Curriculum development in Informatics in Lithuania

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1. Introduction

This paper describes the setting up and initial operation of an ongoing project to update the teaching of Computer Science and Software Engineering in Lithuania, and its effect on curriculum development in City University. The project partners are City University (CU), the Coordinator and Contractor, the University of Namur (FUNDP) in Belgium, and Kaunas University of Technology (KUT), Lithuania , the beneficiary institution.

2. Obtaining funding

We decided to request funding from the TEMPUS scheme (Trans-European Mobility Scheme for University Studies), part of the PHARE programme of the European Community (EU) which had been set up initially to help the countries of Central and Eastern Europe (C&EE) restructure their economies. TEMPUS promotes the development and renewal of the higher education systems in C&EE countries as well as encouraging their growing interaction and cooperation with partners in the EU.

Our first success was to obtain funding under the TEMPUS individual mobility scheme for Rimantas Seinauskas and his colleague Vytas Reklaitis to visit our department and for myself and Professor Bernie Cohen to visit KUT. More ambitiously, we also planned to make an application for a TEMPUS Joint European Project (JEP) in the area of curriculum development in Computer Science.

3. Initial Steps

One of my first hurdles was to convince my Lithuanian colleagues that we were not attempting to replace Moscow as the colonial power. I explained to them that City University hoped to raise its international profile by managing such a project, and that we hoped that there would be some positive feedback into the curriculum development process at City. Conversely we now have to alert our Lithuanian colleagues to the fact that the money available for cooperation is a finite amount for a relatively short period of time!

4. Background

Lithuania is one of the three Baltic countries (the others being Latvia and Estonia) whose land area is similar to that of Belgium, and with a population of 3.7 million. Prior to annexation by the Soviet Union in 1940, Lithuania was predominantly rural with an agricultural economy and a standard of living comparable to that of Denmark. During its enforced membership of the Soviet Union Lithuania became dependant on light and medium industry, exporting mini-computers and machine tools as well as agricultural goods.

During the Soviet rule the education system supported the economy of the USSR which was centrally planned from Moscow. Academics were very much part of the Soviet system and courses prepared students for entry into industries, mostly in Lithuania. Computing courses in particular were designed to meet the needs of local industries including that of computer construction. When Lithuania became independent trade barriers

tumbled, and production of mini-computers ceased; local industry suddenly had access powerful PC's and workstations as long as they had hard currency, and had no need for the locally produced outdated hardware.

However the years of Soviet rule had a great effect on KUT; the West's export controls and the restrictive nature of the Soviet system combined to cut off our colleagues in KUT from modern developments in computing. Unrestricted communication of information had always been regarded as dangerous in the USSR and computer networking was not encouraged; the lack of facilities such as electronic mail and access to the Internet meant that staff and students could not benefit from contact with the international academic community. Furthermore, the computers available were old-fashioned minis plus Soviet-made PC's, which were not able to support modern GUI's.

Networking was recognised as a key technology which would act as a catalyst within the university and also facilitate communications with the outside world. Email is now fast and reliable, although routed via Norsk Data machines which have non-standard hardware and software, and FTP has become available since March 1994. An indication of the commitment to the use of electronic communications was the fact that by May 1993 all staff, including the Rector, had email addresses which they actually used!

5. Courses at KUT

KUT has a student population of about 8000 with under 300 at Masters level and less than 200 PhD students. There are around 1000 lecturing staff and 190 researchers. The Faculty of Informatics comprises about one-tenth of the staff and student population and comprises the departments of Computer Engineering, Computer Science and Software, Practical Informatics and Management Informatics.

The Faculty of Informatics previously offered several undergraduate and postgraduate degrees, but now offers an umbrella Bachelors of Science in Informatics which is four years in length with entry at 17. Following this students can take a one year postgraduate Diploma in Engineering, speciality Engineer of Informatics, or a two year Master's Degree with speciality in Informatics.

Students on the undergraduate degree follow specialisations which approximately represent the previous degrees which were awarded by department. The first two years are general foundations in engineering with some emphasis on computing; thereafter students can choose a specialist or broad profile by selecting from the options which mostly comprise the last two years. The modular structure with one umbrella degree is taken advantage of by the project since it is easy to create a new stream or `flavour' in Software Engineering.

