EVICAB - Biomedical Engineering Program on the Internet including Video Files for iPod

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Abstract — **Internet is more and more used as an educational tool. We have developed the EVICAB platform which provides a curriculum in Biomedical Engineering. EVICAB includes the educational material in various formats eg. lecture videos, lecture slides, textbook, exercises and examination. The video material is available in various formats to be viewed on the PC, iPod and media phones. EVICAB offers for the users the possibility to submit additional information and comments. It also includes rating of the educational material. Its use is free and it is available worldwide.**

Keywords — **Biomedical engineering, Internet education, www.evicab.eu**

I. Introduction

The most modern and advanced method in education and student administration is the use of Internet. The use of Internet makes the geographical distances to disappear and allows the studying at a time which is most convenient to the student.

Biomedical Engineering is needed all around the world and globalization encourages the students to mobility between universities. It is important that education in Biomedical Engineering is harmonized to facilitate the mobility. The BIOMEDEA project facilitates this within the study programs in European universities. All this gives strong reasons to develop an education program on the Internet.

This is the basis for the project: European Virtual Campus for Biomedical Engineering – EVICAB. It was funded by the European Commission Education and Training for 2006-2007.

EVICAB offers high-quality courses prepared by the best international teachers. The courses include lecture videos and associated lecture slides. The courses are also associated with additional teaching material like full textbooks, exercises, laboratory exercises etc.

All courses offered by EVICAB are recognized by at least one university in the European Union. Thus it is easy for any other university in the EU to include EVICAB courses to their curriculum.

Because the teaching material in EVICAB is available free of charge and because it can be used via Internet form anywhere in the world, the BME program provided by the EVICAB is available for worldwide use.

EVICAB uses the Wiki-idea but is more strongly controlled by an Administrative Board. This ensures that the teaching material provided by the experts is of high quality and cannot be changed by anyone else than the author. In addition to the primary teaching material, the courses have windows with free access. These are used for providing additional teaching material by the users of EVICAB. In addition to helping the students, this Wiki material may be utilized by the course author for improving the course.

The teaching material for EVICAB is provided by the best experts free of charge. The benefit from this for the teacher is that his/her reputation as an expert will be strengthened worldwide and this will support his/her career as pedagogue and scientist.

Associated to the EVICAB education there is also developed a method for Internet examinations. This will further strengthen the worldwide use of EVICAB because the geographical location of the students and the teachers does not play any role anymore.

www.evicab.eu

II. Evicab project

The objective of the project is to develop, build up and evaluate sustainable, dynamical solutions for virtual mobility and e-learning that, according to the Bologna process,

- Mutually support the harmonization of the European higher education programs,
- Improve the quality of and comparability between the programs, and
- Advance the post-graduate studies, qualification and certification. These practices will be developed, piloted and evaluated in the field of biomedical engineering and medical physics.

Important goal is that these approaches and mechanisms for virtual e-learning can be extended and transferred from this project also to other disciplines to promote virtual

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student and teacher mobility and credit transfer between European universities.

III. EVICAB CONSORTIUM

EVICAB is coordinated by the EVICAB consortium. Professor Jaakko Malmivuo at Tampere University of Technology serves as Director of the project and Assistant Professor Juha Nousiainen as coordinator. The consortium has partners in Finland, Sweden, Estonia, Lithuania and Czech Republic. EVICAB also co-operates with the BIOMEDEA project. This is important because harmonization ensures wide application of the educational material.

EVICAB welcomes interested institutes to join as associate partners. We hope that the associate partners actively participate in producing teaching material to EVICAB.

IV. IDEA OF EVICAB

The fundamental idea of the EVICAB is that it offers an open platform for Biomedical Engineering curriculum on the Internet. The openness means the open access to and free right to use the resources of the EVICAB, and an open possibility for all experts in the field to contribute to the development of the content of the virtual curriculum.

Teachers, who are experienced and recognized experts in their field, are encouraged to submit full e-courses, course modules and other teaching material to EVICAB. The material may include many different formats like video lectures, PowerPoint slides, pdf-files, Word files etc.

EVICAB is not a university. The course and student administrations continue in the universities as usual: The teacher, responsible of the course/study program, may select from EVICAB courses for the BME curriculum of the university. The students study the courses either as ordinary lecturing course with the EVICAB material supporting the lectures or the course may be partially or solely studied from EVICAB. The students, or anyone even outside the university, may study EVICAB courses to add their competence in Biomedical Engineering. Thus EVICAB is important also for the persons in the working life to improving their professional competence.

