Towards the Integration of Course Modules of Different European Institutions of Higher Education into a Multimedia Learning Platform

Freddie Priem, Johan Calu and Renaat De Craemer

Abstract – **This paper deals with the added value of participating in European joint projects and with important aspects of the outcomes of such collaboration.**
Important are (a) the content of the developed course modules and laboratory practices, (b) the implementation of innovative didactical and pedagogical approaches and strategies, (c) the access and effectiveness of distance education and e-learning, and (d) the new horizons for teachers and students. Attention is also paid to the dissemibnation of the project outcomes, the building of European networks and the realization of the European Higher Education Area.
All this is illustrated on the basis of two projects.

Keywords - **international collaboration, distance education, e-learning, dissemination, networks.**

I. INTRODUCTION

In university and higher education there is a long tradition of focussing on the quality of the content of the learning and teaching subjects and course modules. With clock-like regularity course modules are compared, evaluated, and the pros and cons of emendations are weighed. Maybe less frequent learning strategies, didactical approaches and pedagogical aspects are scrutinized and put into practice as time goes by. Lots of ideas are to be found at international conferences like this one in Sozopol.

In this paper four different findings of the outcomes of joint European projects will be reported:
(1) the advantages for the academic experts of bringing together know-how, expertise and experience;
(2) the opportunities of discovering new horizons for the students;
(3) the implementation of innovative and up-to-date computer-aided learning and teaching methods;
(4) the contribution to the realization of a European Higher Education Area (EHEA).

These four striking findings will be illustrated on the basis of two European projects that are actually being developed, and in which seven institutions of higher education from North, West, East and South Europe are involved, namely the EDIT project *advanced level study programme in electronic design and integration technologies* (Erasmus joint project number 2821) and the VME project *virtual measurement environment* (Lifelong Learning programme, Erasmus project number 133844).

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II. JOINING THE KNOWLEDGE

Both projects could be set up and developed thanks to joining the knowledge, expertise and experience of the participating European institutions of higher education.

In the EDIT project it was and still is the collaboration in the domains of *digital design*, *digital signal processing, artificial intelligence* (KHBO-Ostend/ Belgium), *data compression*, *electronic design* (BUT-Brno/Czech Republic, *design of integrated circuits*, and *radio-frequency technology* (TUS-Sofia/Bulgaria).

The result of the EDIT-project is a common international postgraduate programme, described in detail in a programme guide. The study programme ensures the student interdisciplinary knowledge and skills, as requested by the industry. The necessary competences are offered by the consortium via *introductory modules* (remote, self-study and e-learning), *advanced modules* (some remote, self-study and e-learning) and a *project work* related to a research topic or a product development in collaboration with industry. The modules are consistent with the current expertise and research projects in the participating institutions.

Whereas in the VME project the specialist fields are *electronics-ICT* (KHBO-Ostend/Belgium), *physics, computer science* (DIT-Dublin/Ireland), *physical measurement*, *on-distance learning* (IUT/B1-Bordeaux/ France), *electrotechnics* and *environmental engineering* (TAMK-Tampere/Finland). All institutes are offering the students of the consortium laboratory experience, using the learning platform of the coordinating institution. The laboratory experiments are instructed, guided and evaluated on distance. Laboratory experiments on distance with a Hall-element are offered by KHBO - Ostend, studying and experimenting with vacuum-technology is offered by the school of physics of DIT - Dublin, measurements on basic electronic circuits are set up by IUT - Bordeaux and TAMK - Tampere is guiding the students through some experiments related to environmental measurements and automation.

In both examples, the gained advantages for the participating partner institutions may be far-reaching:
-    the extension of the curricula;
-    the participation in European projects;
-    the participation in European networking;
-    the contribution to the realization of the EHEA.
  For the individual specialists/teachers:
-    the elaboration in depth of the specialized subjects;
-    the participation in the development of European projects;
-    the participation in teachers mobility;

- the experience of implementing distance and e-learning

Other examples are:

- As an outcome of the EDIT-project: the *European Postgraduate in Electronic Design and Integration Technologies*, a 60 ECTS study programme at KHBO-Ostend/Belgium, BUT-Brno/Czech Republic and TUS-Sofia/Bulgaria). It focusses on the design of modern electronic systems, considering recent evolutions in electronic technology.
- *EUROMASTER of Science in ICT*, a 90 ECTS master programme (European Interreg III project number FR-VL-1.2.6 developed by KHBO-Ostend/Belgium, Université de Dunkerque-Calais/France and the University of Kent-Canterbury/ United Kingdom) leading to a masters degree awarded by the University of Kent.

III. New Horizons for the Students

The students are enabled to make up (part of) their curriculum with course modules as outcomes of joint European projects.

The students have three options: They can take the chosen course modules at their home institutions. They can use the electronic learning platform at their own institutions or at the partner institutions. Or they can go abroad to the partner institutions to investigate something on the spot. (i.e. students mobility stipulated by the Socrates bilateral agreement).

