

A SYSTEMS APPROACH TO TEACHING WEB SITE DEVELOPMENT

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Abstract

The creation of a Web site development course is based on a sound educational foundation of the basic technology principles that incorporate systems analysis and design functions. A multidiscipline project-based course designed to educate students at the graduate and undergraduate level in the area of Web site development is detailed in this paper. The Web Site Administration: Theory and Practice course follows the systems development life cycle (SDLC) in order to build a Web site. The identification of appropriate Web development tools and pedagogy is delineated. Together these components create a realistic learning situation that mirrors an actual Web site development environment.

Introduction

The growth and business acceptance of the Internet is unparalleled in the history of technology. The personal computer first introduced by Apple Corporation in 1979 and then by IBM in 1981, took a number of years to become standard business equipment. Even fax and answering machines took many years before they were considered to be essential business tools. However, the record growth of the Internet has exceeded all previous records for both the brief time of acceptance and the number of businesses embracing this new technology. Miller (1999) points to a recent International Data Corporation (IDC) research report indicating that small businesses with Web sites have grown by nearly 110 percent over the last several years and by 2001, there will be close to 4.3 million small businesses on the Web. For most companies, the question is no longer whether to establish a Web site but rather how to construct the best site for their business.

The explosive growth of Internet technology is challenging educators to develop courses of study. Many of these courses involve teaching students Internet literacy or how to create pages and publishing them on the World Wide Web. However, the building of a Web site is much more complex than this. It involves:

1. knowledge of the communication process.
2. understanding of graphics, animation, video, and sound.
3. understanding of hardware, software, and standards of a Web network.
4. appreciating the rising issues and capabilities of the web.
5. application of the phases of the systems development life cycle, which include analysis, design, implementation, and maintenance.

A new course, Web Site Administration: Theory and Design, was developed to provide students with an opportunity to address some of the issues created by the explosion of web sites. This course combines the major principles of the systems development life cycle (SDLC) with the techniques used in web site development. One of the strengths of this course is the wide diversity of the students who enroll. There are undergraduate and graduate students from a wide spectrum of majors whose computer skills range from basic computer literacy to more advanced levels. One of the strengths that come with such diversity is the tendency to avoid "tunnel vision" as students progress through the various steps in the development of a web site. This paper describes the features of a Web site administration course.

Teaching and Learning Environment

The teaching and learning environment is based on 4 components: classroom, software, hardware, and teaching. The environment can be modified based upon available facilities and budgetary situations.

Classroom

The room is designed so that it could be used as a laboratory as well as a classroom. Two-thirds of the room is the laboratory portion and one-third is the classroom. Specifically, the room includes the following:

1. Permanently mounted overhead projection system.
2. Instructor's station equipped with a microprocessor, VCR, document camera, and mixer.
3. Twenty-eight student workstations configured as a LAN.
4. Work tables for group meetings and project development.

Software

The major benefit of this course is to actually design and publish a WEB site in a team environment during one academic semester. As a result, web authoring and site management software, Web server software, graphic design software, and communications software are necessary. The specific software used in this course is:

1. MS Front Page 2000 (Web authoring/site management software).
2. MS Windows NT Server with Internet Information Server 4.0(Web server software)
3. Netscape Communicator/Internet Explorer (communication software)
4. Corel Webmaster Suite/Photo Paint (graphic design software).
5. Sound blaster suite (sound editing software)

Hardware

This course is effectively taught with the following hardware configurations:

1. Dell XPS D333 Microprocessor (production Web server)
2. Dell XPS D333 Microprocessor (test Web server)
3. Dell XPS D333 Microprocessor (FTP server--main storage location for student files)
4. HP LaserJet 5s printer HP
5. HP ScanJet 4c scanner
6. Kodak DC265 Digital Camera

Teaching

1. Teacher as facilitator
2. Hands on
3. Teamwork using project method
4. Observation

Paradigm for Web Site Development

In order to accomplish the goals of this new and innovative class the decision to rely on a project-based approach was made. The first third (based on a 14 week semester) of the class is traditional lecture/discussion and the remaining class time is based on a project-based format.

