A DIDACTIC PROPOSAL FOR THE INTEGRATION OF STATISTICS AND BASIC INFORMATICS IN AN UNDERGRADUATE PRE-DEGREE PROGRAM: ADMINISTRATION AND ECONOMY OF SMALL AND MEDIUM-SIZED BUSINESSES

Norma Patricia Caro, Cecilia Díaz, Margarita Díaz, and María Stimolo
Universidad Nacional de Córdoba, Argentina
pacaro@eco.unc.edu.ar

In 2004 the School of Economics and Business Administration at the National University of Córdoba opened an undergraduate pre-degree program, Small and Medium-Sized Business Administration and Economy. The first-year curriculum includes Statistics and Basic Informatics, which can complement each other in the teaching of their contents and in tests. Therefore, a test was written which makes possible the integration of both subjects. It is an Integrating Assignment which must be submitted after the theory and practical applications in both subjects have been learned. This test is published on the Educational Platform with a series of guidelines. The result of the experience was positive, since it fostered students' learning and proved a collaborative form of work between the professors in both subjects.

INTRODUCTION

This proposal was implemented in an undergraduate pre-degree program, Small and Medium-Sized Business Administration and Economy, by the School of Economics and Business Administration at the National University of Córdoba after an agreement was signed in 2004 between this university, the School of Economics of the University of Turin (Italy) and Córdoba Legislature. It started out of the need for the integration of two subjects in the first-year curriculum: Basic Informatics and Statistics.

In a business context of continuous changes in organizations, it becomes necessary to provide students in the undergraduate program with knowledge and skills which will later become competences to solve business-related problems. The descriptive contents will allow them to collect, organize, present and interpret data taken from the real world in the context of economy and administration. The notions of probability provide the foundation to understand basic inferencing and sampling methods.

On the other hand, informatic tools have become widespread and have been accepted for the solution of problems in the different areas of every organization. The most commonly used tools are word processing programs, spreadsheets, data analysis packages, network communication software, which make possible group and cooperative work.

The network of economic relations and the performance of the actors involved give each company common and specific characteristics which make training necessary in order to provide them with competences to use in their work as future specialists.

Therefore, students become active and capable of thinking and acting with reflexive and critical soundness when faced with different tools in an organization. It is expected that the contents and skills learned in both subjects will become integrated through the use of technology for the solution of problems by means of a virtual platform.

PROPOSAL DEVELOPMENT

The objectives set in both didactic proposals refer to students who are able to:

Statistics	Basic Informatics
- Recognize the importance of statistics in the context of business and organizations. - Promote the study of statistics and its application in the solution of problems. - Recognize the importance of data summary procedures for the	- Understand the importance of the use of office automation tools to improve the efficacy and efficiency of organizations. - Acquire skills for the use of a PC and different tools in a Windows environment. - Apply the acquired knowledge to the

systematic handling of research problems in the field of economics and business administration. - Strengthen their ability to distinguish different statistical methodologies based on theoretical and practical knowledge. - Apply the learned notions to the solution of problems in the context of small and medium-sized companies. - Use statistical software (*Infostat* and/or *Excel*) in problem solution. - Acquire skills to analyze and interpret results.	solution of particular personal, study and work situations.
By completing the Integrating Assignment students should be able to: - Integrate practical applications with the subject contents. - Critically receive the information given. - Incorporate the use of technological media for better communication and solution of the situations presented. - Provide the necessary tools to learn by themselves and do interdisciplinary work. - Encourage cooperative work and individual responsibility to achieve a common goal. - Perform within informatic structures in a network.	

The thematic blocks developed in both subjects justify their integration, since students are being taught to apply spreadsheets (*Excel*) and use statistical software (*Infostat*) to solve problems involving data collection, organization and analysis as well as the calculation of probabilities and reliability intervals. These blocks refer to the following topics:

Statistics	Basic Informatics
- Basic notions - Data collection, organization and summary - Data analysis (position, dispersion and form measures) - Regression and correlation analysis - Time series and index numbers - Probability. Probability models. Sampling distribution. Inference notions	- Making, editing, formatting, configuring and printing a document with *a word processor*. - Creating formulas and charts, printing and managing data by means of a *spreadsheet*. - Analyzing data with spreadsheets. - Using data files by identifying their structure and codification. - Obtaining results with the use of a specific statistical package. *Infostat*

Prioritizing evaluation as a reflexive attitude in the analysis of the different topics, aptitude and ability for logical reasoning and the acquisition of skills in the learned topics, the following Integrating Assignment is presented which will be evaluated jointly by the professors in both subjects and should stick to the following guidelines.

