TEACHING ECONOMIC STATISTICS IN THE INTERNET ERA

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For decades, the course on economic statistics has been a vital part of the curriculum at the University of Ljubljana's Faculty of Economics. The course aims (1) to deepen students' understanding of the use of statistical information in decision-making processes at all society levels, and (2) to teach students how to find relevant statistical data and to use them appropriately in the statistical analysis of economic, business and social problems. Implementation of these objectives relies heavily on the use of real-life data, mostly available from official statistics. The advent of electronic data media (particularly Internet) opened new perspectives and approaches to realisation of the course objectives. The paper outlines and evaluates the evolution of teaching methods used in the course in the last decade, ranging from the use of a stand-alone CD-ROM ten years ago, to integration of Internet as an inherent part of the course through diverse applications (an on-line textbook, e-research seminars, e-assignments, etc.). Based on this experience, the purpose of the paper is to discuss the current position of economic statistics as a university course, and its potential role in the knowledge society.

1 INTRODUCTION

Development of high-quality statistics of economic and social phenomena is one of the prerogatives for efficient functioning of modern countries and international integrations. Considerable part of these data is produced by official statistics. Governments use official statistics as a basic data input and prerequisite in decision-making process through all its stages, from initial policy design to monitoring the results and measuring the efficiency of the measures taken. Similarly, business sector is more and more aware of the importance of statistics as a potential source of new knowledge about business environment and business opportunities. Shortly, as stated in the Fundamental Principles of Official Statistics "… official statistics provide an indispensable element in the information system of a democratic society, serving the government, the economy and the public with data about the economic, demographic, social and environmental situation".

The increasing recognition of importance of official statistics in everyday life is confronted with the institutionalisation of statistical data accompanied by incredible easiness of using and misusing statistical data. Governmental measures are based on the last decimal value of statistical indicators, as if they were not statistical construct. Users of statistics are overflowed by statistical data, which are often disseminated as if the quality issues did not exist.

One would expect that this new and controversial situation (more information vs. less understanding) would naturally encourage education sector to develop and offer new or modified educational products focusing on the development of ability to access and understand statistical information. However, it is surprisingly to state again that the so-called knowledge society does not care very much about one of the most powerful data resources for creation and dissemination of new knowledge (which official statistics certainly is or at least has the potential to become).

International and supranational organisations have been paying certain efforts to appropriate training of professional statisticians in Europe and world-wide. Murphy (2002) stated that most official statisticians around the world would receive their training 'on the job', or more formally by international organisations such as Training of European Statisticians (TES) Institute or International Monetary Fund. The supply of academic courses on official statistics did not change very much in the last years, and the search on Internet

confirmed again that academic world stays apart from official statistics (Academic and Official Statistics Co-operation, 1999).

Economic statistics as an academic course dealing with conceptual and operational issues of measuring economic phenomena is sharing the destiny of its close relative, official statistics. Within formal educational systems, the topics that deal with economic statistics are seldom included in university programmes. Exceptions include e.g. Germany, Italy, or Sweden, where methodological issues have been traditionally covered in university courses of Economic Statistics/Wirtschaftstatistik/Statistica Economica. In some other countries, the main topics of economic statistics are modestly hidden in macroeconomic courses (e.g. national accounts). It is worth to note that many courses labelled as economic statistics cover nothing more than basic statistical methods.

At the Faculty of Economics, University of Ljubljana (FELU), Slovenia, course on economic statistics has had a status of a core subject for nearly half of the century. Although every revision of study programmes at FELU is starting a new round of discussions about the relevance and position of Economic Statistics in study programmes, we have so far managed to keep the course alive although considerably modified with regard to its content and delivery mode.

This paper focuses on description of course transformation induced by information and telecommunication technology (ITT) and supported by some external and internal circumstances in the last decade. The purpose of summarising this experience is to create a platform and encourage the discussion of relevance, role and perspectives of economic statistics as an academic course in the knowledge society.

2 EVOLUTION OF TEACHING ECONOMIC STATISTICS AT THE FACULTY OF ECONOMICS, UNIVERSITY OF LJUBLJANA

About FELU

FELU was founded in 1946. Today, it is the largest faculty at the University of Ljubljana, with about 10,000 students enrolled. FELU has a long tradition in research and education. Development and modernisation of teaching and research work have been priorities at the Faculty from its very beginning. The Faculty has always been endeavouring to become known for its quality and achievements in education and research. The vision of the Faculty of Economics is to become a prominent member of top-quality European schools of business and economics by profiling its role in the economies of both Slovenia and South East Europe and by adhering to standards of academic rigour in teaching and research, thus enhancing its appeal to prospective Slovene and international undergraduate and graduate students.

