LEARNING STATISTICS ON LINE. FACTS AND FIGURES FROM A THREE-YEAR EXPERIENCE[1]

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During the last decades, the Information and Communication Technologies (ICT) have introduced main changes in both the dissemination of statistical information and the teaching and learning methods.
In this paper we describe our three-year experience referred to the on line course "Economic Data Analysis" included in the virtual campus of the University of Oviedo, AulaNet (www.aulanet.uniovi.es) and also in the shared virtual campus of the G7 Group of universities.
A brief presentation of the subject is included, also describing the e-learning resources and the software ADE+ which has been specifically developed for teaching purposes and is available from the web http://www.aulanet.uniovi.es/ade+.
Finally, the paper provides some figures referred to the academic results and the students´ on line opinions.

1   Introduction

The development of Information and Communication Technologies (ICT) has introduced main socio-economic changes also improving the availability and processing of the statistical information [4,11].

The statistical courses can greatly benefit from the increasing availability of information, the use of statistical packages and the potential of the Internet as a teaching tool [1,2,5,13].

In this context, the subject "Economic Data Analysis" (ADEnet) was specifically designed for e-learning, focusing on the student as a user of the statistical information (mainly economic data) and trying to make good use of the interactive on line facilities and communication tools.

This paper summarizes our three-year experience, including a brief presentation of the subject (section 2) and a description of the software ADE+ (section 3). Furthermore, since ADEnet is a free-election subject included in the shared virtual campus of the so-called G7 Group of universities[2], the final section of the paper provides some figures referred to the evolution of student enrolment, participation, academic results and opinions.

2   Economic Data Analysis

Economic Data Analysis (ADEnet) is an on line free election subject included in the virtual campus of the University of Oviedo, AulaNet [6,9] (http://www.aulanet.uniovi.es) and adressed to a wide variety of students from different universities and academic profiles. Since the main aim of the course is to familiarize the students with the sources, meaning and treatment of the economic information, their participation is highly encouraged through the use of a wide variety of on line tools and the ADE+ statistical software.

The syllabus contains a three-module classification, following the sequence of the origin, treatment and dissemination of statistics. Each of the twenty one lessons starts with a Working Guide and provides access to a virtual class, designed as a twelve-minute multimedia overview of its main contents.

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[2] At the present moment the G7 Group includes the following institutions: Universidad de Cantabria, Universidad de Oviedo, Universidad del País Vasco, Universidad de La Rioja, Universidad de Zaragoza, Universidad Pública de Navarra, Universidad de las Islas Baleares and Universidad de Extremadura.

The students have also access to several on line resources such as Multimedia Educative Materials (MEM), self-assessments, Frequently Asqued Questions (FAQ), interactive tests or forums ... while tutorials are available through e-mail, chat and video-conference.

Although most of the described resources are commonly used in the e-learning experiences some differential aspects of ADEnet can be emphasized:

- Since the Statistical Internet servers provide fast access to vast amounts of information and resources, the **web visits** are highly encouraged, allowing the students to come close to the real statistical information.

- Some **historical notes** have been included (through presentations, videos and links) in order to ilustrate the origin, applications and risks of the main statistical concepts and techniques.

- In order to encourage the students´ participation the course provides many **suggested activities** such as the realization of opinion polls or the on line discussion of "reasonable doubts".

- The critical analysis of the statistical information is also emphasized though a **Statistical Mistakes section** which is enriched with the students´ contributions.

- Practical applications have a main significance in the statistics courses and demand an active participation of students. The practical contents of our course are based on the **statistical package ADE+** which is described in the next section.

The challenges of e-learning experiences include the evaluation method. In order to avoid the existence of incoherences with the learning process, we have developed a flexible system of evaluation based on four criteria:

- Self assesment results (30%)

- Marks of the practical work submitted to tutors (30%)

- Results of the final on line exam (30%)

- Activity and participation indicators (10%)

The realization of an on line exam is an outstanding characteristic of ADEnet, since it is not considered in most of the virtual courses. Although the implementation of this kind of evaluation has some technical and administrative dificulties, it undoubtedly introduces many advantages such as spatial and temporal flexibility[3] and coherence with the course methodology.

3   The ADE+ Software

The practical contents of the subject Economic Data Analysis are based on the ADE+ software [5,10], which has been specifically developed for teaching purposes[4]. This application is structured in three different areas, respectively dedicated to a text editor, a spreadsheet-like data table and an object container, as it is shown in Figure 1.

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[3] In this case, students are offered the possibility of applying for a specific examination day (within a previously reserved period), time (five sessions a day) and location (different campusses depending on the student´s university).