KUT had a considerable expertise in computer education, but has not been exposed to the new methodologies and technologies used in Western institutions. For example, KUT has no experience of modern multi-user operating systems such as Unix, distributed systems and advanced windowing environments. We felt that this needed to be remedied, since commercial computing environments are moving in this direction.

6. What we planned to do

6.1. Activities

The activities planned for the project were:

1. The modernization of curricula content in Informatics, and production of associated course materials. Specifically we planned that for Computer Science the existing course at KUT would be completely overhauled and modernised with the help of academic staff from FUNDP, and that a new course in Software Engineering would be designed with the help of academic staff from CU.

2. The modularisation of the curriculum structure in Informatics, with the help of curriculum specialists from CU.

3. The establishment of a network of Unix-based workstations at KUT to support course development and teaching. Training in the management and use of the network to be provided by FUNDP.

Specifically, we intended that for the construction of new course materials the target group would be academics from KUT who teach courses, or who have responsibility for the production of such materials. Staff members from the three partner institutions were to work together to develop the new curricula appropriate to the situation in Lithuania. This would draw upon the curricula available in both the EC partners. The final design was to be specific to Lithuanian needs and capacities, but the three partners will create the maximum interface between their different courses, and will establish mutual recognition of course elements and of qualifications, thus promoting the future staff and students mobility. The creation of shared European course standards was an important feature of this proposal.

6.2. 'Deliverables'

Thus the results that we promised to achieve in the project proposal were:

- the design and construction of new curricula in a modularised form for Computer Science and Software Engineering,
- the production of course materials to support the delivery of the curricula,
- the training of KUT staff in curriculum theory and design,
- the upgrading of KUT teaching staff skills in Computer Science and Software Engineering,
- the upgrading of computing facilities for both staff and students,
- the training of KUT staff to support the running of these facilities.

6.3. Equipment

We required computer platforms (both software and hardware) to be provided in KUT to support course design and delivery. Over the three years of the JEP, we planned that up-to-date computer laboratories would be established at KUT, based on the practices and experiences of the EC partners. These laboratories were to be linked through communications facilities to European and global networks. The hardware resource was to be supplemented by appropriate software, and we envisaged that students will be exposed to a traditional multi-user multi-tasking operating system such as Unix as well as to MSDOS and to windowing environments for both.

In the event, decided to install Sun-SPARC machines. This decision was influenced by the falling cost of hardware, but the most important factor was our desire to have a common platform across all three sites, facilitating the installation and maintenance of software.

6.4. Mobility

Provision was made for eight one month visits by KUT staff to the West in the first year; during the November mobility, KUT staff members were to perform a comparative analysis of City and FUNDP regarding curricula, curriculum development and equipment, and relate this to the situation at KUT. The second wave of mobility was to plan and develop new or updated courses and to gather course material. There were to be some problems for KUT staff visiting Belgium, since few Lithuanians speak French. Staff from the Western institutions were to visit KUT in May 1994 in order to provide help in the installation and use of the equipment, and to help with course development.

7. The next two years

The Project will concentrate on those modules directly associated with Computer Science and Software Engineering undergraduate streams. We intend to update a number of modules equivalent to approximately 50% of such modules currently being taught, i.e. about 18. We further estimate that this will be equivalent to approximately 6 new modules, but recognise that it is difficult to make a direct comparison. Thus approximately three times the manpower of an updated module is required to create a new module; however

the equipment resources consumed by each activity may be the same. Moreover, we intend to plan and mount a Group Project in Computer Science / Software Engineering, which will absorb between two and three times the resources required for an ordinary module.

We plan to send four staff members per year to Western institutions for retraining and updating purposes. They will stay at CU or FUNDP for 3 months (i.e. one semester) each in order to participate in ongoing courses given to undergraduate and postgraduate students. These staff members will undertake curriculum development (updating or creating new modules) whilst at CU/FUNDP. We also intend to send six staff every year from the Western universities to KUT for one week each in order to perform teaching assignments in the subject area as well as to help with curriculum development at KUT.

