Teaching a Project-based Web-Development and IT Project Management Course at a Distance

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Abstract
The authors have designed and taught several courses successfully at a distance in the online Masters in Computer Information Systems (CIS). In this paper we describe our experience with a couple of project based courses. The Web Development course and the IT Project Management course will be discussed as a case study using two models for teaching at a distance—pure online and blended elive. In this paper the authors present their lessons learned from designing and developing such courses and successfully teaching and managing a project-based course. This paper explores the role of simple tools that are available for free and more complex tools that provide live two-way audio- and video communication in online learning environments.

Introduction
The purpose of this paper is to describe tools and techniques and the methods and procedures of teaching project based courses at a distance. It is a very vast topic so we scope our paper to two key topics. The first half of the paper introduces the online and blended model for teaching courses at a distance. The second half introduces the topic of simple and complex tools to teach the course and to manage projects online. We also address quality issues as they pertain to course design and execution at a distance.

First about the university. Located along the Charles River in the heart of Boston, Boston University (BU) is the fourth largest private university in the USA. The institution offers more than ten fully online degree programs and ten online graduate certificates in a variety of disciplines. The MS in Computer Information Systems is one of the largest online programs in the country. The program has concentrations in Information Security, IT Project Management and Database Systems. Its success, to a great degree, relies upon competent core faculty, highly qualified students, enthusiastic and dedicated support staff, user-friendly learning management systems, and relevant communication and collaboration tools.

Framework for Online Education
Our online courses are developed and taught by full-time PhD-level faculty, and a dedicated online faculty coordinator oversees the program. Our online course development begins with peer reviews of the proposed course map, syllabus and development plan. The lectures, quizzes and other course content are developed by the full time faculty who teach the courses. Our courses are then implemented by professional instructional designers, videographers and web animators. When the faculty member and instructional designer are satisfied that the course has been developed well, we begin our post-development quality processes.

Professional technical editors skilled in online course editing review all course content, identifying any weaknesses in English, clarity, and consistency, and recommending changes. The faculty author and
instructional designer review these editor recommendations and change the course appropriately. After this editor review we conduct a full academic review. This review is conducted by one or more faculty members, usually adjunct faculty, with expertise in the different course subject areas.

Recommendations from the review are addressed by the faculty author and instructional designer. The result of this course development process is a very high quality course content. We follow this with high quality course execution. We host our courses on high-powered servers to assure the best possible response time and essentially no downtime. We provide our students with online and telephone technical support, and student services support within the classes. Near the end of each course we conduct a formal anonymous student course evaluation. The evaluation results are a primary input into the course update planning process, as we begin the next update in the quality cycle of continual course improvement.

To summarize, our framework of online education involves three parameters that we seriously invest in a) instructional technology, b) teaching techniques, and c) policy and procedures. Modern, effective, and user friendly communication and collaboration tools are essential to a successful online class.

Models for Online Teaching
Traditional Class Room involves “Same Time, Same Place” interactions. We know this as traditional face to face teaching and is also called synchronous model of teaching. The impact of online teaching on traditional teaching is immense. Learning management systems and some successful communication and collaboration tools have been integrated into the world of face to face teaching. Most schools today use tools like Blackboard, Vista or Noodle to hold classroom content including media files for students. Such tools have helped instructors teach their regular courses effectively.

Pure Online This is the “Any Place Any Time” model for education. Our research paper discusses this mode of delivery for the Case Study pertaining to Web Language courses or Database Courses. This method involves students across the USA and even international students. This model permits students to complete their education at a time that is most convenient to them. The model also benefits working students who generally devote late evenings or weekend hours to coursework. There are no requirements for participating in “same time” sessions—even though many professors offer recorded video or audio sessions that are attended by as much as 20% of the students. However, one important aspect that remains missing in our pure online model is the immediacy and dynamics of live communication.
**Blended Format** Boston University has used a blended format which we term eLive to teach courses. As Figure 1 illustrates, this model is a blend of Pure Online Model and Traditional teaching. This model has been developed with the goal to merge the best from traditional on-campus and distance education models. We brand this model as eLive. It represents a pre-determined balance of some classroom and continuous online education, improves the quality of teaching through ongoing engagement and interaction, and promotes student success by focusing on active learning that is immediately applicable to professional skills and everyday life. Online learning offers not just the obvious convenience advantages of “any time, any place”. Much more important and valuable is the unprecedented richness of the medium. For the first time in the history of education the spoken and written word, film, discussion forums, animations, simulations, and online collaborative tools have been pulled together and made available in a one place. As we indicated earlier, pure online does not have face to face meetings with professors and even students don’t see each other. To meet this challenge we added a weekly synchronous component to the distance education experience in the format of video-collaboration sessions consisting of overviews and summaries by the instructor followed by structured discussion. Students came on campus every forth week for one Saturday class and study the remaining time online.