It is an assignment to be done in groups of between 2 and 4 students each, who will have to submit a report no longer than 15 pages. By entering the educational platform, http://aula2.eco.unc.edu.ar, with user and password identification, group members can select one of the two databases in Excel format which they will find in the File section in order to do the Assignment. Both subjects share the same space in the Educational Platform. This is the first integration, which will be enriched later through the solution of the problem set out in their work.

The task consists in writing a statistical report with the data given. It will have 2 (two) parts:

First Part	- Selecting at least 2 (two) qualitative or categorical variables and 2 (two) quantitative or numerical variables. The selection will depend on the type of relations to research into. - Writing a statistical description. This implies, for each of the selected variables: 1. Drawing all relevant charts. 2. Making frequency tables to organize and summarize the information. 3. Obtaining the main position, dispersion and form measures. The most relevant measures will also have to be selected here taking into consideration the variable being studied, the distribution characteristics, etc. 4. Making joint interpretations of the measures and charts exhibited and drawing some conclusions.
Second Part	- For two quantitative variables analyzed jointly the group will have to: 1. Draw a chart which will allow them to see the relation between them. 2. Calculate a joint variation measure and deduce whether there is a relation between both variables and in what direction. - For two qualitative variables analyzed jointly the group will have to: 1. Make the joint and marginal frequency table and write the interpretation. - For a qualitative and a quantitative variable analyzed jointly the group will have to: 1. Make the corresponding frequency table for each category of the qualitative variable. 2. Calculate conditional measures. 3. Make a chart which will make possible the comparison among the distributions. 4. Make a joint interpretation.

Guidelines are minutely detailed because the students do not have previous knowledge of statistics, and although they know some informatics, this knowledge is not related to the use of statistical tools.

Any spreadsheet (e.g., *Excel*) or statistical software (e.g., *Infostat*) can be used for the calculations. However, the results should be edited and integrated into the rest of the work in a document created with a word processor (e.g., *Microsoft Word*).

The assignment should be submitted after the first four weeks of the course (6 weekly hours of Statistics and 3 weekly hours of Informatics), since this is the moment when the students are ready to work on it.

PROPOSAL EVALUATION

The proposal was first implemented in 2004 and its evaluation was made in the process of grading the assignments, where it was observed that 90% of the students submitted the work timely (those who did not had dropped one of the subjects for different reasons). The whole class passed and their qualitative grades ranged between *Excellent*, *Very Good*, *Good* and *Fair*.

The most common mistakes were: calculating position and dispersion measures of categorical variables with incoherent interpretations; drawing charts without considering the axis

scales and with incomplete interpretations. The use of informatics was remarkable, as well as the effort to set out a problem, according to the selected database, and the correct answer to it.

The students stated that the work had been positive and that it had helped them in the integration of the theoretical and practical contents of each subject.

Finally, the collaborative work between the professors of each subject should be specially praised, since achieving horizontal integration is usually difficult in higher education programs.

BIBLIOGRAPHY

Berenson, M., Levine, D. and Krehbiel, T. (2001) *Estadística para Administración* (2nd edition). Mexico: Prentice Hall

Castello, Díaz and Jones. (2000). *Curso de Windows*. Editorial Asociación Cooperadora de la Facultad de Ciencias Económicas de la Universidad Nacional de Córdoba.

Castello, Díaz and Jones. (2000). *Curso de Word*. Editorial Asociación Cooperadora de la Facultad de Ciencias Económicas de la Universidad Nacional de Córdoba.

Castello, Díaz and Jones. (2000). *Curso de Excel* Editorial Asociación Cooperadora de la Facultad de Ciencias Económicas de la Universidad Nacional de Córdoba.

Castello and Ricardo. (2004). *Notas de cátedra de Sistemas de Información y Procesamiento de Datos I* Editorial Asociación Cooperadora de la Facultad de Ciencias Económicas de la Universidad Nacional de Córdoba.

Cátedra de Estadística I de la Facultad de Ciencias Económicas de la UNC. (2004). *Guía de Estudio de Estadística I - Ciclo Básico a Distancia* Editorial Asociación Cooperadora de la Facultad de Ciencias Económicas de la Universidad Nacional de Córdoba.

Departamento Universitario de Informática. (2003). *Curso de Internet*. Universidad Nacional de Córdoba.