History

The course on Economic Statistics was introduced into the undergraduate programme of Economics a few years after the foundation of FELU, in 1953. The course has been gradually evolving according to social changes and development of statistics in the country and world-wide. Its contents mirrored the dual character of the Yugoslav economic system being a mixture of the planned and market economy. At the same time, the course benefited from strong international co-operation and openness of Slovene statisticians. For instance, in the early seventies, students were taught about the material production approach for measurement economy output, based on the Marxist doctrine, but at the same time they studied SNA1968, known as a conceptual framework for measuring performance of market economies. Course delivery was traditional, with face-to-face lecturing as a dominant mode. Students were obliged to attend lectures and group tutorials, but practical work with real data was limited to one assignment based on the data from Yugoslav statistical publications.

Considerable changes of Economic Statistics both in terms of contents and pedagogy occurred in the last decade of the past century. The key incentive for this deep transformation was generated by external changes. In 1991, Slovenia became an independent state functioning as a market economy; very soon Slovenia applied for membership in the EU. These changes and their implications demanded adequate adaptations of Economic Statistics' contents, including some new topics (e.g. labour market statistics, short-term statistics) and deleting obsolete ones.

In this period, the interest for study at the FELU increased tremendously as a consequence of a profound knowledge shortage of business and economic disciplines on one and an increased demand for such educational programmes, significant for all countries in transition, on the other hand. This additional demand was mainly channelled to enrolment into a part-time study programme at the undergraduate business college (High Business School). Furthermore, the faculty management decided to develop a distance education programme with objectives of improving services for part-time students, increasing study efficiency and reducing teachers' workload. The project of development of the Distance Education Programme for the High Business School was also supported by Slovene government and the Phare Multy-country Programme for Distance Education, running in the period 1994-1999.

The active participation in the Distance Education Phare programme did not brought benefits only for the institution as a whole and distance education programme at the FELU, but had also managed to accelerate the innovating process targeted at individual courses. This period could also be characterised as an early, exploratory stage of introducing ITT into FELU's educational processes. Many important innovations and leading ideas came from distance educators' community. Those responsible for the course on Economic Statistics did not miss the opportunity to join the leading edge.

Introducing ITT in the Course on Economic Statistics

First attempts to use ITT in Economic Statistics started with the application of stand-alone CD-ROMs as data resource for students' assignments in the beginning of the nineties. Use of CD-ROMs brought mainly practical advantages, while copying hundreds and hundreds of pages of printed statistical publication became needless. First computer lab seminars were introduced at that time in order to teach students how to handle electronic media. Traditional twenty years old textbook was revised and newly designed in 1992 and after two years supplemented by the study guide, which was later transformed into a study guide for distance students. A database with about 500 multiple choice questions for students' self-assessment was created and stored on floppy discs.

The decisive impetus on integration of Internet as an inherent part of Economic Statistics was brought by the project Course on European Economic Statistics (CEES)[1]. CEES was developed at the FELU with the help of the consortium of partners in the period 1998-1999. The main objective of the CEES project was the development of an original course module on official statistics covering the field of economics for non-statisticians at the higher education level, taking into account recent developments of European statistical standards and deploying ITT in order to improve the quality of the learning process and increase users' access and understanding of official statistics. CEES is based on the constructivist educational philosophy and principles of learning statistics in the context of the constructivist environment (Garfield, 1995) and available in three versions with different functionalities: the on-line course, the CD-ROM and the printed textbook (Bregar, Ograjenšek, Bavdaž Kveder, 2002).

[1] The consortium also included Faculty of Electrical Engineering from Ljubljana/Slovenia, Faculty of Economics and Business Administration from Sofia/Bulgaria and the Training of European Statisticians (TES) Institute from Luxembourg. The project was financed by the Phare Programme for Multi-Country Co-operation in Distance Education, Course Module Development Project CEES, Contract No. ETF/97/VET/0068.

In Table 1 only the basic structure of the on-line CEES version is presented. Its rationale and detailed description are given in Bregar, Ograjenšek and Bavdaž (2000: 237-249).

Table 1: CEES User Interface: A Real-Life Model of ITT-based Statistics Course

COURSE/CONTENT	ADMINISTRATION	TOOLS	COMMUNICATION
Objectives European Standards National Application Activities Resources Links (external, internal)	Student Progress Student Evaluation Study Profile Personal Profile Notice Board Study Office Help Desk FAQ	Calculator Search Notes Editor Written Notes Question Mark Statistical Methods Library	E-mail (Tutor) Usenet Notice Board Videoconference

Teaching Economic Statistics Today

On-line CEES is currently used as a reference resource and a tool for supporting several statistical courses:

- Official Statistics in the Master Programme of Statistics, run as an interdisciplinary programme at the University of Ljubljana,
- Business Statistics[2] at the High Business School, run at the FELU, and
- Economic Statistics in the university undergraduate programme, run at the FELU.

