BIOMEDICAL ENGINEERING EDUCATION ON THE INTERNET AT THE RAGNAR GRANIT INSTITUTE: A MODEL FOR A EUROPEAN E-LEARNING NETWORK

J. Nousiainen* and J. Malmivuo*

* Ragnar Granit Institute, Tampere University of Technology, Tampere, Finland

jaakko.malmivuo@tut.fi

Abstract: The purpose of this paper is to set up a model for a European e-learning network and program on Biomedical Engineering, based on the experience of Ragnar Granit Institute on the web-based learning activities.

Introduction

The large-scale exploitation of the Internet in the education of Biomedical Engineering has been of long interest and activity at the Ragnar Granit Institute (RGI) of Tampere University of Technology. Goals of these e-learning activities have been:

- To create of common virtual *learning environment* for students and teachers outside of the class room.
- To enhance the *interaction* between students, student groups and teachers/tutors.
- To enable the *distance learning* of selected courses of the BME program on the Internet.

To form a basis for *international* BME e-learning program.

Learning environment

The concept *learning environment (LE)* means a space that includes various study modes, learning methods, and working tools necessary for teaching and learning. A web-based LE supports the traditional contact learning and provides a common platform for e-learning.

In the RGI, the Moodle [1] LE has been selected as a common platform for all courses in the BME study program. The web pages of all courses are in the Moodle proving students a customized learning portal to the courses enrolled. Moodle is running in an RGI web server [2] and enables students outside of the university to register to the courses. It provides versatile resources and activities for course material delivery, communication, assignments, quiz, etc.

Components in the e-learning program

The e-learning program should be composed of several components, like course curriculum, program management, course material delivery and production, interaction and assessment.

The curriculum should be composed of selected courses on various fields of BME, provided by the participating universities on the Internet. The courses provided by the RGI cover the fields of bioelectromagnetism, medical electronics, medical physics and medical informatics.

The management of the courses should be under a common LE platform (e.g. the Moodle) that provides services for course enrolment, downloading the course materials, interaction, tutoring, and assessment.

The learning on the Internet is based primarily on the teaching material available in an electronic form, including video (or audio) clips of the lectures, electronic text books, lecture notes, assignments etc. At the RGI, in several courses the web-edition of the *Bioelectromagnetism* text book (3) serves as a reference.

The Internet plays important role to enhance the interaction between students and teachers outside of the class room. At the RGI, the assignments of home and laboratory works and feedback to students take place in the Moodle LE in many courses. Discussion forums provide tools for project working and discussions. Interactive demonstrations and animations running in the web help to understand complex systems.

An essential component of virtual courses in addition to the learning tools and material is the organization of the assessment of the students. A web-based final exam is one method for assessing. It can be organized in a controlled environment in a computer class room or un-controlled environment at home. A controlled open-book web exam has been tested with good results in the Bioelectromagnetism course.

Conclusions

The good experience and benefits obtained from an extensive web-based education at the RGI together with advanced telecommunication and learning environment software encourage developing a European network of virtual BME courses and finally a complete BME e-learning program.

References

[1] http://moodle.org/
[2] http://www.rgi.tut.fi/moodle
[3] http://butler.cc.tut.fi/~malmivuo/bem/bembook/