Examples are:

- VME project: 2 students from IUT/B1-Bordeaux/France study at KHBO-Ostend/Belgium: second semester 2008-2009.
- VME project: 5 students from KHBO-Ostend/Belgium go to DIT-Dublin/Ireland: for laboratory experiments and measurements: first semester 2009-2010 (i.e. after having studies the DIT course module via the electronic learning platform at KHBO).
- EDIT project: 1 student from BUT-Brno/Czech Republic stays at KHBO-Ostend/Belgium to do some research that leads up to a master thesis: *development of algorithms for digital real time image processing on a DSP processor* : second semester 2008-2009.

IV. Innovations in Distance Education and E-learning

In the fields of applied science and technology lectures, laboratory practices, experiments and course materials that result from European cooperation almost automatically imply the pressing need for up-to-date methodical approaches and pedagogical innovations.

As a lot of innovative or rather new tools and used, new didactical approaches and strategies are necessary, and teaching staff as well as students should be made familiar with the possibilities of :

(1) open and distance learning, e-learning, electronic platforms;

(2) online presentation of courses and test materials;

(3) interaction between teacher and student or student and student;

(4) assessments via the electronic learning platform;

(5) virtual measurements in laboratory sessions;

(6) evaluation of the student's progress and examination both at the home university or at the guest university via the electronic learning platforms.

The application of the e-learning concept in the older joint European projects of KHBO-Ostend/Belgium and in the more recent VME and EDIT projects is as follows:

The different projects have different approaches in using a multimedial e-learning platform. The older projects used CD-ROM/DVD as divulgation method for the courses. Each course was videotaped and edited with the presentations. Examples are:

- *Deutsch – Mal anders! (DEMA). An interactive multimedia foreign language course for non-philology university students* (Lingua II project number 72057: KHBO-Ostend/Belgium, Friedrich-Schiller-Universität Jena/ Germany, TAMK-Tampere/Finland).
- *Technical Aviation English (TAE)* (Leonardo project: Sabena Technics-Brussels/Belgium, KHBO-Ostend/Belgium, Question Mark-London/United Kingdom, Université de Besançon/France).
- *EUROMASTER of science in ICT* (Interreg III project: HKBO-Ostend/Belgium, Université de Dunkerque-Calais/France, University of Kent-Canterbury/United Kingdom).

The more recent EDIT and VME projects are using one or more learning platforms for the dissemination of the education material. All platforms provide the possibilities to deliver the content (documents, multimedia content, references to websites, etc.), quiz material and assignment administration, as well as communication possibilities. For the EDIT project the decision was taken to use the learning platform of the institution where the course has been delivered. This means that students have to be enrolled on all the platforms where they take a module. In the VME project it was decided upon the use of one single electronic learning platform (Toledo - which is the blackboard platform used at the KULeuven Association).

Especially for the VME project different servers have to be connected so that lab experiments on the different locations can be accessed from the home location. All locations are accessed through a single sign-on system (shibboleth).

Both projects can use a learning path, using tests as stepping stones in the progress or remediation in the courses. For the editing of the tests a number of question types can be used, of which most can use automatic quotation so that students can walk along the learning path without intervention of the instructor. Of course, the instructor can at all times view the progress of the student and - if necessary - guide the student through personal communication.

Apart from the above ideas and examples of good practice in the field of science and technology is the urgent need of a good command of spoken and written languages both for teachers and students.

Examples of European language projects are:

- *Technical and Aviation English (TAE)* (Leonardo project: Sabena Technics-Brussels/Belgium, KHBO-Ostend/Belgium, Question Mark-London/United Kingdom, Université de Besançon/France).
- *Deutsch – Mal anders! (DEMA). An interactive multimedia foreign language course for non-philology university students* (Lingua II project number 72057: KHBO-Ostend/Belgium, Friedrich-Schiller-Universität Jena/ Germany, TAMK-Tampere/Finland).

However, technical and pedagogical problems may not seldom occur. This implies the support and collaboration of qualified staff members. All this requires (1) permanent refresher courses of the academic staff; (2) the essential infrastructure at the university and (3) a strict and binding course planning.

V. Contribution to the European Higher Education Area

The developed course modules and laboratory experiments are likely to be integrated into the degree programmes of the project partner institutions. The ECTS European Credit Transfer System is implied. The dissemination planning guarantees spreading the project outcomes over the memberstates of the European Union, thus creating a wider network. And the up-to-date learning methods and facilities are made easier.

Students and teachers mobility is integrated and partly subsidized by the Socrates/Erasmus programmes and guaranteed by bilateral agreements. Europe-wide recognized diplomas and certificates can be obtained by accreditation at a partner university. European centres of good practice can be created.

VI. Conclusions

When taken into consideration the above findings, the innovations of ODL and e-learning will be operational in the newly developed course modules, the quality of university education in general and higher education in the field of science and technology will be improved and be raised to a higher level - for the benefit of the European universities, as well as of teachers and students.

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