

Perspectives and Realities of Teaching Statistics at a Superior School of Business Administration

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Abstract. This paper aims to describe the reality of the teaching of statistics in a superior school of business administration in Portugal. It is supported in a twenty years of experience teaching several disciplines belonging to the scientific area of Mathematics such as: Statistics and Probability, Data Analysis, Calculus, Algebra and Numerical Analysis. This experience is not limited to school of business administration but also in engineering and health courses and in all these schools there has been a substantial increase of failure in these disciplines.

I intend to present the main difficulties that teachers encounter. These difficulties are due to a diversity of problems. A leading cause is undoubtedly the huge heterogeneity of the level of knowledge that students have. The large number of students in each class it is also a massive problem. I must point out that, in my opinion, 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 that teachers have to face: How to teach statistics to a class where more than 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 more practical way? How can we install a critical thinking in the students, to enable them to use the knowledge acquired to solve problems? How can we deal and prevent the failure that is increasing each year? These are only a few questions that all the teachers need an answer.

INTRODUCTION

With this study I try to transmit the reality of teaching Statistics at a higher level, namely at a superior school of Business Administration. This work follows one presented at 2010 in the 8th International Conference on Teaching Statistics (ICOTS8). Unfortunately I have to say that the problems detected at that time not only remained but have got worse in these five years.

The problems begin immediately when we try to teach the basic concepts, getting worst at a more applied level such in areas like the multiple linear regression, logistic regression, principal component analysis, time series and so on.

Founded in 1994, the College of Business Administration of Polytechnic Institute of Setúbal is in the urban periphery of the capital of Portugal and is a prominent school in its field of study and it has earned the respect of the business community and other organizations. All in the institution and mainly the statistics professors are motivated to overcome these problems.

The socio-cultural asymmetries that are found in the group of students that attend the courses ministered in this institution contribute, in my opinion, to the problems found in the classes. Evidently that 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 the teachers are faced with at school for some years now.

My main goal is to point out the primary difficulties found in the subjects that I have been teaching in the Statistic area at the School of Business Administration. It is obvious that I am aware that although the problems are similar in the different subjects and also similar each year they not exact the same, the realities and professional needs of the students are different, hence meaning that the solutions presented here may not be the most adequate to all the situations.

I am trying to share my experience and try to collect ideas that may at some time contribute for the solution of the problems that we all encounter every day.

THE MAIN PROBLEMS

There are countless problems that daily teacher faces in the classroom which contribute to the underperformance in the teaching Statistics and in the underperformance in general. Some of them like the socio-cultural asymmetries or the language barrier common in students from other countries are issues that should be reflected but will not be covered in this work.

The main problems inherent to the teaching of the subjects of Statistics are the following:

- Heterogeneity in previous knowledge in the area of Mathematics and consequently in Statistics. The number of students with only nine years of math instead of the usual twelve has increased exponentially. It is quite usual to have classes where half of the students find themselves in that situation and the other half has the twelve years of math. I can testify from personal experience that teach in these conditions is an authentic nightmare. Not only for the teacher but also for students. Half cannot follow the lesson and the other half is disheartened because they expected a more advanced lesson.
- Class dimensioning; both the theoretical and practical classes suffer from this problem. Clearly the over-dimensioned classes are a bigger problem in practical and computational classes.
- The difficulty that most of the students find in applying the knowledge “acquired” in practical situations; the difficulty they show in the resolution of concrete problems.
- The pre-conceived stigma in relation to everything that is linked with Mathematics and Statistics.

Blending this set of problems the daily teacher’s work becomes a real challenge. How can we get past all these obstacles so that each student may achieve the goals 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 hurdle very often difficult to overcome when several are put together and the most varied combinations are found, the obstacle reaches dimensions frequently unsurpassable, which leads to high underperformance.

BOLOGNA’s PARADIGM

The Bologna process that all of us were “made” to adopt in our particular case has made the situation worse, my opinion of course shared by most colleagues. The feeling that we all have, professors and students, was that “a house started being built from the roof” (a Portuguese proverb). In this learning process the students are expected to be more and more autonomous in what concerns studying, have less and less classes attendance and, on their own, be able to perform a set of tasks, leaving the teacher with a tutorial role. But our reality is very far from this assumption. As I already state our 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 with a first challenge: how can the teacher with less academic hours, teach the fundamental concepts of 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 becomes more difficult to overcome if we remember that in the same class the level of basic knowledge is very dissimilar which intensifies the problem and makes it more complex 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 assuming the decrease of classroom hours and the increase of 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, the practical ones for about 50 students and the computational classes for more than 35 students. In this last case we must refer that the classroom have no more than 23 computers. What can we say? Unworkable! Unrealistic! Even for students with solid bases! Imagine what happens to our students!!