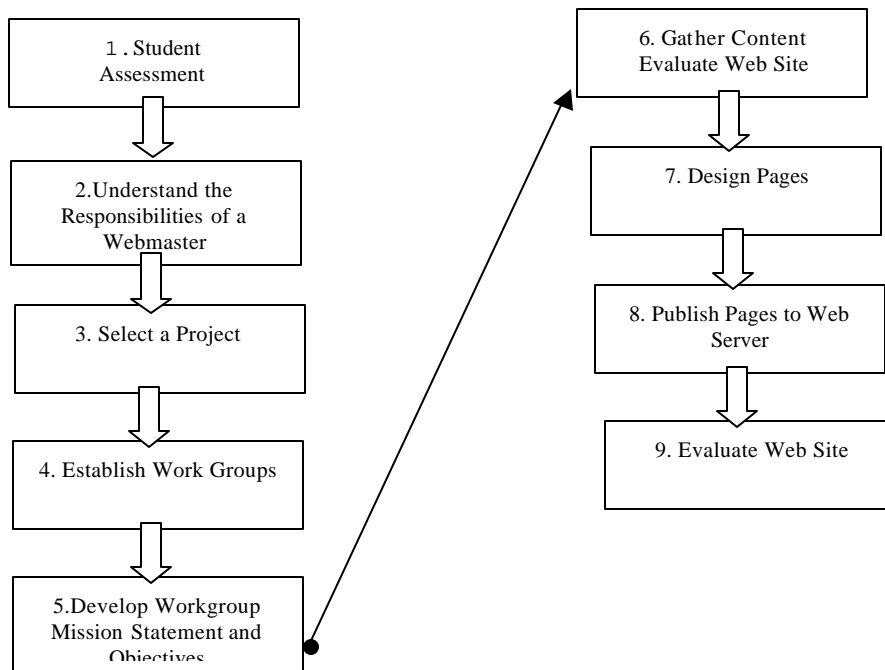
According to Prpic and Hadgraft (1999) "In Problem [Project] Based Learning, you spend much of your

time learning--by identifying what you need to know, finding out, teaching each other and then applying your new knowledge."

Researchers have investigated project-based learning in a wide variety of settings and subject areas and have generally shown it to be effective in increasing student motivation and improving student problem-solving and higher order thinking skills (Albanese and Mitchell, 1992, Buck Institute, 1999, Tretten, and Zachariou, 1995).

For these reasons, a project-based methodology was developed that addresses the specific needs of students at the undergraduate and graduate level by providing a realistic Web development experience. The following model illustrates the course steps, followed by a detailed discussion of specific issues regarding each step.

Model of Course Components



1. Student Assessment

This class consists of a wide variety of majors and also includes undergraduate and graduate students. To assist the instructor in establishing work groups an assessment is done to determine the experience each student has on a number of important criteria (see Appendix A).

2. Understand the Responsibilities of a Webmaster

In order to provide a solid foundation regarding the various roles of a Webmaster and to avoid "tunnel vision," detailed explanations are provided over a two-week period. According to Mohler (1997) the roles of a Webmaster include the following: technical designer, media designer, information design specialist, Internet specialist, and technical manager. Stein (1997) and Haggard (1998) describe Webmaster

responsibilities in other terms but in all cases there is a core agreement that a Webmaster must possess a wide scope of knowledge. Whatever model you use the students must understand the specific tasks that are part of the process of setting up a Web site. For example, instructions on setting up a web server and the use of graphics will need to be provided.

3. Select a Project

Since this course is focused on a project-based model, the selection of an appropriate project is very important. This process is student driven with guidance from the instructor. The main thing to avoid is the selection of a project whose subject material is beyond the scope and interest of the students. A topic that is of interest to all students, that can be researched easily, and one that can be compartmentalized will permit a focus on the objectives that are most important for this class. Examples of projects selected for several of these classes include:

- a. how to build a web site (preliminary planning, design, site marketing, server set-up, hardware & software, legalities, and maintenance).
- b. getting a job (job tools, interview techniques, job links, relocation, job fairs, and working abroad).
- c. designing a welcome center (entertainment & arts, recreation & sports, places of interest, shopping & dining, annual events, education, housing and healthcare).
- d. purchasing a computer (hardware, software, accessories, used computers, computer trends, and package deals).

