GLOBAL COLLABORATION IN CONSTRUCTION IT EDUCATION

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ABSTRACT

Civil engineers have to be innovative to be able to solve problems in the field where conditions often change unpredictably. This characteristic was probably the main driver for civil engineers to be among the first users of computers. In the era of global communication civil engineers are again among the first users of computer supported collaboration environments, where they join to solve complex problems. With sophisticated ICT support experts with different specialization are able to find solutions for which they would otherwise need immense resources.

There are many universities offering civil engineering graduate and postgraduate programs, but there are specific fields which a single university can't cover. In such cases collaboration between universities is a way to complement the dispersed knowledge. The paper discuses such case, an interuniversity postgraduate program on information technology in construction. The paper describes concepts, technological solutions, experiences and plans for further development of the program. Asynchronous and synchronous internet communication makes the program reachable on virtually any place and available for any student on Earth. With the described concept we are not only able to effectively design specific programs with dispersed teachers and students, but can also significantly influence the globally unbalanced levels in education.

KEY WORDS

higher education, Information Technology in Construction, e-learning, joint study program.

INTRODUCTION

Human collaboration is a very strong method for solving problems. On one hand it can use resources effectively, in the first place knowledge and expertise, which is leading to desired synergy effects. On the other hand it leads to exchange of knowledge, which is resulting in a higher level of balance. Brainstorming, which means an extreme in mental collaboration, is often leading to innovation and thus to enriching of the society. If collaborators are joining from many different countries, the effects are even stronger and the results can have global effects.

In the past decade, after the Internet collaboration tools have been developed to a more mature level (Crook 1996), projects have started with the aim to explore and experience the developing collaboration tools and to bring together experts from different professional as

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well as cultural areas. Works have been published on successful engineering collaboration between students of different universities working (and learning) on common projects. Fruchter (1999) reported on combined research and curriculum development for multidisciplinary, geographically distributed architecture/engineering/construction (A/E/C) teamwork. She presented a model for a distributed A/E/C learning environment and an Internet-based Web-mediated collaboration tool kit. Other successful attempts were reported from different research networks (e.g. Holliger 2003).

THE ITC EUROMASTER EXPERIENCE

One such attempt has been the IT in Construction joint curriculum development project, ITC Euromaster (Rebolj et. al. 2002, Rebolj and Menzel 2004). In 2001 seven European universities started to develop a new postgraduate program in Construction IT. The program development has been funded by the European Commission in the Socrates / Erasmus framework between 2001 and 2003, and again in between 2004 and 2005, when two further partners joined the program dissemination process. The following partners have been active in the program development and dissemination (in alphabetical order): Universidade do Algarve (Portugal), Technische Universiteit Delft (Nederlands), Technische Universität Dresden (Germany), Glasgow Caledonian University (UK), Universidade nova de Lisboa (Portugal), Univerza v Ljubljani (Slovenia), Lulea University of Technology (Sweden), Univerza v Mariboru (Slovenia; coordinator of the project), University of Salford (UK).

The main purpose of the project was to develop a curriculum on Construction IT to give students the possibility to extend their knowledge in research, development, and application of computer and information science in civil and building engineering. The result, a European Masters curriculum in Construction IT, complements the existing portfolio of teaching programs and should meet the growing demand for such skills. In the case of those institutions already offering ITC courses, the project is providing the added value of a European dimension for their existing ITC program.

The development of the content and of the teaching material of each subject has been coordinated by a responsible partner. Teaching materials have been prepared in digital form to conform to the e-learning standards. At the University of Maribor and University of Ljubljana the program has been accredited in its full content and started in autumn 2004. Delft University and Dresden University are contributing up to three courses to the program and integrate them into their already accredited curricula.

The curriculum was focused on students who have finished their undergraduate studies with a university degree in civil, building or structural engineering as well as architecture. The program graduates will earn a new “European Master on Construction Information Technology” academic degree, which shall enable them to continue with the relevant PhD study, or immediately start to work in the industries as civil engineers with a specific focus on Information Technology. The need for such new profile has already been recognized by different authors (e.g. Froese 2004).

We are convinced that the civil and building industry will need more engineers with profound IT understanding and knowledge in the e-society of tomorrow. Offering courses in the proposed distributed way will give the students the best existing knowledge and quality in the ITC field, enriched with the multicultural dimension.

