Curriculum Development and Courseware Implementation Using World Wide Web technology

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Abstract

The curriculum development of medical informatics related courses and their adoption into the faculty curriculum is one of the main tasks of the present day educators. To this end the Internet technology has supported this task. The Internet was born in December of 1969 and has grown phenomenally since. Its graphically interactive, user-friendly modality, the World Wide Web (WWW), is younger and growing even more explosively. By its nature, the WWW is a tool ideally and uniquely suited for the advancement education. This paper describes the design, development and the implementation of a Web Site for supporting the education of the students in the Faculty of Nursing at the University of Athens. The application will be used also in the European project Nightingale.

Keywords

Curriculum Development, World Wide Web, Education, Interactive Courses

Introduction

The World Wide Web (WWW) is the newest and the most powerful information service on the Internet. It has great features of its own plus it integrates most other information services in a way that is simple to use and understand.

The backbone of a Web page is a document written in a specific script language, which is called Hypertext Markup Language (HTML). There are various versions of the HTML language, now version 3.2 is available, and in every new version a great number of new features are added. The new features include extended functions for text and image formation inside the page. It also includes functions for the creation of tables aimed at a better presentation of the available information and special techniques for two-way communication between the user and the Web server.

Nowadays the WWW is considered to be a standard communication method. A huge "library" of available information is at everyone's disposal, and most of the time it is easier and quicker to search for information through the WWW than through other conventional communication means.

Until recently the WWW was used mainly for presenting infor-

mation to the users according to their needs. Another area, which is now being explored and becomes a new perspective in education, is the use of the Web technology and Computer Assisted Instruction (CAI) for distance learning.

This article is based on a Web Site designed to provide education facilities basically to the students of the Faculty of Nursing, of the University of Athens as a first priority and to other Nursing personnel working either locally or at a distance.

Rationale

The initiative for designing the system was the development of an application for supporting the education of the students of the Faculty of Nursing. The benefits of computer-assisted instruction (CAI), already existed in the literature since the mid 1960's, genuinely affect learners, educators, and administrators. Well designed CAI programs empower learners. Interactivity engages the learner into the activity of acquiring new knowledge and skills. Active learners are not passive recipients of the information dumps inherent in the traditional "show and tell" lecture and demonstration format.

The desirable characteristics of the application were the following:

- An easy to use interface with graphical controls that will help the students to use the application and to navigate through the available information baring in mind that the nursing students and the majority of the health care personnel are not familiar with the use of the computers

- The ability to "run" on different computer platforms, in terms of hardware and operating system since the network is not homogeneous.

- The ability to work in a networking environment which supports Microsoft Windows 95 Network and TCP/IP protocol, like the one that exists in the Laboratory of Health Informatics in the Faculty of Nursing of the University of Athens.

- The flexibility of such an application in order to easily update and change the information content.

- The centralised nature of the information content (it should be stored in one main machine) so it can be easily maintained.

- The application will "run" using client-server architectures

The WWW-based technology combined with Multimedia and Interactive features was the choice for this application and a real challenge for the researchers and the educators in the Faculty of Nursing of the University of Athens.

In terms of information content the application should include instructions for using and navigating or moving around within the program, learner outcomes, a glossary of terms, pre/post-tests, validated content, practice exercises, individualised feedback, and high level interactivity of the learning process. In addition, the instructional design must incorporate and be congruent with current theories of learning. Additional attributes that could be included are performance assessment, scoring, and record keeping.

Methods

Our intension was to use WWW in such a way in order to supplement the conventional classroom rather than replace it. In a traditional classroom setting, learners retain approximately 20% of what they hear or are told, and 30% of what they see when information is visually presented. Reading, acquiring information in textual format, is associated with a 10% rate of retention. At most, a retention rate of 50% can be anticipated when learners are engaged in passive learning experiences, whereas a 70% to 90% retention rate is associated with active learner participation.