The EVICAB has an Administrative Board which administers the EVICAB curriculum. The board accepts courses of sufficient scientific, pedagogical and technical quality. The board may also invite experts to provide course material to the EVICAB. Courses which apparently are of low quality, either out of date, lower quality than competing courses and not appreciated by the users of the EVICAB will be deleted. Active feedback from the users of EVICAB, both teachers and students, is essential. All this will be realized by utilizing a dynamical quality assurance system.

V. IMPACT OF EVICAB ON E-LEARNING

In its completed form, EVICAB will have strong impact on all main levels of the education process:

For students it will provide virtual mobility as a complementary, preparatory, or even substitutive option for physical mobility. The increased number on e-courses for distance learning will give higher variety of qualified studies and degrees.

Teachers will substantially benefit from the open resources, teaching materials and e-courses available through the EVICAB. The support provided for design and development, as well as the good practices and high-quality e-courses will motivate and spur the teachers in the e-course development.

EVICAB will contribute to the harmonization process of BME curricula in Europe in co-operation with BIOMEDEA and will improve the quality of the curricula. Finally, the solutions and models developed for building the virtual BME curriculum can be applied to other disciplines.

VI. FORMAT OF THE EDUCATIONAL MATERIAL

The basic format of the educational material on the Internet includes a larger window for the lecture slides and a smaller window for a video on the teacher. The sound track is, of course, also included. The lecture videos may be easily browsed back and forth for the student to repeat the difficult issues or to skip less interesting issues in the lecture.

The EVICAB courses include also other educational material than the videos. These include: information on the teacher and the course, course book, and exercises. One of the courses, Bioelectromagnetism, displays simultaneously the corresponding location of the book below the video.

The lectures will have a discussion forum for the students to make comments or add relevant links and material.

The lectures will also have a rating system for giving overall rating and for rating the technical and/or pedagogical quality.

