Chapter 2.4
Hypermedia Modules for Distance Learning

Nicoletta Sala
Università della Svizzera italiana, Switzerland

INTRODUCTION

The rapid development of digital, networked multimedia technology such as the Internet, e-mail and computer-based and video conferencing can open new educational opportunities. This chapter describes the use of hypermedia modules in distance learning. This educational experience has been developed by the Department of Electronics (Dipartimento di Elettronica) of the Politecnico of Torino (Italy) in the field of computer-based training in electronic instrumentation and measurements, where the author was a supervisor for the educational process. This project is a part of an Italian study of distance education named "Consorzio Nettuno" that involves different undergraduate courses (Electronic Engineering, Information Technology, and Economic Science). Several modules have been developed using multimedia technologies to assist the students to acquire the fundamentals of the basic electronic instrumentation. A client-server system has been designed in order to allow the students to operate in a remote laboratory for experimental training. The courseware includes lessons, exercises, and training on virtual instruments that emulate actual instruments. The students can also carry out several real laboratory experiments without actually being in the laboratory by using a client-server structure based on the Internet.

BACKGROUND

The education experiment named "Consorzio Nettuno" ("Neptune Consortium") was started in Italy in 1991 to create a distance university education using the television as a medium in the learning process. The "Consorzio Nettuno" is comprised of 34 Italian universities and the Open University (UK), and 285 university courses (electronic engineering, economic sciences, etc.). The project's targets are:

- To offer a formative approach free from space and time encumbrances
- To develop active national and transnational collaborations

- To use the new technologies inside the learning process

The didactic model is a psycho-pedagogical mixed model that empowers, through the use of new technologies, the teaching system of traditional universities. It realizes a synchronic and diachronic teaching and learning system, without limits of time and space that includes a direct phase of interaction between teachers and students, both face-to-face and at a distance (Garito, 2001). In the first step of the experiment, the lectures are broadcast on TV or distributed on videocassettes, and it is possible to use the Internet as a medium to create an educational cyberspace. Using these media, there are some problems in transmitting the correct information on some particular technical subjects; for example, to train students to use electronic instrumentation, because students are still required to attend laboratories to achieve practical experience under the guidance of an instructor. In fact, education in fields such as electronic measurement requires students to gain a reasonable skill in using various kinds of instrumentation (Pisani, Cambiotti, Sala, & Sanpietro, 1995). Such a skill cannot be achieved by theoretical lessons only—an intensive laboratory activity is also always required. This problem exists both for the first level and for qualifying courses (Sala, 1999a). Basic instrumentation teaching is required for first-level courses that are taken by a large number of students. The cost of basic level instruments is often low, but large classes require large workbench availability and a massive and qualified assistance that is not easily found. Qualifying courses are taken by fewer students so that the assistance problem is reduced, but the instrument cost in such a case is often rather high, thus preventing the possibility of arranging more than a few workbenches. For these reasons, some years ago, the Department of Electronics of the Politecnico of Torino was involved in activating traditional degree and diploma courses in several educational structures

for the "Consorzio Nettuno." It was decided to invest time and resources to develop an alternative solution to the laboratory replication by using the new technologies offered by computer-based multimedia courseware. The goal was to allow the students to carry out a pre-training activity outside the laboratory and possibly at home (Sala, 2003). After this pre-training phase, students who enter the laboratory require less assistance and less time to complete the training activity. About seven years ago, several tutorial modules were developed that were organized like lectures, each being on a particular subject. Each module contains theoretical and functional concepts of a basic electronic instrument and allows for simulated instrument exercises by providing a series of instrument simulators. By means of the realistic control panel of the virtual instrument, the students practice under several operating conditions and situations. In addition, it was decided to explore the possibility of making a real instrument laboratory available for use at home.

HYPERMEDIA MODULES TO INTRODUCE THE ELECTRONIC INSTRUMENTATION FOR DISTANCE EDUCATION

The actual curriculum of the engineering school includes courses where the first practice electronic laboratory precedes the first lectures in which the students learn the theoretical and functional aspects of the instrumentation; deeper knowledge comes in a successive phase based on the actual student requirements (Brofferio, 1998). It seemed to be necessary to provide the first course to students by multimedia tools that allow them to use basic instrumentation in simple physics and initial electronic circuit laboratories. If these tools are organized based on different levels of knowledge, it is possible to satisfy different needs of different kind of students (undergraduate school level or university education). On the basis of

Related Content

From the Cold War to Internet Cathedral
Andrew Targowski (2005). *International Journal of Information and Communication Technology Education (pp. 87-99).*
www.irma-international.org/article/cold-war-internet-cathedral/2264

Significance and Uniqueness of Personalized E-Coaching
Ni Chang (2009). *Encyclopedia of Distance Learning, Second Edition (pp. 1876-1883).*
www.irma-international.org/chapter/significance-uniqueness-personalized-coaching/12004

Barriers to and Strategies for Faculty Integration of IT
Thomas M. Brinthaupt, Maria A. Claytonand Barbara J. Draude (2009). *Encyclopedia of Distance Learning, Second Edition (pp. 138-145).*
www.irma-international.org/chapter/barriers-strategies-faculty-integration/11748

Late Departures from Paper-Based to Supported Networked Learning in South Africa: Lessons Learned
Illasha Kok, Petra Besterand Hennie Esterhuizen (2018). *International Journal of Distance Education Technologies (pp. 56-75).*
www.irma-international.org/article/late-departures-from-paper-based-to-supported-networked-learning-in-south-africa/192073

The Opinions of Field Experts on the Usability of Internet-of-Things Technology in Open and Distance Learning Environments
Hakan Altnpullukand Hakan Kilinc (2022). *International Journal of Information and Communication Technology Education (pp. 1-17).*
www.irma-international.org/article/opinions-field-experts-usability-internet/294582