The only way to support collaboration of so many different universities was in using an effective e-learning system. According to our experiences a firm technical infrastructure is a vital part of any such system. So far we have gathered experiences at experimental e-learning supported seminars (Rebolj and Menzel 2004) and in various other projects, where audio or videoconferencing (HorizonLive, VCON, CUSeeme, ClickToMeet) and different web based content delivery systems have been used (Blackboard, Fgweb, Moodle).

The current ITC Euromaster e-learning environment consists of two components: the course management system, which is the entry point to the program (ITC Euromaster 2006), and the Virtual classroom. The main function of the first is to enable access to teaching and learning materials as well as other relevant functions (e.g. forums) and information (e.g. teacher and student lists, timetables etc.) from any location on the Internet. The course management system (Figure 1) is based on the Modular Object-Oriented Dynamic Learning Environment (Moodle 2006).

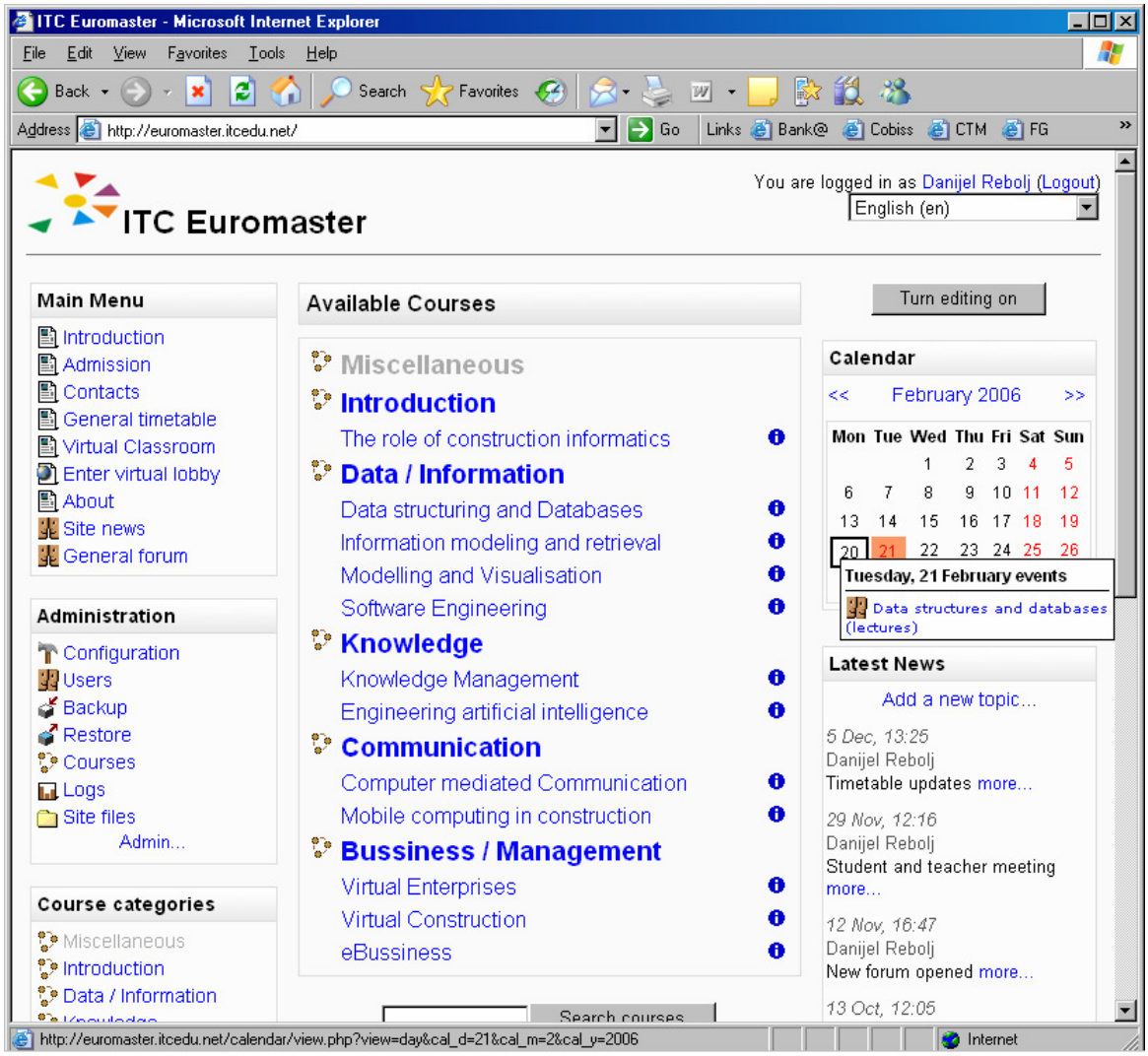

Figure 1. The Course management system of the ITC Euromaster program.

