

Official statistics has targeted the world of education as fertile ground for public outreach. With this in mind, Portugal's statistical office (INE) has designed a website – ALEA – facilitating statistical literacy for tomorrow's users and budding statisticians.

PEDRO CAMPOS, head of dissemination at INE's Porto regional directorate, describes the aims, workings and first experiences with the site.

<http://alea-estp.ine.pt> (*Als Banderole oÄ auf der ersten Seite einbinden*)

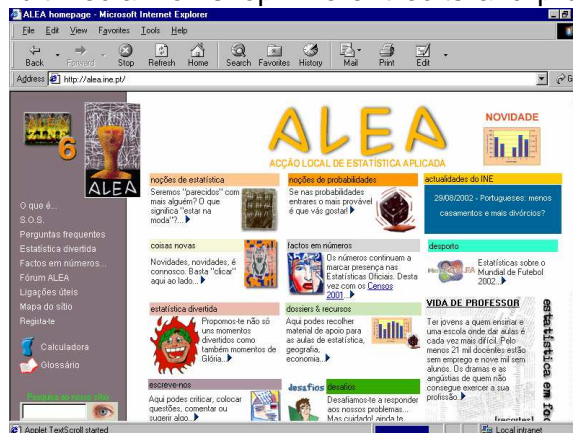
Now, that's edutainment

Let's be frank. To understand the written word, let alone statistics, we sometimes need a huge amount of grey cells as well as mental gymnastics training. To understand statistics, one not only needs to master a foreign statistical terminology, but they also need to know about methodology and metadata.

Statistical users must therefore be provided with tools to decipher this specific language and young people, in particular, must be helped to overcome their reluctance to deal with this subject and become critical and responsible users of statistics.

This is where the ALEA project comes into play. ALEA – Local Action of Applied Statistics – is a new instrument to support the teaching of statistics to primary and secondary school students and teachers through an interactive page on INE's website (<http://www.ine.pt>).

The project started out as a joint proposal by the Tomaz Pelayo Secondary School from Northern Portugal and INE and has now become a joint project with a third partner, the Ministry of Education. The school, having considerable computer resources, namely a multimedia workshop where it edits and produces educational



material, was particularly qualified for such a project. In terms of resources, ALEA has benefited from European funds through Portuguese operational programmes aimed at developing educational resources and training.

What's in it for us? The answer is simple. Statistical institutes, in carrying out their activity, are responsible not only for producing, disseminating and analysing statistical information but also for ensuring that this information is understood as objectively as possible. Our specific interest in ALEA is in disseminating data and promoting the use of statistical information for a specific public.

Multi-disciplinary input

To create the site, we needed more than statistics anoraks! The ALEA-team brings together people from INE and the Tomaz Pelayo School with different backgrounds – economy, statistics, mathematics and sociology. An external consultant, Prof. Eugénia Graça Martins – who also consults for the secondary school mathematics programme on which all the statistical concepts presented in ALEA are based – contributes in terms of elementary statistical concepts. Not to mention the web designers involved in page design and content creation, and schoolteachers who translate the website so that English- and French-speaking students in other parts of the world can also benefit.

Rethinking statistics pedagogy

One reason that pushed us to become more proactive in the area ‘statistics and education’ was that, in Portugal, the teaching of statistics was recently included in the O-level (7th, 8th and 9th years) and A-level (10th and 11th years) mathematics syllabi.

Elementary topics such as the gathering and organisation of data, data representation and interpretation, measures of central tendency and probability calculation are taught at primary school level, while secondary school students are introduced to more elaborate concepts such as inductive statistics.

This development encouraged us to reflect on the usual introductory courses in statistics. The ALEA project, taking advantage of its complimentary character in relation to the classic concept of the lesson, is equipped to adapt to the new paradigms of teaching statistics.

For readers who are unfamiliar with the world of teaching statistics, statistics pedagogy is said to follow four paradigms:

1. Statistics as a branch of mathematics;
2. as data analysis;
3. as experience planning; *and*
4. as a problem-based matter.

Encouraging statistical reasoning

Traditional statistics teaching focuses on the first three aspects. However, statistical reasoning must come before statistical methods. It is not advisable to present statistics at the introductory level as a branch of mathematics. Good statistics should, of course, be identified with purity and mathematical precision, but it is also associated with careful thinking.

Adopting the last paradigm implies, therefore, demonstrating that statistics are part of a problem-solving strategy. Statistical methods would, thus, be used to define a data set and not the other way round. Under this perspective, the course is organised as a series of applied problems – problems that could very well be taken from news items with a statistical content found in the mass media. Demonstrating the power, elegance and beauty of statistical reasoning by using realistic examples will encourage students to use critical thinking skills – an ability for life.

