

Pedagogical evaluation of remote laboratories in eMerge project

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Abstract — This paper presents the development of the eMerge project, an innovative and advanced educational network structure that will permit the dissemination of online laboratory experiments to support engineering and science education. This project has been performing in the framework of European Community SOCRATES – MINERVA program. Partners from nine different educational institutions are involved in this project. The actual work is based on previous experiences where prototypes of virtual laboratories were realized and successfully demonstrated. By using Web technologies and computer controlled instrumentation, students could access to these remote laboratories. The main objective of the actual project is to extend these technologies out of the individual institutions, making the services available to the European students. In the project, we emphasize the creation of a variety laboratory experiments, and the development of supporting course material and educational practices. From a pedagogical point of view, it is very important to create a lab-like atmosphere at the client side. To evaluate the pedagogical effect of working with remote laboratories a design with two groups of students is used. 76 students from the University of Bordeaux took their practical courses either using remote laboratories or participating in a traditional course. These two groups are compared with respect to the knowledge they gain by taking the courses. Within this special design the increase of knowledge can be measured. The study gives information about the effectiveness of remote laboratories: Do they lead to an increase or decrease of knowledge compared to a traditional course? Knowledge was measured by a multiple-choice-test consisting of 120 items. Items are constructed in a criterion-oriented way by the teacher of the courses. The test shows a satisfying reliability. Additionally acceptance and usability of the remote laboratories are assessed by a questionnaire. Results of the knowledge test and the questionnaire-data are discussed, and implications for future development of remote laboratories are shown.

Index Terms — remote laboratory, pedagogical evaluation, pedagogical effect