

Organisational Aspects of the EVICAB – a Virtual European Campus for Biomedical Engineering

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Abstract – The European project EVICAB is devoted to implementing the idea of a virtual university campus for teaching a standardized curriculum of Biomedical Engineering (BME). This joint effort of several universities from Northern and central European countries should lead to a possibility for students from anywhere in Europe (or even in the world) to study the Biomedical Engineering via Internet connection, still under guidance of hopefully some of the best BME tutors from different European universities offering quality e-learning courses to EVICAB. It has turned out that one of the important issues to be solved in frame of the project is the design of a suitable organizational structure that would enable smooth running of the virtual university in all respects, i.e. tuition, home works and projects, and also reliable tests and exams. The main ideas of the corresponding organizational structure are described.

Index Terms – Biomedical engineering, e-learning, virtual campus, international students.

INTRODUCTION

A European two-year project supported by a grant of the European Commission, for preparation of an e-learning virtual campus for biomedical engineering, is presently running under the acronym name EVICAB. The project has been initiated by the Ragnar Granit Institute at the Tampere University of Technology (RGI TUT) in Finland and is coordinated by the originator of the idea, Prof. Jaakko Malmivuo; Tampere UT is also hosting the centre of the project. However, several other groups from universities in other European countries (Finland, Estonia, Lithuania, Latvia, Sweden and Czech Republic) are participating on the project, each responsible for a particular aspect of it. The main idea of the project is to prepare a virtual environment, in frame of which the best available European electronic courses from the area of biomedical engineering could be offered to students from anywhere inside Europe (or possibly also from other world as well). The accessibility of courses via Internet should enable to study the selected courses independently on the locations of the student and of the course tutor.

The EVICAB group at the Brno University of Technology has been entrusted with coordinating the work

package WP5 aimed at preparation of the organisational structure enabling the basic functions of the project. The basic ideas designed at Brno are being naturally developed in cooperation with other project participants and namely with the respective professional IT implementer MediaMaisteri Group Tampere. Analysing the requirements of communication among the parts of the EVICAB virtual campus, the needs of an applying (and consequently studying) student and his university, of the teacher or tutor and his university, and also the necessities concerning the content, form and timing of all the data involved, we arrived at a certain solution that was gradually modified and partly reformulated during the projects meetings and email discussions.

The basic concept consists of three involved bodies for each implemented EVICAB course and each its participant: the EVICAB centre, the teaching university offering the course, and the student university where the student interested in EVICAB study is enrolled as a standard student; the course teacher and the student are involved personally in each individual case. Some rules must be imposed on the extent, content and form of mutual communication, as well as there must be clearly defined competences of the involved bodies. The suggested structure and some its details are subject of this contribution.

MAIN IDEAS OF EVICAB ORGANISATION

1. Overall structure of EVICAB management

There are basically three types of involved bodies in the EVICAB structure (Figure 1): the *EVICAB centre* (at the Tampere University – Ragnar Granit Institute) as a roofing institution, the universities, offering the courses (*teaching universities*) and the universities where the interested student is enrolled in a standard way (*student universities*). The EVICAB structure should primarily provide for a flexible communication between the tutor of a course on one side and the student on the other side; besides that, the necessary administration serving the application process, acceptance, teaching, testing or examining and credit recognition must be arranged in a reasonable way. The basic idea of the accepted solution is that the teaching university offers the course, provides tuition, testing and student evaluation, while the student's administrative affairs – student authentication, the course (and obtained credits) recognition and finally the

diploma issuing is the matter of the student university. The EVICAB centre role is limited to the mediating services: primarily defining a standard BME curriculum, checking the quality of offered courses and accepting suitable ones thus providing a dynamic list of courses available in frame of EVICAB. Further it receives the students' applications, checks their eligibility in cooperation with the respective

student university and mediates the results of exams of EVICAB courses to the student university. This way, EVICAB centre is not involved in any diploma issuing or student examination; it only provides the connection between the university providing the tuition and the student university. For this purpose, it maintains some necessary databases.