By combining the immense quantity and spectrum of information within the WWW, the interactive capabilities of a Web client, and the multimodal nature of Web pages, the WWW can be an instructional aid for a conventional class. Each segment of a lecture course can be given an Internet component. The academic concepts are extended and reinforced, and as an added benefit, supplemental Internet skills are imparted to an Internet-naive student population.

In designing the application we used the well-known methodology of dividing the plan to the following steps: User needs, Defining the training targets, Collection of Authoring material, Designing of the didactic scenario, Adapting the didactic scenario to the Web technology environment, Verification of the implementation at local level (intranet), Validation of the application to Internet and Demonstration.

In particular for the Web site implementation the methodology included:

- Installation of the Web server software
- Customization of the Web server to the application needs,
- Designing the forms that interact with the user,
- Development of the Common Gateway Interface and the JAVA scripts that translate the forms input,
- Development of the scripts which process the applications data,

- Designing the web pages which present the information to the user and the use of video, sound and other multimedia extensions using JAVA programming language.

Results

In the beginning, a decision had to be made concerning the modules of the curriculum, which could be included in the Web site, as it was impossible to implement all the modules in this stage. Currently the application invokes two modules: "Introduction to Health Informatics" and "Communications and Networks".

The didactic scenario was designed in such a way that allows to the user to select a specific Training Module. This is done after the registration of the student to the Interactive Course. Each module consists of a number of Tutorials (Classes) organised in several Sessions (Pages).

The information content of each module is presented using text with hyperlinks and also with multimedia extensions such as drawings, pictures, animation, sound or video, the student can select which part of these media forms are going to be presented each time.

As an example in the module of "Communication and Networks" the different kind of Networks (LAN, WAN, TOKEN RING), apart from the relevant text of the syllabus (definitions, terms), are explained using sketch drawings and 3D images on which the user can "click" to see the details for each component. Also a list with Proposed Bibliography and External Links on the WWW is available. At any time the student can search for a specific term in the area of his interest from the available information content.

After the end of a module there is an Examination Paper for evaluating the progress of the student. Evaluations Reports are available at anytime for the students and there is also the option of real time response from the evaluation system, so the student knows if he gives the right answer or not.

The application informs the Educator, the Student, and the System Administrator for the results of the Examination Papers using the Electronic Mail Messaging System and all the available data is organised in several log files.

In the development phase, the first step was related more with the preparation of the Web site to include the relevant material. The next stage was the design and the development of the user interface, a number of forms were designed keeping in mind that a well-structured and easily to use interface should be created so the students can easily use it even without experience in using computers. For this reason a specific software package called "Multimedia Toolbook II" was used to prepare the various screens of the application.

The porting of the user interface to the WWW was achieved using special authoring tools such as MS-Frontpage97, MS-Office97 Professional, JAVA Workshop and Netscape Gold.

The application which is planned to be used in a European based course is currently available now for the students of the Health Care Sciences in the National and Kapodistrian University of Athens, Greece (http://www.dn.uoa.gr/ICourse).

Evaluation

The application has been used from 300 students until now, and the comments are quite encouraging. About 75% of the user are satisfied from the application both in terms of information content and in terms of usability. The possibility of accessing the application from the residencies of the students is very challenging for themselves and there is always a library of available information that the students can browse.

In the immediate future other success criteria that we are going to use are: the number of accesses, the overall amount and type of information used in the application and an on-line questionnaire of evaluation of the application.

Of course there are also some drawbacks which had to do more with the time needed to download the relevant files. The problem is more obvious when accessing the application from distance locations (Internet) than when the Local Area Network is used.

The efforts are channeled to the direction of eliminating these problems so that the application can be used more easily and is immediately accessible through Internet.

Conclusions

The reaction of the educators and the students towards this kind of education is quite positive as can be concluded from the log files of the application. A big number of students have already used the application and this number is increasing day by day. As it seems, this new form of communication between the educators and the students is very interesting for both sides, and has great potential for further development in the future.

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