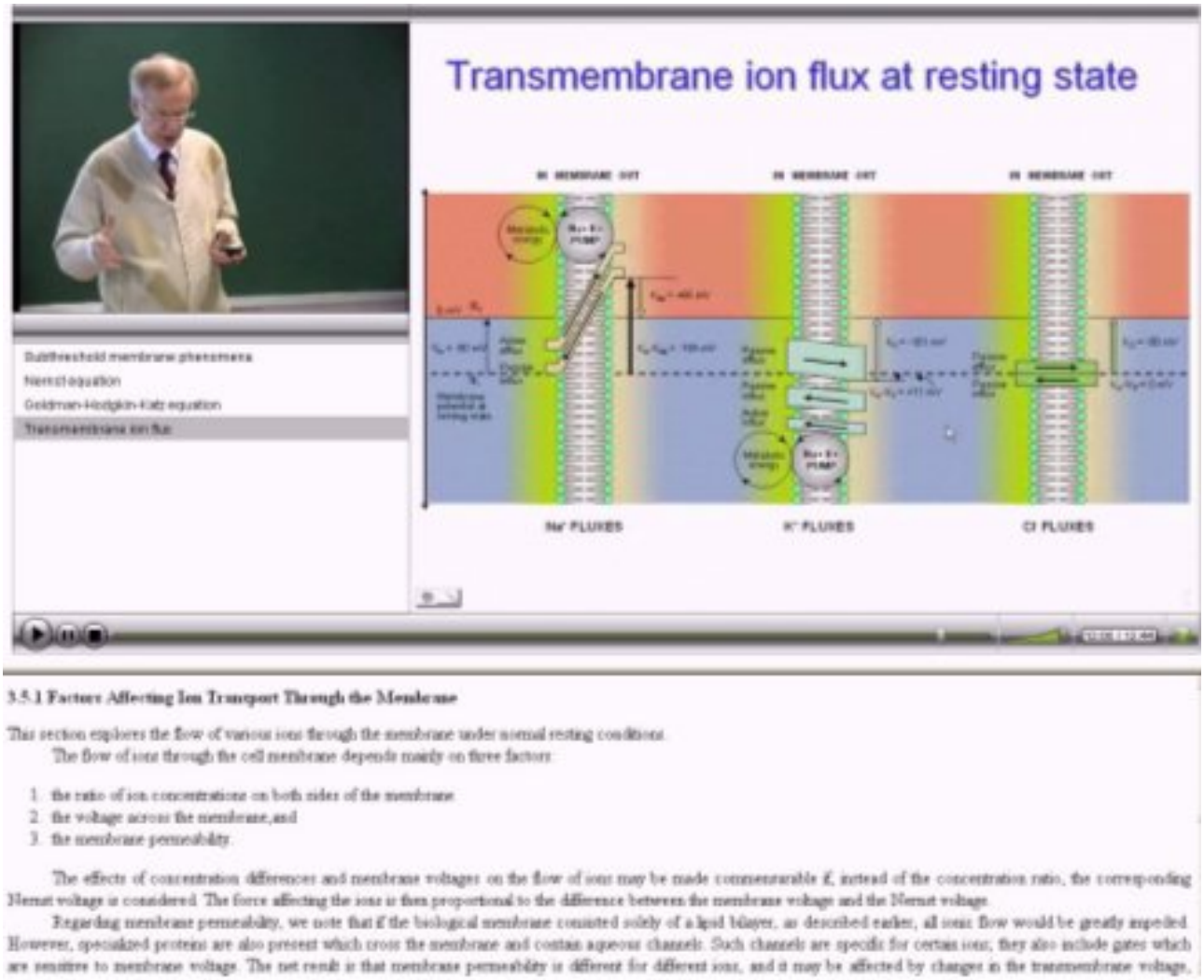

Fig. 1. Example of the lecture video with a larger window for the slides and a smaller window for the lecturer video. Below is a window for the textbook material of the lecture. The windows may be resized and the textbook material may be freely scrolled.

VII. Mobile course material

One of the key issues in the EVICAB is to reach the students anywhere and anytime. The learning process should not be dependent on the location of the student. Internet based material supports this idea and hence all the educational resources are provided in the EVICAB platform on the Internet.

Not only is the Internet used for media for learning process but also portable devices such as iPod and mobile phones can be used. In EVICAB project these media are supported. The video lecture in these formats may be downloaded from EVICAB web page and uploaded to the iPod or media phone. Because of the limited size of the image in these devices, these files include only the PowerPoint slides and the sound, not the video image of the lecturer. A new interesting application is the Cinemizer produced by Zeiss. It includes two video images in front of special spectacles which are connected to iPod. They also include earphones fixed to the frames of the Cinemizer. Cinemizer provides a "hands/free" binocular (though not stereoscopic) observation of the videos.

Students may choose the best media for his or her current lifestyle; busy student may, for instance, watch the lecture videos in a bus on the way to or from university.

VIII. Internet examination

Another successful innovation and application in our e-learning activities has been the Internet examination.

In the Internet examination the students make the exam in a computer class. This may be performed simultaneously in several universities. Therefore the students do not need to travel to the location there the course was given.

The students open the Moodle program at the time of the examination and find the examination questions from there. We usually allow the students to use all the material available on the Internet. This requires that instead of asking "What is ..." the examination questions shall be formulated so that they indicate that the student has understood the topic and is able to apply this information. The only thing which is not allowed is communication with another person via e-mail etc. during the examination.

IX. Why to provide courses to EVICAB?

EVICAB is an important teaching and learning method only if it is available free of charge and worldwide. As a consequence, the learning material should be provided free of charge.

Why experienced and competent teachers should provide such material without charge and without receiving royalties? Acceptance of a course by EVICAB will be a certificate for quality. Worldwide distribution to all university students will give exceptional publicity for the author and his/her university. All this will facilitate the sales of traditional teaching material produced by the course author. This will also attract international students from other countries all over the world to apply to the home university of the material author. We already have experience which has proven these issues to be realistic.

The Internet has dramatically changed the distribution of information. Distribution is worldwide, real time and free of delivery costs. The technology also supports wide variety of attractive presentation modalities. All this ensures wide audience and publicity for the material on the Internet. For instance, the Wikipedia dictionary serves as a successful example of this new era of information delivery. On the basis of this publicity it is possible to create markets also for traditional printed educational material. In addition the EVICAB will provide the platform for all courses free of charge. Pedagogical evaluation and technical support for course design are also provided in request. This will ensure the high quality and up to date virtual learning environment.

X. Conclusion

In the future, the teaching and learning will mainly be based on the Internet. The ideas and the technology of EVICAB are not limited only for application on Biomedical Engineering but it may be applied to all fields and levels of education. EVICAB will be the forerunner and show the way to more efficient and high quality education

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