WHAT SOLUTIONS ARE REALISTIC?

Any teacher before such challenges undoubtedly will want to overcome them. Hypothetically some of the problems seem to be easy to solve. The question is that from the theory to the reality there is a big gap.

Before a class with a large heterogeneity of basic knowledge how can a teacher make the weaker students reach the defined goals and on the other hand how can he motivate the students with more knowledge?

At first sight we might think that this problem has an easy solution. It would be enough to create differentiated classes according to the level of knowledge. I cannot say if it would result. We never managed to convince the school board to try this solution. According to them the lack of human resources makes it impossible. The same reason is presented whenever we try to solve the over-dimensioned classes.

Could a more practical approach relegating the theoretical concepts to second plan? Is this an idea that makes 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?

We are trying to implement a mix of the abovementioned, less weight in the theoretical approach devoting more time to practical applications, but it is still soon to analyze the outcomes.

Below I present some ideas, which to a certain extent may answer some questions. Theoretically, I know that some of these suggestions were easily feasible, since some of them are actually running. However, and through my own experience, I 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.

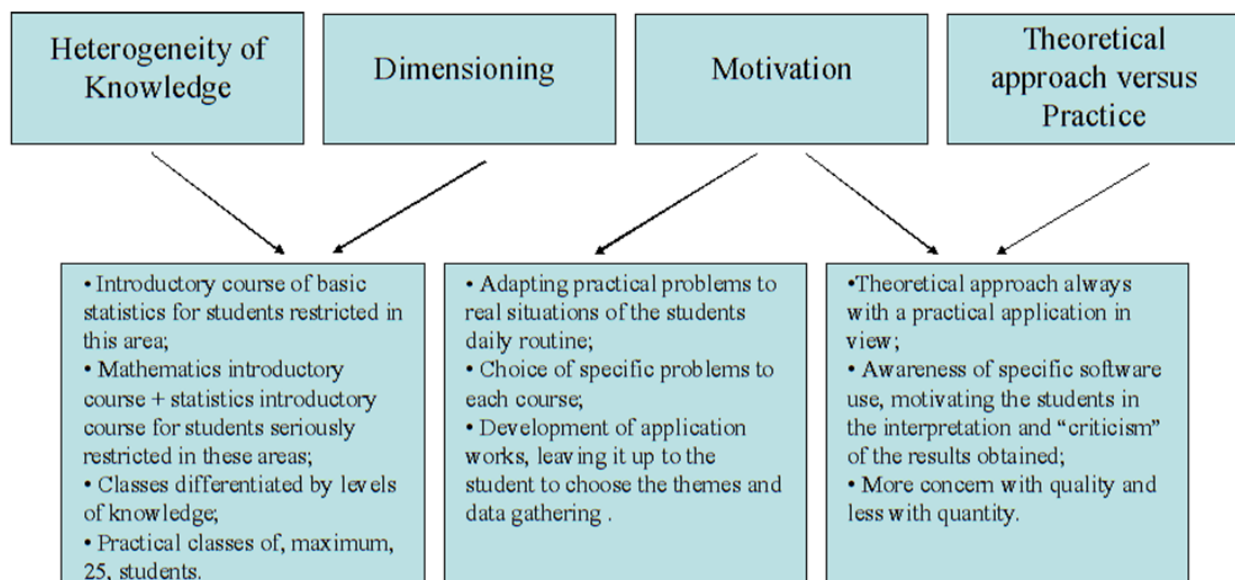


FIGURE 1. Problems vs Solutions

The above figure was built five years ago when I presented this issue in the 8th International Conference on Teaching Statistics. I decided to keep it exactly the same since I believe that the presented solutions could together produce highly positive results.

CONCLUSIONS

This work is a result of a deep reflection that has been ongoing through the twenty years of teaching these subjects. The difficulties that students always had in the area of Mathematics and Statistics have worsened over the years and more since the implementation of Bologna process. My intention was to summarize a set of problems that

seem to be the core of underperformance in these subjects. I have presented a few ideas, some of which are already implemented. As a result of this reflection, I hope to be able to find some solutions to at least one of the presented the problems.

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