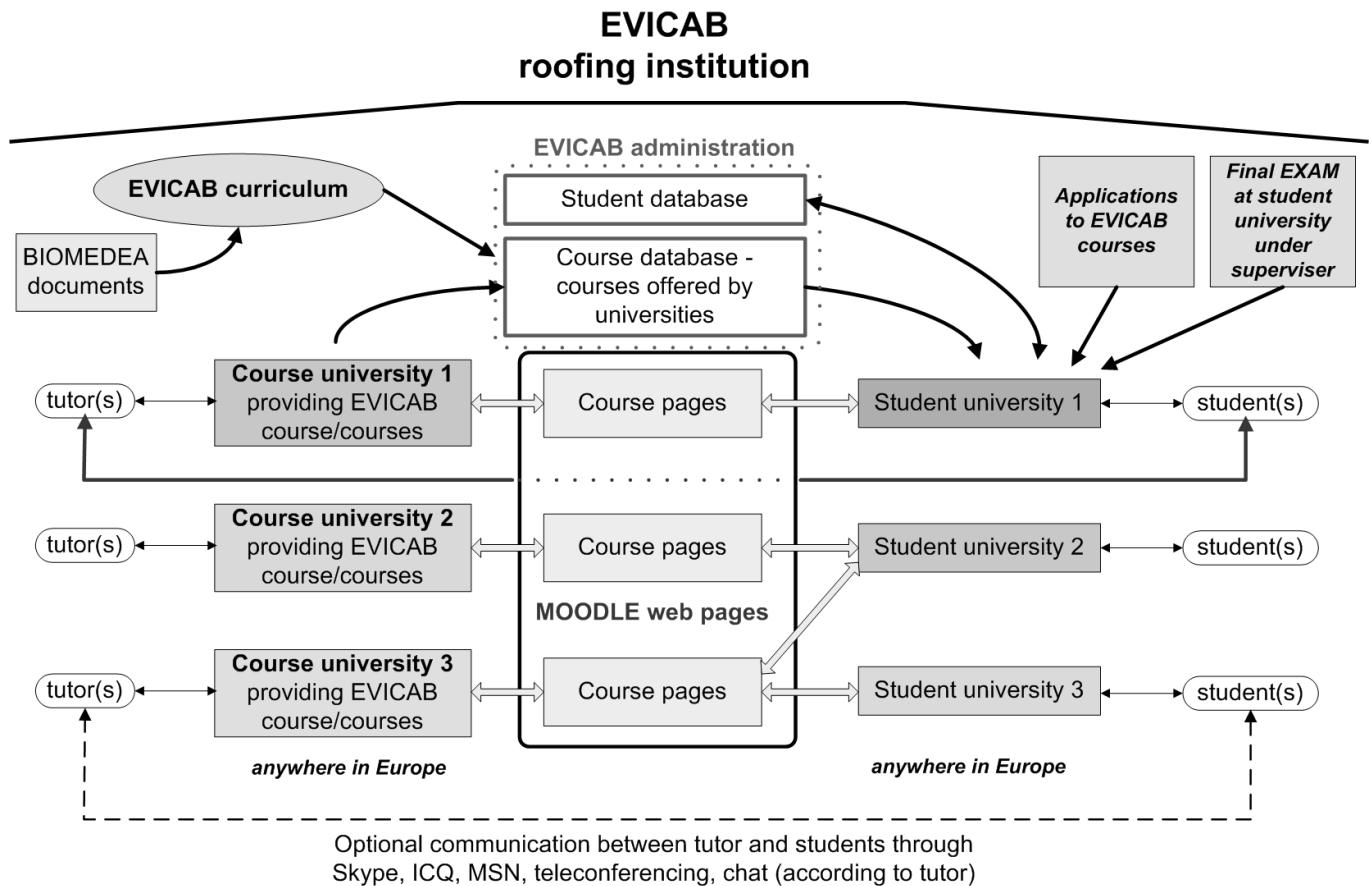


FIGURE 1

ROUGH SCHEME OF THE EVICAB ORGANISATIONAL STRUCTURE

II. Structure of the student administration

In a more detailed form, the rules concerning the student administration look like this:

The EVICAB is – from the organizational point of view – a roofing institution providing a link between the student-universities and the course-universities via EVICAB MOODLE information system, but it is only partly involved in student administration. There should be a simple central administration of EVICAB at the Tampere UT - RGI, maintaining databases of all present and past students and of the available courses. The administration also provides an easy way for enrolment of applicants into EVICAB courses: it receives the applications, checks the eligibility of a student - his valid enrolment in his own local university (“student university”) and, if applicable, the prerequisites for a particular course based on the

submitted documents. The administration arranges the enrolment into the required course at the “course-university” based on established and formalized cooperation agreement of EVICAB with all the course-universities.

The EVICAB will keep records on all the EVICAB accepted courses and also on the basic student data – personal data, EVICAB courses attended, results of final exams and credits awarded (the latter to be delivered by the course-offering university after the course is finished).

It is supposed that the student – besides being a regular student at his own “student-university” anywhere in Europe (or even elsewhere) – will enroll, as a visiting student, in the “course-university” offering the particular requested EVICAB course. The main administrative record of the student with respect to this EVICAB course,

including all the intermittent and final results of the course, will be kept by the course-university, thus there is no need for maintaining this detailed student administrative data at the EVICAB centre. Any course certificates will be issued by the course-university, no certificates will be issued by RGI, TUT or EVICAB.

On the other hand, the final degree diploma will be always issued only by the student-university that would have recognized the EVICAB course as a part of the student's curriculum. No diplomas will be issued by EVICAB or RGI TUT as far as the EVICAB concerns.

MOODLE will inform both involved universities on registration of a student in a course (or even on a shown interest in it), possibly also issuing concrete e-mails in parallel.

III. Curriculum management

A generic recommended biomedical-engineering curriculum ("EVICAB curriculum") was formulated in EVICAB's work package WP2, together with the valid current list of presently available EVICAB courses. The model (standard) BME curriculum is based on the BIOMEDEA reports [2] and [3] published as a result of several European conferences on teaching of biomedical engineering. The set of courses available via EVICAB will not completely cover the official recommended curriculum in near future; it is expected that, gradually, the offered courses will fill this template possibly even with alternatives to individual areas.

It is important to realize that the EVICAB recommended curriculum is not binding for the students. They are only responsible to their own student university. It is expected that the student university will recognize a particular EVICAB course or courses (and the credits obtained therefrom via EVICAB) in frame of the local curriculum of this particular student.

IV. Specific technical problems in teaching process

Concerning how to monitor students in their learning, it has been concluded that no EVICAB contact with students will be made via emails due to danger of viruses, uncontrolled load for tutors etc.. All the EVICAB student communication will be arranged entirely via MOODLE web pages, designed and arranged for EVICAB and physically situated at RGI TUT server.

As for the interaction across the network, the preferred mode is asynchronous for its organizational and technical simplicity and availability even in countries where the Internet is still less reliable and/or slower. It is also simpler and more comfortable for teachers, as it means easier but controllable availability of a teacher. However, the synchronous communication, including high-end possibilities as real-time video and audio, will be considered as an alternative wherever possible. Thus, the teachers can only be contacted by students via the EVICAB MOODLE web pages, either off-line or on-line depending on installed modes and on possibilities primarily on side of the student. If the off-line contact is

considered (which should be always available as an alternative for all tasks), a reasonable maximum delay time of a teacher's response should be defined.

An important issue might be, how to keep the motivation of students on. However, the EVICAB attitude is that intensive and active work in the course is in the primary interest of each student and therefore is left on his/her responsibility. On the other hand, the EVICAB administration and course presentation should be attractive and maximally simplifying the administrative tasks so that the student's interest and motivation does not get lost. As the offered courses concerns, they should provide interesting and well-done e-learning material, possibly enhanced by professional IT services for the authors of e-learning courses.