Once a general topic has been identified, the class needs to develop a focus for the topic. The first step is writing a mission statement with supporting objectives. This is an assignment given to each student and then the students are asked to blend their individual mission statements and objectives into one. The instructor excuses her/himself from this exercise. Again, if this is student driven, they will take a more active involvement in the entire project.

4. Establish Work Groups

Based on information contained on the student assessment form (Appendix A), the instructor will form work groups. Attempts should be made to organize well-rounded groups so that there is a variety of skills and backgrounds. From this point forward each group will need a variety of strengths from which to draw. Group size is determined by the class size and the number of project components. However you should avoid groups that are too small or too large. Experience suggests that 4 or 5 is an ideal number.

5. Develop Workgroup Mission Statement and Objectives

Each group is required to develop a mission statement and supporting objectives. These must be directly related to and supportive of the overall mission statement and objectives developed in Step 3. Once each group completes this assignment, they need to carefully check the mission statements and objectives of the other groups and refine as necessary. For example, two groups may overlap or gaps in content may become apparent.

6. Gather Content

Once the group mission statements and objectives have been adopted each group will research and develop content that will become part of the pages for this web site. Each group will be responsible for establishing procedures to accomplish this step. The most efficient method is to divide the objectives, and then after all material is accumulated, coordinate the results. One outcome of this activity is the further refinement of each group's mission statement and objectives.

7. Design and Develop Pages

Once each group has gathered their content they will begin the process of designing and developing their individual Web pages. All pages will be developed locally, that is, they will not be developed on the server. Once again how they accomplish this is up to each group. For example, since each group will most likely

have a main splash (home) page, often all members will be responsible for its development. For other pages they may want to work individually or partner with another person.

The instructor needs to consider several important issues relating to the design and development of the Web site pages. For example, to what extent will you permit individual or team creativity? Generally good Web design requires consistency. One negative side to consistency is the elimination of techniques from the learning process. One way to deal with this is to promote consistency via the home page that will carry common elements on all pages created by using frames or tables. Beyond this each group could be permitted to be creative but maintaining consistency within their group. Another issue is the assignment of responsibility for the development of the home page. One team could be assigned the task of creating this page or one member from each group could be responsible.

8. Publish Pages to Web Server

A deadline should be set for the completion of all pages approximately two week before the end of the semester. At this time all groups will FTP (File Transfer Protocol) all of their pages to the appropriate folders on the Web server. Prior to this a selected group of students will prepare the Web server by creating folders with appropriate privileges and assign FTP privileges to each student.

9. Evaluate the Web Site

Each group will have approximately one week to "test" their pages on the Web server. They will revise all pages where errors occur. After this week all FTP privileges will be revoked and during the next week each group will evaluate the other groups' pages using an evaluation form (see Appendix B). As an added incentive each group will receive a point for each error they identify, and the person(s) responsible for the page will loose one point for each error. The points accumulated, or lost, will be used as part of the final evaluation.

Conclusion

One purpose of the Web Site Administration: Theory and Practice course is to offer students basic design principles that they can use to publish durable content on the Internet. However the course is more involved than just teaching students how to create pages and posting them to the Internet. It is a practical guide to enable students to experience Web site development in a realistic environment.

If one of the objectives of an academic program is to produce systems, then it seems that at some point in their studies a student must experience this concept first hand. The described approach produces a system related to a topic in high demand, bolsters student confidence, provides an excellent focus for discussions in interviews with prospective employers, and enables students to participate in an actual group project. This is completed while experiencing all the problems associated with group dynamics, and demonstrates the difficulty and importance of working with a demanding time schedule.

Such a course is never complete, and each semester revisions are necessary. The course is quite time consuming for both faculty and student, but the positive rewards are evident by feedback from students who have taken the course as well as the waiting list of students wishing to enroll.

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Total Points