The Virtual classroom is supported by ClickToMeet videoconferencing system, which enables teachers to directly communicate with their classes. A participant list, chat, audio and video control, web touring, document sharing, application sharing and a whiteboard are the basic parts of the virtual classroom (Figure 2). Both systems are interlinked and function as a single integrated system.

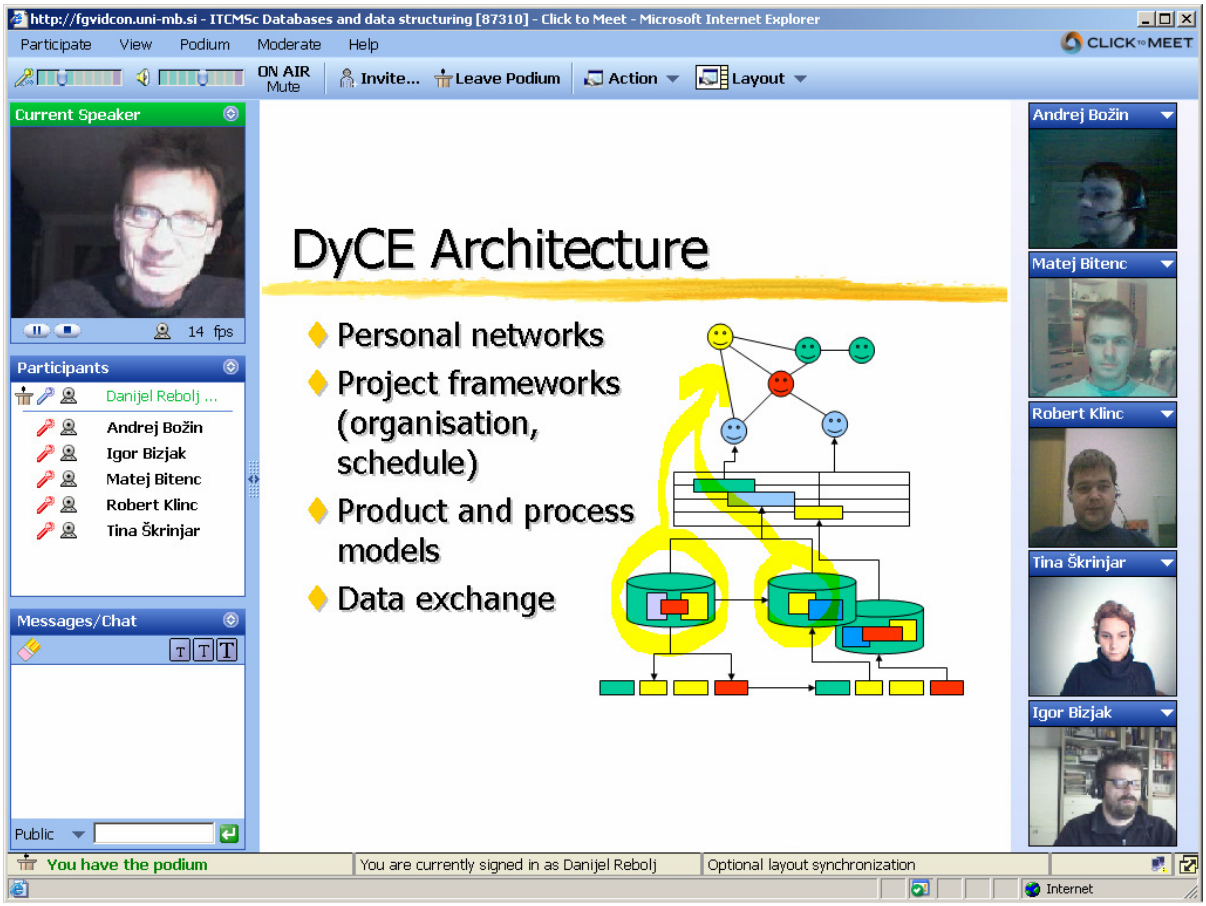

Figure 2: The Virtual classroom of the ITC Euromaster programme.

In the academic year 2004/2005 five courses have been successfully delivered with five students logged in individually and some more students, who have followed the lectures from a classroom at TU Dresden. Except of some audio fine-tuning and bandwidth problems at the beginning of the semester the lectures run perfectly throughout the semester.

