

TEACHING FOR APPLIED STATISTICIANS

Lúcia Pereira Barroso
Universidade de São Paulo, Brazil
lbarroso@ime.usp.br

We consider the experience in teaching for applied statisticians of the undergraduate course of Statistics at Universidade de São Paulo, Brazil. Two courses are offered to the students which are linked to the CEA – Centro de Estatística Aplicada (Statistics Applied Centre).

INTRODUCTION

Training an applied statistician involves several aspects. Applied statisticians always work jointly with professionals from other areas and the first difficulty is the mutual understanding because professionals from different areas in general have their own languages.

We consider an interesting experience in teaching Applied Statistics developed at the University of São Paulo, in two courses offered to the undergraduate students, in the last year of the course of Statistics. Each course has the duration of a semester, i.e., the first (Applied Statistics I) is developed between the middle of February until the beginning of July, and the second (Applied Statistics II) from August to the beginning of December. These two courses are linked to the Statistics Applied Centre (CEA – Centro de Estatística Aplicada).

At first we present CEA and how it provides service. After that we consider aspects of teaching for applied statisticians, which involves:

- How to talk with professionals from other areas;
- How to do statistical analyses;
- How to prepare reports explaining results of the statistical analysis;
- How to present results in a PowerPoint session;
- How to present results in a poster session.

THE STATISTICS APPLIED CENTRE

The Statistics Applied Centre was founded at the beginning of the 1970s and has since given support about statistical analysis to a wide number of researchers from other knowledge areas. Most of the projects selected to be analyzed in the CEA are experiments developed for Master's dissertations, Ph.D. dissertations, or to publication in specialized journals.

The main areas served by CEA are Medicine, Biology, Pharmacy, Dentistry, Human Sciences, Sports and Psychology. The activities offered by CEA are basically of two kinds: Consulting and Statistical analysis of the project.

Consulting involves making an interview with the researcher that is developing the experiment. Researchers usually demand the service offered by CEA in several steps of the development of their projects. Some of them ask for statistical support before the start of the experiment, some during the collection of the data, and others after having collected the data.

- *Before starting the experiment*

In these consulting sessions, the discussion is about the experimental design, the several aspects involved in the study and about the sample size.

- *During the data collection*

At this stage, the client usually asks for help with the correct way to collect the data and to analyze a pilot sample.

- *At the end of the data collection*

Researchers ask for advice about how to do the statistical analysis of the dataset.

After two or three weeks, researchers receive a succinct report about the consultancy, which includes the results of an eventual analysis (sample size, analysis of the pilot sample, for example) and suggestions for the statistical analysis.

At the second aspect of service, the statistical analysis of the data set is made in CEA and takes a semester. Researchers make their data available to CEA and follow all the process of the

analysis. At the end of the semester, they receive a complete report that includes the statistical analysis and the conclusions.

THE EXPERIENCE OF TEACHING

The teaching experience of applied statistics has several aspects. Both mentioned courses are given by two professors of the Statistics Department of the University of São Paulo.

Experience Obtained From Consulting

Each interview is conducted by the responsible professors by the discipline and two students that are responsible to prepare the report. During the interview, these students have the opportunity to talk and interact with professionals from other areas distinct from Statistics, and they can learn and practice a discussion where both sides usually have different languages. Another aspect in this experience is to learn how to conduct an interview to get important and necessary information to obtain complete understanding of the project.

Another important exercise is to make a report of the interview. This involves the job of writing in a clear form the suggestions and the statistical conclusions without employ statistical terms and then to make the report available to be read by people without a culture in Statistics.

Experience Obtained From the Analysis of the Project

Each Project is developed by one or two students, depending of the number of selected projects. Each project is supervised by a professor of the Statistics Department and both supervisor and student(s) are responsible for the analysis. The analysis is followed by the researcher, and this makes it possible that the students can learn about the interaction between researcher, supervisor and students. The steps to develop the project are:

- *Interview with researchers*

In that interview, the experience is similar to the experience obtained in the consulting interview, as mentioned above.

- *Presentation of the results in a PowerPoint session*

The presentation of the results of the statistical analysis is made on two occasions, in the middle of the semester with a presentation that include a descriptive analysis, and an another at the end of the semester where students present the complete analysis and the conclusions. In these occasions, students have the opportunity to learn and prepare a presentation using audiovisual and computational resources and can learn to do an oral presentation.

- *Making the final report*

Students, supervised by their professors, have to prepare a complete report that must include abstract, introduction, experiment description, variables description, descriptive analysis of the data set, inferential analysis of the data set, conclusions and bibliography. At this step of the activity, students have the opportunity of learning how to prepare a technical report.

- *Presentation of the results in a poster session*

At the end of the semester, the analyzed projects are presented in the hall of the Institute of Mathematics and Statistics and this permits the entire community the opportunity to know the jobs developed during the semester. This fact not only provides the students of the last year of the course an opportunity learn to do a presentation in a poster session, but it also encourages students that are starting the course of Statistics.

All the steps developed in this process are followed by the responsible professors of the courses. They always made criticisms and corrections of all involved aspects.

CONCLUSION

Through this experience, students can learn about conducting an interview with researchers from other areas, make succinct and complete reports, and present oral and poster sessions. Students can also learn Statistics in these courses. Students must do the statistical analysis of their own project and have the opportunity to know the analysis made by their colleagues in the occasions of their presentations, when they can discuss and give suggestions about different problems, where different strategies of analysis can be employed.