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ABSTRACT

The Teachers College at Emporia State University in Kansas is now utilizing World Wide Web technology for automating the application procedure for student teaching. The general concepts and some of the key terms that are important for understanding the process involved in this project include: a client-server model, HyperText Markup Language, HyperText Transfer Protocol, and Common Gateway Interface. Three main requirements were considered for the system's design. First, the system should allow student teachers to use a Web browser to enter and submit application data and personal information from remote computers connected to the Internet. Second, it should allow the applicants to update their information at any later time after resignation. Third, the system should allow only eligible students to register and should minimize the involvement of staff or personnel for maintenance. Implementation consists of following three parts: the HTML document, an identification database, and CGI scripts. The application of this system consists of two stages: identification and enrollment. Only through extensive preservice applications will teachers acquire the understandings, skills, and confidence they need to use technology in their classrooms and prepare their students for an information-based society. (AEF)

Online Survey, Enrollment, and Examination: Special Internet Applications in Teacher Education

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In a popular New Yorker cartoon, a dog sitting in front of a computer says to another dog: "On the Internet, no one knows you're a dog." It is true, no one will be recognized by race, nationality, gender, or disability while surfing on the net. The Holmes Group (1993) called attention to the importance of technologically rich field sites for students to practice their teaching. Preservice teachers must see how technology is used in school settings and have opportunities to practice teaching using these technologies. The Internet provides rich information for teaching as well as current research on effective curriculum and teaching strategies. Students can participate in electronic discussion forums that give them the opportunity to provide critiques and to share URLs identified on the Web.

Romiszowski (1994) reports that e-mail is more interactive than most other computer-based products. Student teachers view posted messages from other students, post their own messages, and respond to messages from others. Student teachers communicate with other students and view personal home pages and are able to maintain communication with university supervisors. They also apply technology skills as they search for sources for teaching strategies and lesson plans. While many students complete projects at their assigned school site, others use personal Internet applications or services in libraries or other settings. Class information, announcements, and schedules are posted with relevant information regarding meetings or deadlines for projects. Direct links are provided for students to preview teaching materials on the net. As student teachers move through the semester, they work through Russell's (1996) six categories of technology: awareness, learning the process, understanding and application of the process, familiarity and confidence, adaptation to the contexts, and creative application to new contexts. With the use of the Internet, parents, students, and teachers from all over the world can respond, communicate, and exchange ideas, post questions for discussions, create project Web pages, and even conduct surveys, enrollment, and examinations online.

Online Survey, Enrollment and Examination

In teacher education, staff and faculty often need to conduct surveys, provide enrollment procedures, and give student examinations in one form or another. Prior to the advent of the Internet and the World Wide Web, survey questions, enrollment material, and examinations were usually printed on paper and then sent to students via postal mail or handed to them in person. The whole process is somewhat rigid, inconvenient and time consuming. With current Internet technology, conducting surveys and enrollment online has become feasible and desirable. Allowing students to take examinations online is also technically possible, although some difficulties remain in terms of automatic grading of essay-type questions. The grading can be entirely automatic for single-choice or multiple-choice problems and for some simple answers.

Technically, the design and implementation of these three applications on the Internet all have similar features. Each of the applications involves some form of data collection. The main difference lies only in data processing. Four phases are in order: problem design, Web page design, implementation, and testing. During the problem design phase, the types of questions to be conducted should be determined, whether to use single choice, multiple choice, short answer, or long text. During the Web page design phase, the appearance of the forms should be addressed. The forms to be filled out by the students should be user-friendly, well organized, and suitably sized. The implementation phase involves the actual writing of the Web pages including forms and computer scripts for processing the data to be collected from the Web. Testing, though tedious, is an important step before the Web pages are posted on the Internet. In the following, we present a project that involves the design and implementation of an enrollment system for student teachers to register online. This system is already in use by the Office of Professional Education Services at Emporia State University. The techniques for developing online survey and online examination systems are similar

to those involved in this project and, therefore, will be omitted.

