Paper to be presented at the Biannual Meeting of the Korean Statistical Society, Seoul, 5 – 6 November 2004

Virtual learning environments and applications for official statistics

Hans-Joachim Mittag
University of Hagen, Germany / European Commission, Eurostat, Luxembourg
joachim.mittag@cec.eu.int

The project "New Statistics"

The advance of internet technologies offers nowadays an unprecedented opportunity to considerably improve the quality and efficiency of education and training. Traditional media for learning and teaching, i.e. printed material and teacher-centred instruction, are more and more complemented by multimedia resources and rich virtual learning environments. The new media surmount obvious limitations of traditional educational frameworks with respect to accessibility and customization of learning contents or time-independence ("learning on demand").

World-wide, universities are developing, or have already established, interactive learning environments and virtual campus systems in order to meet the growing demand for individually-tailored education and vocational training. The e-learning Initiative and Action Plan of the European Commission (multi-annual programme 2004 – 2006) for the effective integration of information and communication technologies in education and training systems in Europe, adopted in December 2003 by the European Parliament and the Council, represents the response of the European Commission to these developments. It aims at contributing to the quality of European education and training systems and to Europe's move to a knowledge-based society. The European initiative was complemented by national initiatives.

The German government, for example, acknowledged the strategic importance of e-learning for tomorrow's education by funding, from 2001 to 2003, more than 50 million euro for several huge multimedia projects related to different disciplines, with emphasis on statistics. Public distance universities are forerunners as regards the promotion and extension of virtual campus systems and international educational networks.

In 2001 the German State launched a huge multimedia initiative "New Media in Education" in order to exploit the potentials connected with the use of innovative media for universities and to serve the growing demand for interactive learning environments. Within this framework, an interdisciplinary project "New Statistics" involving 10 universities was funded up to October 2003 (for details, see http://www.neuestatistik.de). The interdisciplinary project aims at providing a multimedia-based and web-supported virtual environment for learning and teaching statistics in economics, social sciences, medicine and other disciplines. The pillars of the modular structured project are Java applets designed for trying out statistical concepts by means of interactive experiments, Flash animations for explaining statistical theory, and a learning laboratory based on the programming language R, the free version of S, for performing statistical calculations based on self-selected data sets. The modular approach gives maximal flexibility and supports very different use scenarios. The Java applets may, for example, be employed independently from other project components as a supplement to traditional lecturing or for self-study purposes.

Java applets for Statistics education

This paper focuses on Java applets as one of the pillars of the project "New Statistics". The applets represent a particularly suitable starting-point for improved international cooperation in Statistics education. The project already covers a library containing over 60 Java applets which could be used

online as well as offline. The applets visualize basic concepts in descriptive statistics, probability theory and inferential statistics. An example layout is illustrated in Figure 1 by means of an applet dealing with the geometric distribution.

The learner may change the distribution parameter by varying the slider position using a mouse and to study the effect on the probability function f(x) and the cumulative distribution function F(x). The scale of the x-axis can be modified via a predefined menu. The functionality "View" offers a choice between the graphical presentation of both functions or only one and also between the presentation or suppression of the numerical values of f(x) and F(x). The "Zoom" option is designed to support lecturing in front of large audiences. The features "Notation" and "Hilfe" (Help) deliver theoretical explanations and hints for optimal use. In the future, all applets could be enhanced by an additional functionality "Language" offering the option to change the language (see figure 2). Multilingual applets and further educational resources could be organized in the form of repositories shared by content providers in different countries (for a prototype of such a catalogue look at https://mmk.fernuni-hagen.de).

Interactive visualization for official statistics

In today's global information society statistical offices have to cope with growing demands for user-friendly data dissemination and presentation. Eurostat has recently started to meet these challenges by testing interactive visualization for European data sets. The visualization is performed by means of self-contained Java applets designed in the same style as those developed within the project "New Statistics". The Eurostat applets allow the language to be changed from English (default) to French or German. Figure 2 shows a trilingual applet on labour costs in the EU Candidates Countries for the most important economic activities in 2000. The "View" feature offers beyond display or suppression of numerical values the choice between bar charts and basic boxplots.

Fig. 1: "Trying out" the geometric distribution

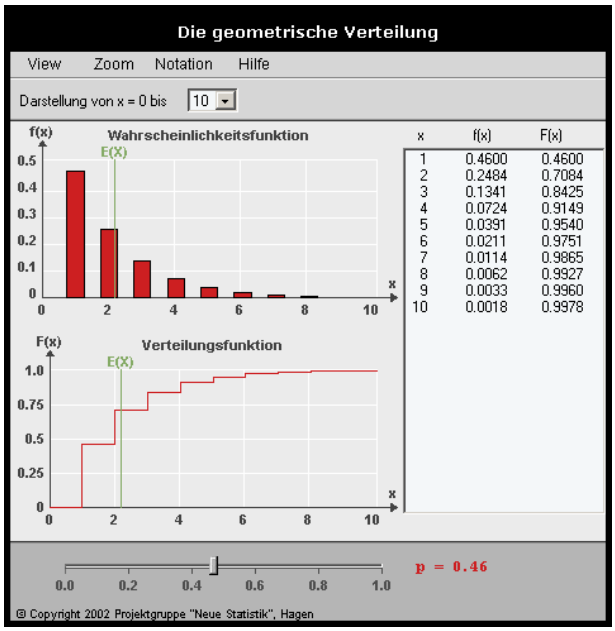
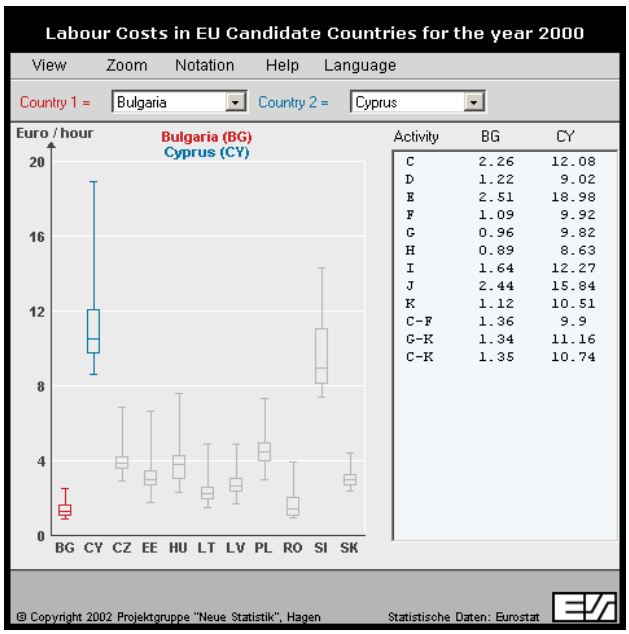


Fig. 2: Labour costs in the EU Candidate Countries



Interactive Java applets and multimedia components, brought together in multilingual repositories, could be exchanged and shared between statistical offices. They could also be disseminated to educational institutions in order to reinforce the visibility of official statistics in society and to improve communication with the citizen.

REFERENCES AND LINKS

Mittag, H.-J. (2002), Java applets and multimedia catalogues for statistics education. Invited paper presented at the 6th International Conference on Teaching Statistics, Cape Town, South Africa, July 7 - 12, 2002 (accessible via http://www.fernuni-hagen.de/e-statistik, English version, see at « Publications »)

Razi, N. , and Hiemenz, B. (2003), New Statistics: Elements for blended learning, Paper presented at the 54th Session of the International Statistical Institute, Berlin, Germany, August 13 - 20, 2003.