The e-learning material will only be available via MOODLE. Downloading of e-learning course material should not be allowed, in order to prevent problems with unauthorised modified versions (and also with different versions by the original author). So far, one of the important issues to be solved generally is the problem of copyright of the e-learning material.

MOODLE will also provide, by particularly designed pages, for students' feedback in evaluating the courses, primarily anonymously.

V. Student authentication

Student authentication in an e-learning university is considered a serious issue.

• Authentication during the course

However, during the course, simple personal password to EVICAB MOODLE pages is considered sufficient; possible cheating (if any) only causes improper preparation of the student for the final exam and might lead to a failure there thus not endangering the credibility of the obtained results. This less severe approach applies also to running tests during courses requiring primarily understanding of the course material, not only memorizing of facts.

• Authentication during tests and final course exams

In contrast to partial tests during the course, the final written exam authentication must be strict, excluding any possibility of cheating (both in the proof-of-knowledge respect, and as to the identity check of students concerns).

The only possibility seen presently as officially recognisable is checked personal presence in closed rooms. However, geographically distributed exams are possible provided that they are synchronized at different "student" universities and use the same questions and problems; this seems to be a solution, providing that all the student responses are checked and classified centrally by the same "course" teacher(s). This means locally organized closed-room written exams, kept by all the involved student universities at the same time, all under supervision of local assistants assigned for the EVICAB program by the respective student universities.

The exam questions or problems will be centrally and synchronously distributed from the course teacher (thus from the course-university) via MOODLE web pages.

All answers will be sent immediately after closing the exam to the course-guaranteeing teacher, who will organise the common evaluation of all responses from all student universities. The answers of students might be communicated to the course teacher directly in real time via use of the MOODLE web page during the exam or sent by the assistant electronically off-line afterwards.

An “emergency case” recommendation has been accepted with respect to the Internet exams: always the alternative possibility of answering by hand-writing, independent on the network technical status and means, should be available and offered to students.

VI. *Suggestions for the main EVICAB databases*

Two EVICAB databases are basically needed:

Student database – data on students studying the EVICAB courses, filled in primarily by the applying students; some items added automatically or by the EVICAB administration. An important item is the consent of the student’s university confirming that the concrete EVICAB courses will be accepted by the university (i.e. credits counted) and that the university would provide assistance with the final exams (closed room + supervision). Further, there are two individual lists: the list of courses selected by the student out of the list of available courses (based on the Course database) and the list of passed EVICAB courses – filled in gradually by the EVICAB administration based on the reports from the course universities (or alternatively, filled in directly by the course universities).

Course database – data on the EVICAB accepted courses and the respective course universities and tutors, filled in by the course universities or by the EVICAB administration based on agreements with the course universities. Besides the course university name and location, the name of the teacher guaranteeing the course, summary of the course content and technical details on availability, prerequisites, recommended literature and technical requirements of the course should be given. From this database, the list of available courses, visible on the respective MOODLE page, is derived.

Besides the Course database, containing the really available courses, there will be a MOODLE page with the ideal EVICAB recommended BME curriculum, which does not need to correspond exactly to the course offer, neither in course names nor in completeness of the offer.

More details on the accepted approaches and present status of the project can be found in [1] and [4].

CONCLUSIONS

The described organizational structure of the EVICAB virtual BME campus has been partly already implemented by the professional IT project partner – MediaMaisteri Group Tampere; the databases are localised physically at a server of TUT-RGI. The project, which is now in its final year, is aiming towards implementing more

courses with a good and possibly novel features of the respective e-learning material. Although the main organizational issues have been solved as described above, the organizational aspects of the project naturally remain one of the substantial areas of interest. What is presently still seen as problematic, that are some legislation issues concerning the personal data protection and copyright problems. These uneasy generic aspects, not concerning only this particular project, would probably deserve a deep treatment by a concentrated effort, perhaps in frame of another specialized international European project.

Another interesting and probably useful direction of considerations would be a possible financial support of the tuition at the course university, and also some systematic support of individual EVICAB students, e.g. via European Socrates funds.

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