**The Courses and Projects**

Project-oriented courses have been very successful for several reasons [1].

a) Students obtain useful project management skills such as project selection, planning, control and communication.
b) Practical skills are acquired - such as interviewing users, obtaining user requirements, keeping projects on track and meeting deadlines.
c) Students put to test concepts obtained in the classroom such as systems design, systems implementation, testing, training and technical writing.
d) Students learn good communication skills learn how to function effectively as a team member.
e) New technical skills are acquired as the project sponsors sometimes have different hardware and software.

One of the best advantages of using projects is that with the emergence of new application and technologies, such courses readily provide a framework to introduce new tools and concepts. For example planning and implementing an Applied Sustainability Green IT environment is a useful topic for students to explore in our department. While we may not readily offer this course, students have the opportunity to research this area within the context of project-oriented courses. Needless to state, this can strengthen the students resume considerably.

Identification of Projects For Students: Potential project sponsors are contacted at least six months in advance, and prior to the start of the semester a final list of potential projects is developed. The project sponsors can come from within administrative areas of the university or from the local business community. The current project that students are working on the IT Project Management class involves creating a Website for Project Management Association at Boston University and then creating a newsletter.

The Web Development course is a key project-based course in the Computer Information Systems program. It provides students with exposure to web programming environment and both client side and server side languages. The IT Project Management course is an elective course in the CIS program for students in the security concentration and the database concentration; however is a required capstone course in the IT Project Management CIS concentration. Finally the Database class is a core course in the
Computer Information Systems curriculum; students have the opportunity to work in teams as well. Different instructors execute the above courses in different ways whether it is face to face or at a distance.

The framework for our discussion is the following two courses:

MET CS 632: Information Technology Project Management (Blended e-live Model)

This course provides students with a comprehensive overview of the principles, processes, and practices of software project management. Students learn techniques for planning, organizing, scheduling, and controlling software projects. There is substantial focus on software cost estimation and software risk management. Students will obtain practical project management skills and competencies related to the definition of a software project, establishment of project communications, managing project changes and managing distributed software teams and projects.

MET CS 601 Web Application Development (Pure Online)

This course focuses on building core competencies in web design and development. It begins with a complete immersion into HTML essentially XHTML and Dynamic HTML (DHTML). Students are exposed to Cascading Style Sheets (CSS), as well as Dynamic CSS. The fundamentals of JavaScript language including object-oriented JavaScript is covered comprehensively. AJAX with XML and JSON are covered, as they are the primary means to transfer data from client and server. Open source libraries such as Prototype, jQuery and Mootools might optionally be covered, as they assist in building cross-browser web applications rapidly and efficiently. The PHP language will be presented and covered; however, students can use other server-side languages; such as ASP.NET, Java (JEE) or Ruby on Rails (RoR) for their projects. The course will focus on MySQL as a relational database system with the final project. Students may use other databases with instructor approval. Students will work with either IIS 6 (or better) or Apache 2, using any conventional operating system when working on their term projects.

Experiences to Date

Recently, instructional technology matured significantly due to advances in hardware and software noting, especially, the improvements in Web 2.0 in the world wide web. The strong bandwidth available also allow audio and video to be readily transmitted from a distance using Web Conferencing. All projects go through certain key phases as they set up project teams. We describe the stages and the various tools that are used. Where possible we indicate if the tool or technology pertains to online or blended teaching.

Forming Teams

A key concern with projects is finding a common time to arrange a meeting. This is a trivial task when students meet in a classroom and can negotiate a suitable time, but in an online class it becomes a challenge. But a Web 2.0 tool called Doodle was first suggested by a student in our program two years ago. This free tool at [http://www.doodle.com](http://www.doodle.com) is an excellent tool to discover good time slots to schedule team meetings.

