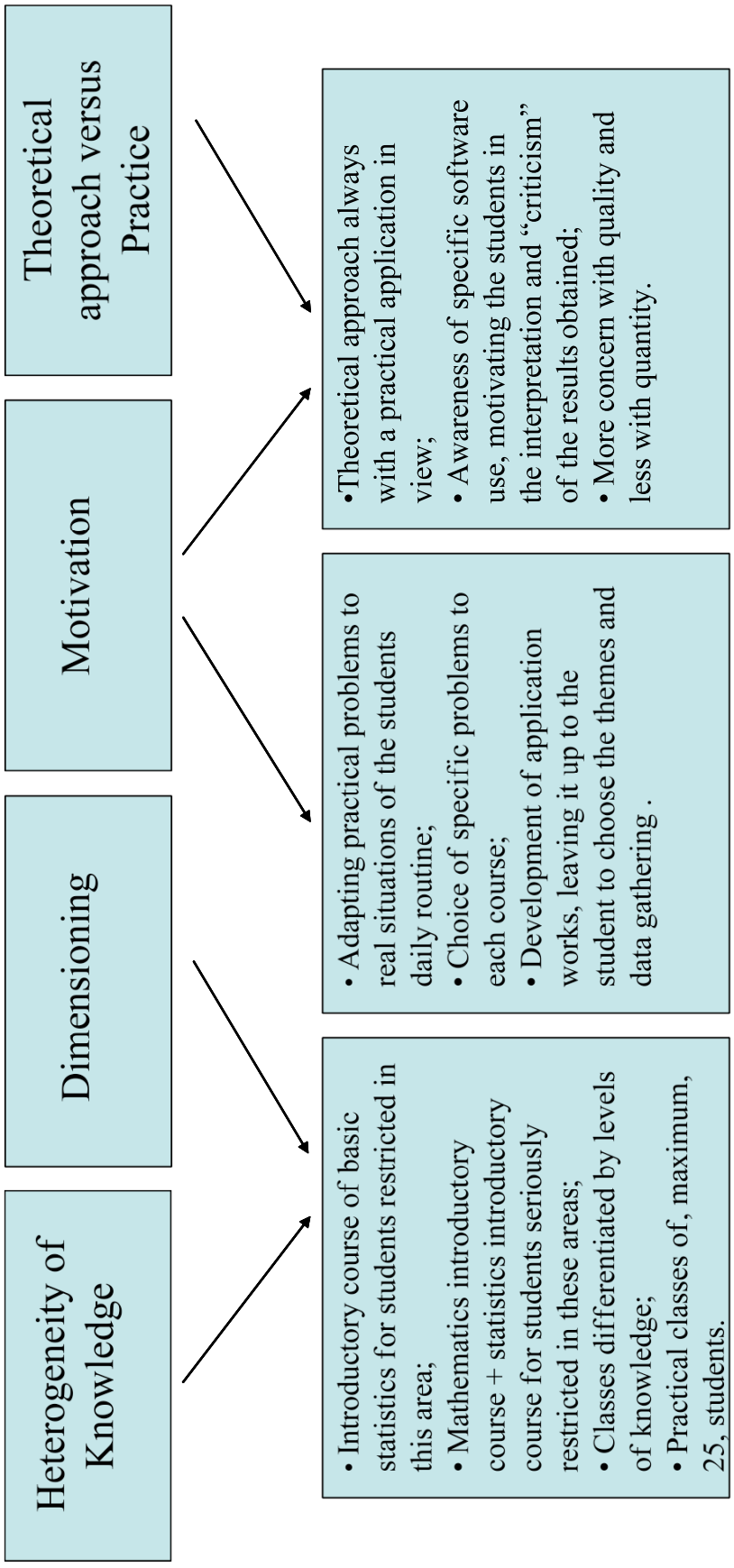

Figure 1. Problems vs Solutions

CONCLUSION

This work is a result of a deep reflection that has been ongoing through the several years of teaching these curricular units. The difficulties that there were before Bologna persist and have made new problems. We intended to summarize a set of problems that seem to be the core of underperformance in the curricular units in the Statistics area. We have presented solution proposals, some of which we are already implementing. As a result of this reflection, we hope to be able to find a solution to some of the problems. We are looking forward to finding similar experiences in this conference so as to exchange creative ideas.

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