High-tech Educational Approaches in Economics and Automation

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Abstract: High-tech educational approaches in Economics and Automation are discussed. A distant learning course layout is proposed. Econometric models for foreign exchange market analysis both in short-run and long-run are illustrated. Further aspirations towards hybrid virtual environments and mobile education are traced.

Key words: high-tech educational approaches, distant learning, econometric models, foreign exchange market, short-run, long-run.

INTRODUCTION

The purpose of the paper is to familiarize with some opportunities for education effectiveness increase in the “English Language Department of Engineering” /ELDE/, Technical University of Sofia on the basis of the IC Technologies. In terms of the specificity of the department, students need a quality business and foreign language education, appropriately involved in their basic subjects. Having that in mind, relevant curriculum on market economy, marketing-management, cross-cultural business communications are developed to crossroad the business-linguistics with the basic engineering education. Of course the fulfilled is only the first step to the establishment of a more ambitious idea for informationally engaged education. The efforts of the great part of the lecturers are entirely striated towards modern IC Tech utilization to improve the quality and flexibility of the presented material.

In the area of the linguistic education, software means for direct and reverse translation from and to different languages, artificial intelligence opportunities utilization to summarize a text through main information extraction, its reproduction, audio-visualization by multimedia applications are of interest. The development of the reading software is of vital importance for blind individuals in unequal statement. We don’t discuss the opportunities for these people through the distant education step-by-step introduction.

In the area of the economic and financial disciplines both the existing software for econometric and investment decisions and the development of new Internet-based curriculum are of interest. A well equipped, for our standards, laboratory with the latest versions of MATHLAB, STATGRAPHICS, etc. is used. An opportunity to estimate different econometric characteristics of the studied quantitative parameters is proposed to the students as well as to make a parallel between competing softwares.

EDUCATIONAL APPROACHES IN ECONOMICS AND AUTOMATION

Different computer-aided educational approaches are used. To display their main features we’ll discuss two of them – one flexible on-line and another traditional with the conventional computer means in the class.

1. A distant learning course layout

As an illustration we’ll overview a sample on-line education course in Financial Analysis and Investment of Flexible Manufacturing systems /FMS/. It stresses on active, project-driven learning. The approach adopted here introduces, besides traditional individual project work, collaborative learning for students to tackle complex problems in groups rather than individually. The course materials will be in various media - Web-based applications, computer-assisted learning software, CD-based and printed materials. The main features of the course are:
1.1. Applicants:
This distant course is appropriate for full-time and part-time students in Industrial Engineering, managers and project engineers who are involved in the design and implementation of FMS. It has a modular structure which makes it suitable for a wide range of users of various qualifications.

1.2. Prerequisites:
Economics /I and II/ and Corporate Finance fundamental education. Also it is assumed that the applicant is familiar with the theoretical fundamentals of FMS. He would have some experience in project design and in team-work. Also he would know a little about computer-assisted learning and be familiar with Windows 95 and Internet explorer.

1.3. Aims and objectives of the course:
To give knowledge about main principles of the financial and investment management, including assessment of alternative investment projects, analysis of the investment risk and diversification of portfolio. As a conclusion financial markets and investment funds are taken into account.

1.4. Program content:
1. Introduction to financial management. Financial analysis. Basic financial ratios.
2. Managing the capital structure of the firm.
4. Classifying of alternative investment projects.
5. Methods of calculation of financial securities price and financial assets return.
8. Inflation and fiscal effects on the investment decisions.
10. Debt financing of the investments and market value of the firm.
13. Investment funds – characteristics and types.

1.5. Personal work required:
Virtual attendance at the course, preparation of numerous assignments, distant quizzes, homeworks, on-line workshops and conferencing, etc.

1.6. Training techniques:
- Self-learning
- Chat discussions
- Virtual laboratory practice
- Individual projects
- Group project
- On-line real-time market analyses
- Interactive tele-assisted tutor guidance

1.7. Assessment methods:
Students will be assessed on the quality of the individual/group project assignments in each module and on their performance in the activities within the modules. The final
result status awarded for the course depends on the student's performance in both the continuous assessment and at the examination /Table 1/.

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Table 1. Assessment methods

2. Econometric models for foreign exchange market analysis

As an illustration the development of the Bulgarian foreign exchange market through the transitional period from planed to market economy is observed on two stages:

2.1. Short-run analysis

The early market development investigation in a short run /1991-1992/ is conducted. Through time-series the average foreign exchange rates, their extreme values and the relevant volumes of purchase-sales are traced. Data for USD exchange rate, lv. and corresponding volumes of sale-trades (PURCH and SOLD, million dollars) from the incipience of the foreign exchange market to November 1992 are analyzed. On the one hand, the imbalanced character of the sale-trades is due to the fact that other foreign currency operations except the dollar ones are available. On the other hand, at the end of every month unrealized foreign currencies remain. Thus it is possible to treat the balance only between the purchases and sales of all the currencies, including the BGL. When the movements of the exchange rate are analyzed what becomes clear is the rising character of both the USD exchange rate and the sale-trades /Fig.1/ at the interbank market. This is an indicator for demand and supply vitality. For the first half of 1992 strengthening of this process when an even balance between the purchased and sold dollars in favor of the purchased is typical. The end of the period point out a decrease as the sold dollars gain the upper hand over the purchased. Trends and seasonal changes are established. A factor analysis of the central foreign exchange rate is realized. For this purpose a series of econometric models are developed through a regression analysis.

![Fig.1. Foreign exchange market volumes in a short run](image-url)
2.2. **Long-run analysis**

During the last twelve years the foreign exchange rate fluctuation is traced through time series. Thus the foreign exchange rate may be determined as a barometer of the changes. The sharp jump of the hyperinflation /February 1997/, currency board establishment /July 1997/, denomination /July 1999/, EURO introduction /January 1999/, crashes and ensuing problems are observed on Fig.2.

![USD exchange rate fluctuation in a long run](image)

Fig.2. USD exchange rate fluctuation in a long run

Similar methods are developed for other markets as: labour, stock exchange, privatization, etc. markets. Students may conduct marketing and investment researches. The conferential relationship opportunities provide them with an interactive workshop where they can simulate real market situations. They can make short-run forecasts and comparisons by themselves tracing the on-line market fluctuations.

The above described models may be very useful when investment projects financial analyses for automation of the production are conducted. Moreover, with some modifications, many of the educational approaches may be successfully applied in engineering education – prototyping, virtual cells for flexible automation development, their simulation, etc. All these opportunities go out of the frames of the department and may be successfully applied elsewhere.

In the automation of the discrete production education the following computerized methods may be utilized:

- Mathematical modelling;
- Dimensional analysis;
- CAD;
- Simulation;
- Computer aided Geometric modelling;
- Finite-element analysis;
- 3D component, assembly, and sculptured-surface modelling;
- Computer visualization;
- Virtual prototyping and testing;
- Virtual cellular design and testing;
- Comprehensive online tutorials;
- etc.
CONCLUSIONS AND FUTURE WORK

The informational society challenges reveal unexpected opportunities for education quality improvement, if only the universities communities answer duly the developing technologies with lightning speed. The created possibilities for virtual space access equalize our intellect with the developed world. Thus, at the end, the problem is reduced to an education for a whole life.

Glancing on the near future, without any pretence of exhaustiveness, we can draw our further aspirations as follows:
- Education in hybrid virtual environments;
- Cognitive methods utilization;
- Step-by-step transition towards mobile education.

REFERENCES

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