We intend that the courses that are developed during the Project will be used in other universities in Lithuania either on a franchise basis, or by contracting from KUT, which has a series of satellite bodies spread over the whole of Lithuania, and that some of the courses can be adapted for use at these sites. We also intend to help KUT to develop and mount a series of short courses for Lithuanian industry. These courses will be delivered on a commercial basis, and will not only strengthen links between KUT and industry, but will directly benefit local industry itself. Moreover, they will provide a source of revenue both for the Department and for individual lecturers who devise and deliver such courses.

In order to support the teaching of Computer Science and Software Engineering we will continue with our programme of installing appropriate hardware and purchasing the required software. The First Mobility Report and the Management Team have established that KUT lacks modern computing equipment, specifically that able to support the Unix operating system and X-windows. The requirements of such equipment is for a workstation with mouse and high-resolution colour graphics to support X-windows and applications software. Moreover we have identified a crucial need for staff and students at KUT to communicate electronically with others across the globe. This communication can be via electronic mail, file transfer (FTP), remote user access (Telnet) or indeed via more sophisticated mechanisms such as Mosaic. This facility will enable KUT to obtain free, high quality, public domain software to support the teaching of the modules. Also it will permit an exchange of ideas and consultation between staff and students world-wide; without such provision, KUT would remain an isolated backwater. We have thus decided to finance the network connection from the workstations in the Computer Software Department to the Computer Centre, from which there is a network connection to the outside world.

We intend to fund the purchase of sufficient books to support the development and delivery of modules, and calculate that about 100 books per year are needed at an average of 12 books per module (for both staff and students). Thus we will finance the purchase of 200 books and manuals during the next two years.

We have also found that KUT lacks overhead projectors and white boards, only blackboards being available. Projectors are required to support the delivery of teaching materials as slides in a constructive and organised fashion, whilst permitting reuse of the materials. White boards are also required in this respect, and will be needed in the teaching laboratory where chalk dust would damage the computing equipment. We intend to buy two overhead projectors and two white boards per year for the two years. We naturally need to fund the purchase of OHP slides, OHP and white board pens as well.

8. Afterlife

We intend that the project will *not* terminate after the three years' funding, but that it will continue in various forms and that further funding for discrete activities will be sought. The project will during its life perform a comparison between the courses as they develop at the three sites. We shall implement mutual recognition of modules or degrees between CU, KUT and FUNDP in order that both staff and student exchange can occur after the life of the project. We will fund these exchanges by Erasmus or its successors (Leonard, Socrates).

The findings of the project will in the first instance be made available to the three participating institutions, but we will to disseminate them more widely. Following on from the workshop for KUT staff in May 1995, we plan that a seminar for academics and other interested persons from the whole of Lithuania be held at KUT in May 1996. One aim of this seminar will be to establish a network of academics in Lithuania who are interested in the area of curriculum development in Informatics in Lithuania. We will also in the first

instance set up discussion groups via email and electronic bulletin boards between all of the three sites in 1994/95. This service will be extended to the wider international community in 1995/96 by via email servers and Net News on the Internet. We will also explore the possibility of setting up a hypertext information system about KUT and the project using Xmosaic and Internet facilities - such a service already exists for City University.

9. Conclusions

We hope that during the course of this project we will be able to "deliver the goods" and to help KUT modernise its courses and update its computing hardware ands software. We have learnt to approach this process with caution, because staff from the three institutions have different interpretations of the same words, and also in order to allay the fears of the Lithuanians regarding domination from other countries.

By participating in this project we at City have gained a wider perspective on the teaching of Computer Science and Software Engineering, and expect this to be reinforced during the life of the project. It is interesting to see how these subjects are taught not only in Lithuania, but also in Belgium, one of our near neighbours in the European Community. Indeed, we are planning closer cooperation between City University and the University of Namur and are exploring the possibilities of exchange of staff and students, as well as strengthening the existing research links. Moreover, participation in this project has brought us into contact with a wide research community of computer scientists, stretching far into the former Soviet Union, and we have begun to capitalise on this in several applications for cooperative research projects.

Perhaps the most exciting prospect is that of a European University which will most likely not be located in one campus but will be distributed over, in the first instance the European Community, but almost certainly incorporating institutions from the European Economic Area and Central and Eastern Europe. I expect that the key concept will be intellectual mobility which will be built on the mobility of information rather then just on physical mobility. I want the School of Informatics at City University to be not only prepared for this, but to be a key player!

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