[4] ADE+ has been developed and registered by Rigoberto Pérez and Ana Jesús López, with license 1996/33/27694 of the Intelectual Property Provincial Register of Asturias. Updated versions are available from the AulaNet website: http://www.aulanet.uniovi.es/ade+/
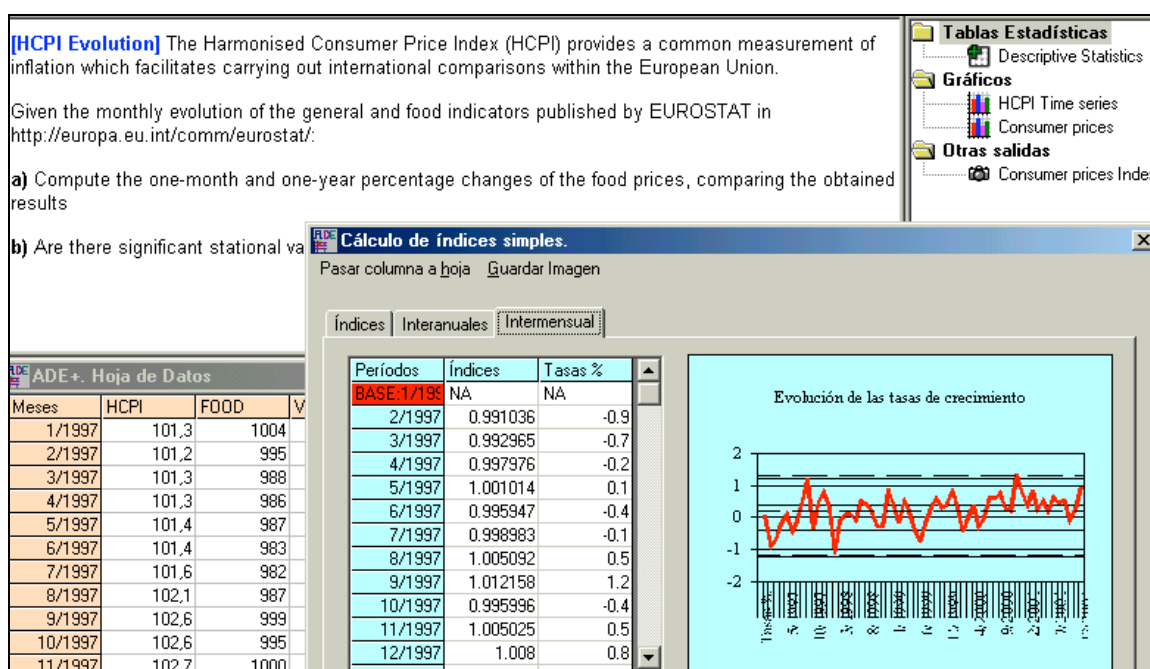
Figure 1. The ADE+ Software.

The use of this software has proved to be useful since students become familiar with real economic information (usually obtained from Internet servers) and its statistical treatment through a wide variety of options (sampling, data tabulation, graphical representations, joint analysis, index numbers, time series, estimation, hypothesis testing, …).

The practical material of the course provides access to several ADE+ workfiles, including solved problems and proposed exercises. Students are requested to select some of these exercises and send their personal work to the on line tutors.

As we have already advanced, students should also attend a final on line exam in order to show their ability in the use of statistical tools and the interpretation of economic indicators. The practical content of this exam is based in ADE+ workfiles and requires the application of some statistical options in order to solve the proposed problems.

4   Facts and Figures

According to its character of free-election subject, Economic Data Analysis has been followed by a wide variety of students, although the most outstanding academic profiles are those related with business administration, computing and engineering.

Our three-year experience shows a positive evolution of students, in both the University of Oviedo and the other institutions of the G7 group. As Figure 2 shows, this positive evolution refers not only to the increasing number of enroled students but also to their participation or activity in the course.

It is interesting to remark that the desertion of students is an outstanding risk of the e-learning experiences. In order to avoid this problem we have progressively increased the interactive contents of the course with satisfactory results.
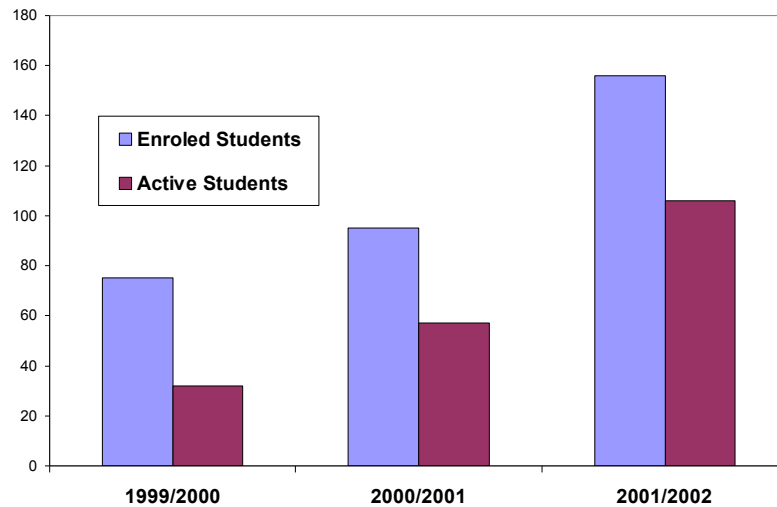
Figure 2. ADEnet students´ evolution.

Students´ opinions have been collected through on line polls refered to several aspects of their learning experience. In general terms, the experience has been positively evaluated and the main conclusions can be summarized as follows:

- The best scores are related to the most participative tools, such as self-assessments, interactive questions or practical contents based on ADE+.

- The use of communication tools (tutorials, chat, forum, ...) has obtained lower average scores with high relative dispersion, showing the existence of two different groups of students with active and passive behaviours.

- Technical difficulties and low speed or the network remain as the most negative aspects, although a considerable improvement has been observed along the period.

- Once the students have became familiar with these new learning methods and experienced their advantages, most of them are highly interested in further e-learning experiences.

5   Acknowledgements

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