Supplementary to CEES, all up-to-date materials, prepared by teachers during the semester (lecture slides, instructions and recommended data sources for various pedagogic activities, sample exams, etc.) are available at the students' web page.

Following discussion is limited to deployment of Internet in teaching Economic Statistics.

Economic Statistics is given in the fall semester to about 80 second-year students, with 30 hours of lecturing and 30 hours split among seminars, tutorials and computer lab seminars. Prior to Economic Statistics, students have to pass Introductory Statistics. Intermediate Statistics follows Economic Statistics in the spring semester.

The course on Economic Statistics deals with the following topics: statistical systems and statistical infrastructure; index numbers and price statistics; population and labour force statistics; production and productivity; national accounts, statistical sources; statistical analysis; use of Internet.

Internet is used as an information resource in all types of pedagogic activities: lecturing, computer lab seminars, e-seminars and e-assignments with the exception of tutorials. However, the intensity of using Internet differs among these activities.

The use of Internet in the *lecturing* process is rather limited. Based on the previous experience of a more extensive use of Internet during lecturing, unstable and slow connection could endanger smoothness of communication between the teacher and a large group of students. Therefore, synchronous visiting of selected web pages is reduced to topics where instructional potential pays off (statistical classifications, population statistics, dissemination of official statistics).

[2] For more details on the course of Business Statistics see the paper presented at this conference by Ograjenšek and Bavdaž Kveder: Student Acceptance of ITT-Supported Teaching and Internal Course Administration: Case of Business Statistics.

Attending two two-hour *computer lab seminars* is obligatory for students. Each student has to solve several short exercises ranging from finding the right data on the Internet, to calculating basic statistics and interpreting results. In the framework of this activity, students are also instructed how to efficiently use CEES.

E-research seminar is an activity closely following principles of active learning and based on the constructivist design.

The objective of the e-research seminar is to give students an opportunity to face real-life situations in statistical analysis. Working on the seminar paper in a *group of three students*, they experience all stages of empirical research: the initial definition of the research problem; search for and selection of appropriate data; application of appropriate statistical tools; and, finally, correct interpretation and communication of results in both written and oral form, putting considerable emphasis on the quality aspects of data used in the analysis.

Students are provided with short instructions about the objectives, structure and main elements of the seminar, with the general list of recommended web pages as well as with some practical advises and hints how to tackle the task. Students are also informed on assessment criteria, which are of qualitative nature (e.g. originality and creative use of knowledge, level of competence, use of relevant data sources, efficiency of team work, technical quality of a written report, quality of oral presentation). During the term, two additional two-hour tutorials on how to tackle a research project are offered to students.

Students' decision on selection of the research topic is facilitated by the list of optional titles. The list covers both themes, which are part of the curriculum (e.g. comparative analysis of labour market development in three selected transition countries in the last decade; analysis of current economic tendencies in a selected country by means of the short-term statistics), and those which could not be included in the course due to time constraints (e.g. structural characteristics of international trade in the selected countries; analysis of poverty). Some fresh new or generally interesting topics appear in the list, too (time-use surveys; introduction of Eurostat structural indicators in Slovenia; development of information-society indicators; environmental situation in Slovenia and neighbouring countries, etc).

E-assignment is a new teaching activity introduced in 2002 for the first time. On the one hand, it has been our response to students' perception of research seminar considering them as rather demanding and not enough 'guided' activities. On the other hand, introduction of e-assignments has been aiming to further exploration of ITT potentials in teaching Economic Statistics. E-assignment relies on instructional pedagogic approach. Student's task is well defined and related closely to the requirements of the final exam. Interaction with students takes place mainly via the e-mail (including individual comments and presentation of the master solution). Data sources used to tackle the assignments are those available freely on the Internet.

The contents of e-assignments can be illustrated by some examples:

- Identification of a selected product in the respective national and international statistical classifications using classification servers of Statistical Office of the Republic Slovenia, Eurostat (Ramon) and the UN Statistical Department; finding and assessing the quality of data on producers of a studied product in the Slovene Business Register.
- Comparative analysis of the age structure (using ageing ratio, share of 65 years and older population, age pyramid) for two selected countries; studying the impact of the age structure on mortality on the basis of mortality rate and standardised mortality rate calculations.
- Analysis of price movements by COICOP/HICP groups in Slovenia in recent years; simulation of inflation rate compilation using data from the last Survey of Household Expenditures in Slovenia; identification of the extent and sources of the divergence between the students' calculation and officially published measure of inflation for the period studied; comparison of ICP in Slovenia with HICP in EU

countries; interpretation of the identified differences from the perspective of criteria for membership of Slovenia in the European Monetary Union.