An Online Enrollment System

Project Description

The Teachers College at Emporia State University in Kansas is now utilizing Web technology for automating the application procedure for student teaching. In previous semesters, students completed a five-page application using a typewriter or word processor. Students now demonstrate their technology skills through an electronic application process. The program can be accessed through any Netscape or Microsoft Internet Explorer Web browser. By completing an "Intent to Student Teach" form that includes the social security number, students gain access to the Internet program. Students enter information such as the list of courses taken, the requested districts for placement, a letter of introduction, and other personal information needed to make the placement. This process gives students another opportunity to apply technology skills and at the same time automates the application process. Students can apply at any time and at any place where there is an Internet connection, whether that be a university lab, wired dorm, or home computer.

Background Knowledge

Before describing the enrollment system, we shall briefly explain the general concepts and some of the key terms that are important for understanding the process involved in this project. Refer to Buhle, et al. (1996) and Stanek (1996) for more details.

- **Client-Server Model**
  Web technology is based on the client-server model in which the client makes requests to the intended server for services and the server provides such services for the requesting client. In our case, the client simply refers to the browser used by the applicant to access the Web pages and/or to enter the data for registration, and the server refers to the program that serves the Web pages and/or accepts the submitted data.
- **HyperText Markup Language (HTML)**
  Based on a subset of the Standard Generalized Markup Language (SGML), HTML is a specific language used to create and access resources on the Web. It uses tags and commands to format a document. Tags are also used to indicate functionality and to define services.
- **HyperText Transfer Protocol (HTTP)**
  HTTP is a set of rules that govern the communication between a Web browser and a Web server. It is regarded as the official language of the Web. An HTTP server, or a Web server, refers to a program that serves Web pages on a computer.
- **Common Gateway Interface (CGI)**
  CGI is the interface between an HTTP server and the resources of the server's host computer. A CGI script refers to a program written in some suitable computer language such as Perl, Rexx, C, or Java, that accepts data from the Web server, performs necessary processing, and sends output to the server which will then report the results back to the client. The simplest client-server model for a Web client requesting a Web page from an HTTP server is shown in Figure 1, where no CGI script is involved in the process.

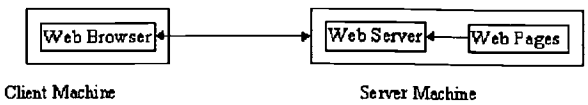

Figure 1. The basic Web client-server model.

For an online enrollment system to work, this simple model is not enough since one or more CGI scripts are required. Figure 2 shows a more general model that involves the interaction among the Web browser, HTTP server, and CGI scripts. With this background knowledge in mind, the design considerations and implementation strategies of the online enrollment system will be presented.

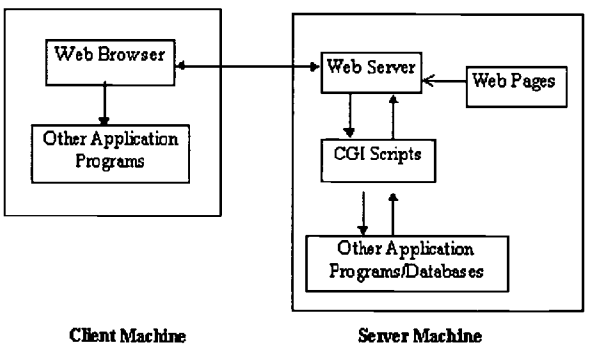

Figure 2. A more interactive Web client-server model.

Design Considerations

In designing such a system, we had three main requirements to consider. First, the system should allow student teachers to use a Web browser to enter and submit application data and personal information from remote computers connected on the Internet. Second, in addition to this basic capability, which is required in any online enrollment system, it should also allow the applicants to update their information at any later time after registration. This latter capability is especially convenient and useful since it not only enhances flexibility but adds modifiability by the applicants, encouraging them to update their data at their earliest convenience. Third, the system should allow only eligible students to register and should minimize the involvement of staff or personnel for maintenance.