Extensions and upgrades of the system are planned to offer further functionality for classes with larger numbers of students.

THE ITC COURSE POOL AS A NEW COLLABORATION PROMOTER

The accreditation process of a joint study program proved to be a problem, since different rules are in power in such many different countries and universities. To overcome formal obstacles and to open the program to the global community we have decided to form an open

pool of ITC related courses. The initial ITC course pool has started to accept courses developed in the ITC Euromaster project. However, any institution with knowledge in the ITC field is welcomed to offer a course to the pool. Once accepted by the steering committee, the new partner institution can include any number of existing courses in its own program, since the pool is based on reciprocity (Figure 3). Any unbalances in students and courses will be regulated by the steering committee. One way of balancing is for example by requesting further supporting staff from a partner having more students in a specific course given by another partner.

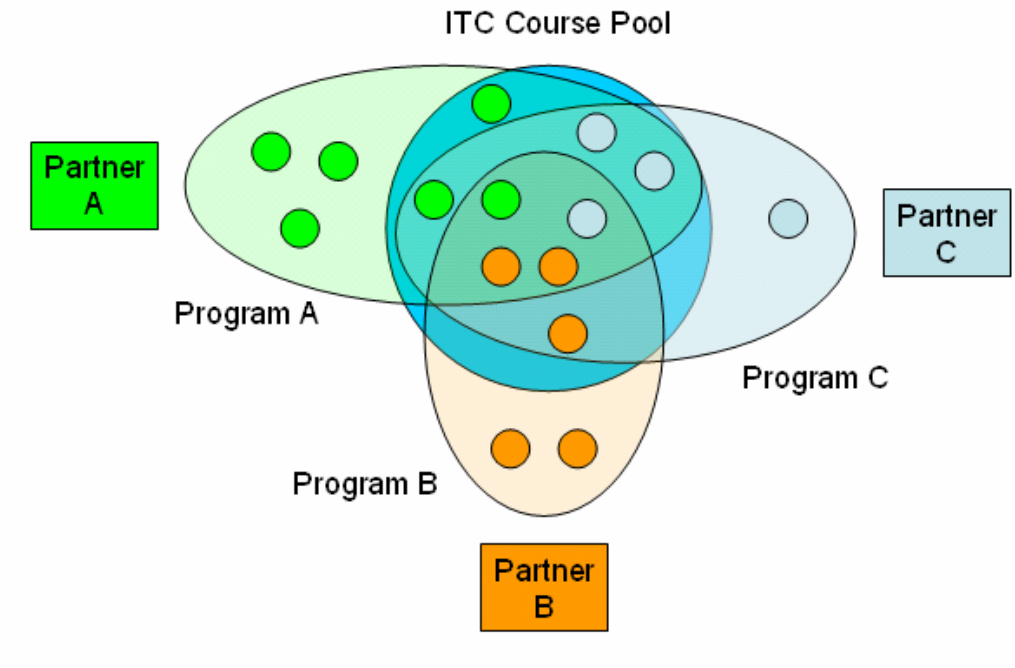

Figure 3: The ITC Course Pool concept

From the technical viewpoint joining the ITC course pool is easy. The agreement is available at the ITC@EDU network web page (http://www.itcedu.net/). The appendix of the agreement consists of the template of the Accession declaration to the ITC Course Pool, which includes the institution wanting to join, the offered courses, and nomination of the steering committee member. Once the document is accepted by the steering committee the courses are at disposal for all members. The acceptance procedure shall among others include the quality check of the offered course materials.

The ITC course pool will need a strong support from collaborating institutions. The experiences in the current ITC Euromaster program showed that much effort is necessary to prepare high quality e-learning materials, to become familiar with the on-line communication, to manage and further develop the e-learning system, and to coordinate the whole program. But even in the short term the investments give a high return. Having a whole pool of courses at hand certainly gives each partner a strong background to form a whole new program and to offer their students specialized knowledge and skills which they could possibly never be able to offer by themselves.

CONCLUSION

The experiences of many authors show that on-line collaboration tools have a high potential for sharing knowledge and ideas, and therefore stimulate innovation. The ITC Euromaster program further proves that collaboration between different universities in a joint program lead to effective synergies and can lead to better quality in higher education and research. The proposed ITC course pool represents a further step towards global collaboration in specialized area of IT in Construction. By their global accessibility the programs built upon courses offered in the ITC course pool can be brought to virtually anyone on the planet and thus help to achieve a better balance of knowledge.

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