Team Repository

For team repository students have used Microsoft Groove, GoogleDocs primarily. Office Groove 2007 is a collaboration software program that helps teams work together dynamically and effectively, even if
team members work for different organizations, work remotely, or work offline. [1]. Groove is a peer to peer tool and has the following functionality a) Create a workspace right on the computer b) Invite students and professors to share the workspace and c) Add tools to support the team’s evolving needs such as file-sharing, discussions, meetings, business forms, and more.

Google Docs is an easy-to-use online word processor, spreadsheet and presentation editor that enables you and your students to create, store and share instantly and securely, and collaborate online in real time. One can create new documents from scratch or upload existing documents, spreadsheets and presentations. There's no software to download, and all work is stored safely online and can be accessed from any computer.

**Using Twitter**

For the past two years we have used twitter to communicate with facilitators and students. As the following figure suggests, it is meant to keep the students engaged and in close touch with the professor. We especially find it valuable to communicate sudden availability of office hours.

Each course has a dedicated Twitter web page. Students are encouraged to create their own home page using twitter.

**Using Shared Calendars**

A course calendar is a key tool for maintaining project schedules. The following figure illustrates how Google shared calendar was used by about a dozen project teams to document their schedule.
Using Project Management Tools

In order to schedule team projects it is important to use a project planning utility, two good tools come to mind. One is BaseCamp and the second is Gantter.com.

Basecamp is another project management tool that students can use for project management and collaboration. It is located at [http://basecamphq.com](http://basecamphq.com) Students have to use a free version which is limited for certain number of days.

Web Conferencing

Web conferencing software is used by students to conduct live team meetings at a distance and presentations via the Internet. Students don’t have to use a web cam but it is strongly requested that each team member purchases one. There are several web conferencing software that students use, and we provide couple of them. In the Blended model – we provide MET-MEET which is our branded software at no cost. This is illustrated in the diagram below. It supports quality video delivery and also recording of seminars.

Within the context of Web conferencing, one must use a backup plan to communicate. This includes using traditional phones. Websites like FreeConference.com also provide teleconferencing capability that must be leveraged when other forms of communication fails.

Using MET-MEET we provide live lectures to students and also students collaborate with each other. Other tools that are available are WIMBA which is not free—but available for free to professors who use the online class.

Video Conferencing

In the blended model we have experimented with full blown Video Conferencing using a product called IOCOM. Students manage projects using this videoconferencing tool and professor’s present lectures on a weekly basis using it. IOCOM provides software to keep people connected through video, data and audio conferencing. Its trusted solutions work with virtually any Internet-enabled device, including room systems, PCs, laptops and mobile devices. We used IOCOM video-collaboration tools integrated into the Vista courseware system.
Figure 2: Met-Meet Communication Tool

Blogging Discussions and Chat

Student-student communication usually takes place in the context of discussions and chat. Such features are available in the courseware and serve the purpose of allowing students to keep a paper trail of their discussions about the project.

Also the final team presentation is recorded using a webcam.

Conclusion

In this paper we have covered the two models for teaching at a distance. We have also presented tools and techniques and our experiences pertaining to teaching a project-based course online. The clarity and thoroughness of all assignments and especially the project is one of the most important aspects of online courses. Our standards documentation states that, “Edit them for clarity until you are exhausted; then edit them some more. In this way, you may get close to a problem statement that doesn’t confuse some students.” Additional points to consider: Sufficient time should be allocated to evaluate the project characteristics. Due to schedule pressure in such courses, expect only a general prototype to be
implemented. Attempting to do something substantial as a project might lead to project failure and can demoralize the team and the instructor. If there are several students on a team, each of them should play different roles, for instance, one can participate first as a knowledge engineer and then as a programmer or project manager. This provides a diversified set of skills to all team members. When it comes to tools we recommend that you should provide students a good set of functional tools and procedures to use them. Training should be provided to use such tools. Leverage free tools and we have listed the basic popular ones in this paper. Finally, have a contingency plan, tell the students to use the good old telephone or their cell phone to maintain communication.

Acknowledgement: We are grateful to Mr. Leo Burstein, Architect, Research & Educational Technology, Boston University for providing support with the technology and with the paper.

Biography

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