E-assignments and e-seminars are obligatory and offered to students as alternative choices. Equivalent to *a written and presented research seminar by three students* are *five successfully completed e-assignments per student in one semester*. This contributes 10 percents to the final exam score. In the academic year 2002/2003 about one fourth of 80 enrolled students decided for newly introduced e-assignments, the others rather stuck to the widely tested and well-known research seminar.

In order to get immediate students' feedback on the newly introduced pedagogic activity, students were asked to submit their comments on difficulty and usefulness of each e-assignment together with the solutions. In general, they found e-assignments useful, covering the major exam topics and encouraging them to study continuously. Additionally, e-assignments seem to have increased student awareness of the importance of Economic Statistics in their future professional work. Also worth noting is the fact that intensive use of ITT did not present any major problems for this group of students.

The main complaints were due to the workload and time pressures. Individual appeals for moving e-assignments deadlines were more and more frequent towards the end of the semester and communication with teacher more and more intensive. Students also proposed to increase share of e-assignments in the final exam score. Similar suggestion came from research seminar students' group.

Certainly, these remarks demand reconsideration of balance between the students' workload and existing rewarding scheme of the course on Economic Statistics. We also plan to verify and deepen our observations on students acceptance of various pedagogic activities by carrying out comprehensive students' survey relying on experiences from the recently conducted survey of Business Statistics students (Ograjenšek, Bavdaž Kveder, 2003).

3 DISCUSSION

Development of the course on Economic Statistics in the last decade profited enormously from the genuine benefits of introducing ITT into pedagogic process in terms of enhanced access to information resources, availability of various study tools and increased level of interactivity, which are basic prerequisites for students' active learning as a first step in the knowledge creation process.

Nevertheless, in spite of the distinctive benefits of ITT deployment in educational process and the continuing informatisation of our society, some specific factors, which shape this process, should be properly accounted for:

- Many students have limited access to modern technology and this fact could have repercussions on their perception of the ITT-supported teaching.
- Introducing ITT into pedagogic process imposes new pedagogic concepts and new operational criteria for students' assessment. Students are in principle motivated to embark on a new, active way of study, and acceptance of e-research seminars is generally favourable. But their insufficient skills for independent self-study force them to ask for additional pedagogical support. The introduction of well-guided e-assignments was an attempt to find alternative solution to this problem. E-assignments improve teacher-student interaction, but teachers' workload considerably increases.
- Generally, course transformation based on ITT is a continuous action, determined by the unprecedented dynamism of Internet itself. But the need for continuous updating and upgrading could not only be assigned to Internet. Coping with changes is inherent to the course such as Economic Statistics, whose ultimate objective is to develop learners' ability to find and appropriately use the right statistical information

on real phenomena. From the teacher's perspective, fulfilment of this objective requires an efficient strategy of knowledge management. In this sense, the economic statistics' knowledge is not limited to economic statistical data and meta data, mainly produced by official statistics. It also encompasses information on the specific fields' research of statistical measurement as well as information on new methods and techniques, on various studies and comprehensive surveys on statistical methodologies, etc.

Currently, in the absence of organised communication and information transfer from official statistics to the academic world, web sites of international and national statistical organisations remain primary information resource for teachers of economic statistics (United Nations, 2001). Documents on procedures and materials, produced within statistical organisations and not publicly available, stay out of academic reach.

We think that certain improvements could be achieved in short period with some organisational measures, taken by official statistics, such as minimal standardisation of web sites, creation of students' and teachers' portals, establishing interest groups of academic and official statisticians. Some initial steps in this direction have been taken by international organisations (e.g. CIRCA server of Eurostat, Statistics Portal of OECD).

4 CONCLUSION

In the information society, knowledge is power. By extending and deepening sources of information, courses deploying ITT open promising alternatives to traditional study courses in many areas of expertise – also in the field of economic statistics. Compared to traditional courses, courses relying on ITT are more complex and demanding in terms of their development procedures, delivery and maintenance.

In the transformation process of Economic Statistics from traditional course to the course with Internet as an inherent and indispensable part of the teaching and learning process, we learned a great deal about statistics providers, web sites' information organisation and structure, benefits and weaknesses of using ITT in education in general and in Economic Statistics in particular, etc. We believe that ITT creates opportunities for affirmation of Economic Statistics as an important academic discipline of interdisciplinary character in the knowledge society. However, for thorough future exploitation of the ITT development potentials in the field of economic statistics, more co-operation as well as systematic and co-ordinated research efforts of academics, professional statisticians, information technology experts, fields' experts and users are needed.

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