Implementation Strategies

Our implementation consists of following three parts: The HTML document, 2) an identification database, and 3)

CGI scripts. The HTML document is created using the Hyper Text Markup Language and is grouped into three folders. The first folder stores the identification Web pages. The second folder stores blank application forms which include the applicant's demographic information sheet, teaching assignment request data, academic activities/ experience, and statement of introduction. These two folders are common for all applicants. The third folder is initially empty and will be used by one of the scripts to create individual subfolders, one for each applicant. The data submitted by the applicants are processed using CGI scripts written in Perl. Two different scripts are implemented: one for identifying the applicants and for creating individual folders, the other for storing and updating the submitted data. The identification database is used by the script to identify whether the applicant is eligible for enrollment or not. This database should be and is the only part that need be maintained by the authorized personnel for adding and removing entries.

Application Procedure

The application of this system is divided into two stages: identification and enrollment. During the identification stage, an applicant is asked to provide his/her name and a password which are then checked against the identification database by the first script to determine if the applicant is eligible for enrollment. This stage is crucial since the system is to be used only for student teachers. Once eligibility is successfully determined, this same script also creates a private folder consisting of HTML files for this specific applicant. The system then enters the enrollment stage and prompts the applicant with application forms, one by one, asking for more information. These forms are designed as separate pages so as not to overwhelm the applicant with input. In other words, the second form will be available only after the first form has been submitted, the third form will be available only after the 2nd form has been submitted, and so on. Whenever a form is submitted, the HTTP server invokes the second CGI script to process the submitted data. Since the system is designed to allow the applicant to update information at any later time, the data submitted by the applicant are automatically entered into the form fields of the Web pages in the private subfolder to make them available to the applicant the next time the same pages are revisited. It is important to note that the subfolder belonging to an applicant is accessible only to that particular applicant.

Conclusion

According to Andres (1993), there are an estimated 50,000 teachers worldwide using the Internet. In the US, Internet access for schools ranges from 44% in Mississippi to 92% in Vermont, while many states, such as Kansas, hover around the national average of 70% (Education Week, 1997). The numbers are increasing on a yearly basis as President Clinton proposes to have all schools connected to the Internet by the year 2000. The continued growth of educational technology use in U.S. schools has prompted interest in strengthening technology literacy in teacher preparation programs. This interest is spearheaded by The National Council for the Accreditation of Teacher Education technology standards for prospective teachers that were developed in collaboration with the International Society for Technology and Education (ISTE:1992, NCATE:1994).

The importance of technology in teacher education was strengthened in recent months by the release of the 1997 NCATE Task Force on Technology and Teacher Education report, "Technology and the New Professional Teacher: Preparing for the 21st Century Classroom." The task force concluded that teachers must teach beyond the textbooks through applications such as Web technology to prepare students for an information-based society (Cooper, 1997). Studies of effective technology in teacher education emphasize that teacher education students must have opportunities to acquire understanding, skill, and confidence as they learn these new technologies (Niederhauser, 1996) and conventional methods of lectures and discussions are not sufficient for learning skills needed to implement educational technology (Dell & Disdier, 1994). Cognitive capacity for learning is greater when students are able to apply new knowledge to teaching situations (Watkins & Marsick, 1995). Teacher education must find ways to apply new technologies to classroom settings (Mckinzie & Clay, 1995). Teacher education programs can use Web technology in various ways, including automated procedures that make existing organizations more efficient. The Web can also be used to support information technologies that expand knowledge and understanding (Zuboff, 1988).

The next goal of our project is to develop an electronic data interchange system where information from files can be merged and faculty can approve applications through a form-based system rather than by manual approval. It is also our goal to allow present and past cooperating teachers and other student teachers across the state and nation to participate in the bulletin board component.

If teacher preparation programs are to produce teachers who are capable of using new computer technologies, preservice programs must prepare them. Only through extensive preservice applications will teachers acquire the understandings, skills, and confidence they need to use technology in their classrooms and prepare their students for an information-based society.

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