In this sense, the ALEA project aims to create a place where both teachers and students can take part in solving everyday problems giving rise to reflections of a

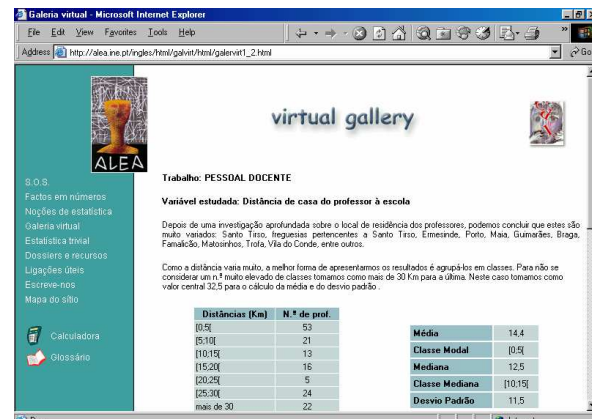
statistical nature. It also gives an opportunity to use interdisciplinary activities by using and serving other subjects besides mathematics.

In some courses students are suggested to read the texts before the lessons, during which only questions regarding the data sets to be analysed are discussed. By placing a vast quantity of available official statistical information at the disposal of students and by allowing them to create their own documented databases, ALEA complies with this pedagogical approach.

Learning by doing

Developing students' statistical reasoning includes active learning strategies that make it possible to supplement what they have heard and read on statistics, and actually produce statistics. Experimental learning ('learning by doing') must be supplemented by the written and oral presentation of results.

Because writing helps to clarify and understand a subject, students present their statistical project with its objectives, how data were gathered, data-based inferences and, finally, questions or reservations concerning the conclusions found. The results of the best statistical work in the courses, after correction by the teacher, are then made publicly available in the "Virtual Gallery" of ALEA's website.

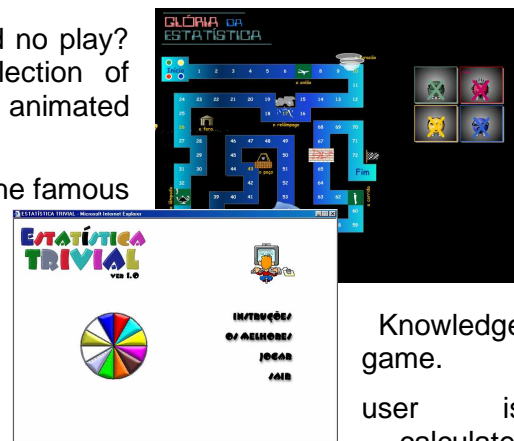


Statistics can be fun

Who said statistics was boring, all work and no play? Our site proves the contrary with a selection of edutainment activities using fun cartoons, animated images and the like.

With the "Trivial Statistics" game, based on the famous Trivial Pursuit, the idea is to better understand INE's website by asking questions on a number of different topics (demography, health, external trade, etc.) and speed are important elements of the

In another game, "Glory of Statistics", the user is asked about descriptive statistics, and must calculate, against the clock, parameters like median and average for a given list of values.



Other features and initiatives

Statisticians are well aware of how the media can sometimes misinterpret statistical data. The site therefore tries to stimulate users' understanding of statistical information in the media, with analysis and comment of texts extracted from newspapers and magazines.



Other practical tools such as a calculator (to ask Mr Campos about probability course) enable the

user to edit data obtained through classroom or field activities such as compilation of questionnaire results, collection of data sets, among others.

We have also developed two courses, available online: "Statistical concepts" which presents elementary concepts of descriptive statistics and "Probability concepts" which provides concepts and exercises on probability.

One of our latest projects was in the context of the 2001 population and housing census. We carried out a survey with a sample of about 200 schools, involving almost 11 000 students. This so-called "Mini-census" ("*you count, too*"), collected information about the use of information technologies (PC, Internet), daily aspects of the students, including transport, friends, etc.

An e-learning environment is also being created, based on the two statistical courses available on ALEA: "Statistical concepts" and "Probability concepts". This area will allow teachers and students to develop some statistical skills, under the guidance of a tutor, who can remotely monitor the class, using synchronised resources such as a chat room or, even through sporadic face-to-face statistical sessions.

And if that's not enough, a CD-Rom and other multimedia products have also been developed to supplement what is on the Internet.

Some 400 visitors a day!

The ALEA website averages about 400 visitors per day, who spend about 13 minutes online; a real success! Moreover, the feedback has generally been very positive. Every day, the ALEA team receives suggestions for improvement; contributions to the Virtual Gallery, or questions via the "ALEA Forum".

The ALEA project is widely known in academic circles and teacher disciplinary groups. Several times a year, we promote the ALEA web pages by providing schools with posters, the magazine ALEAZine and CD-ROMs. To maintain a direct link to the users, the ALEA team maintains a list of contacts to teachers and schools. In addition, cooperation projects are being established with the Statistical and Mathematical Societies and the Mathematical Teachers Association.

People from the ALEA team are frequently invited to present the project in conferences and seminars related to edutainment, distance learning and statistics teaching. And if you go to the next ISI world congress in Berlin in August 2003 (see *article on page x*), you will hopefully bump into us presenting it and share your comments and suggestions with us.

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useful addresses in WWW

Journal of Statistics Education (JSE):

<http://www.stat.ncsu.edu/info/jse/homepage.html>

WWW RESOURCES FOR TEACHING STATISTICS:

<http://it.stlawu.edu/~rlock/tise98/onepage.html#Section 7.1> (coleção de endereços)