**The Potential & Pitfalls of Online Course Management: Experiences in a Large-Scale Freshman Program**

John A. Merrill, Mary Lamont, and Richard J. Freuler  
The Ohio State University

**Introduction**

In the past two academic years, the Freshman Programs at The Ohio State University's College of Engineering have incorporated an online course management system to help with the implementation of a curriculum for over 1,000 first-year students. The instructional team consists of faculty, graduate teaching assistants, undergraduate peer mentors, lab supervisors, and a central office staff. A systematic method was needed to ensure continuity of materials and instruction across multiple sections each week throughout the quarter, to support communication among student teams, and to provide a coordinated vehicle for program assessment. This paper describes the selection of an online environment for course management, including the administrative and training requirements that must be met for ongoing implementation.

The College chose to participate in a site license for the use of WebCT, through the University’s Office of Technology Enhanced Learning and Research. Although WebCT is primarily designed for a distance-learning environment (which is not the delivery mode in use by the Freshman Programs), it offers many features that are useful for course management. The instructional team has used the online environment to provide students with up-to-date course information, an electronic grade-book, animated presentation material, study guides, communication tools and links to evaluation instruments. Student access is password-protected for the course and section in which they are enrolled.

One of the benefits in utilizing these tools is that students have to assume more responsibility over their own progress. They can submit assignments, view their grades progressively throughout the quarter, check the daily syllabus, participate in a class calendar, and access information about their instructional team. However, some of the pitfalls that exist are the amount of time to prepare and load materials by the administrative staff, and occasional problems with the server or computer equipment. Overall, the online environment provides the Freshman Programs with a means to keep a large-scale program organized and to achieve its goals.

This paper will describe the key features used by the instructional team and by the students, with an analysis of the lessons learned for implementing, maintaining, and improving an online environment that supports a large-scale and dynamic program.
Defining Key Players

The following chart shows the number of people involved on a per quarter basis using WebCT in one context or another.

<table>
<thead>
<tr>
<th></th>
<th>Autumn 2001</th>
<th>Winter 2002</th>
<th>Spring 2002</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Introduction to Engineering</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instructors</td>
<td>8</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>Lab Instructors</td>
<td>8</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>Graduate Teaching Assistants</td>
<td>16</td>
<td>22</td>
<td>18</td>
</tr>
<tr>
<td>Peer Mentors</td>
<td>16</td>
<td>22</td>
<td>18</td>
</tr>
<tr>
<td>Students (approximate)</td>
<td>550</td>
<td>760</td>
<td>650</td>
</tr>
<tr>
<td><strong>Freshman Engineering Honors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instructors</td>
<td>7</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Graduate Teaching Assistants</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Undergraduate Teaching Assistants</td>
<td>23</td>
<td>26</td>
<td>26</td>
</tr>
<tr>
<td>Students (approximate)</td>
<td>250</td>
<td>235</td>
<td>215</td>
</tr>
<tr>
<td><strong>Administrative</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program Manager</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Information Associate</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>TELR Intern</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL PEOPLE</strong></td>
<td><strong>1329</strong></td>
<td><strong>1547</strong></td>
<td><strong>1264</strong></td>
</tr>
</tbody>
</table>

Table 1: Number of people involved on a per quarter basis

The Freshman Programs consist of two programs: Introduction to Engineering (IE) and the Freshman Engineering Honors (FEH) program. One of the two sequences must be taken by all incoming first-year students in the College of Engineering. The IE program incorporated WebCT in Autumn of 2000 and students officially began using the site in winter quarter of 2001. The FEH program incorporated WebCT into their classrooms in the fall of 2001. Since the IE program has a longer history using WebCT, the program has a further developed site within WebCT. The FEH program has had a well-established and content-rich website independent of WebCT containing all course materials and links to independent assessment sites. Therefore, when describing the online environment, this paper will mainly focus on the features of WebCT as it stands under the IE program. However, issues relating to benefits, problems, and growth relate to both programs.
The Information Associate and TELR (Technology Enhanced Learning and Research) intern in the IE program is responsible for creation and maintenance of all WebCT courses in the Freshman Programs.

In the IE program, each instructional team consists of an instructor, a lab instructor, two graduate teaching assistants (GTA) and two peer mentors. The instructor teaches two sections of thirty-six students and instructs one lab while the lab instructor takes the second section. Each GTA is in charge of roster management and grading of one section of thirty-six students. Each peer mentor is placed with a section of thirty-six students to act as a resource and, in some instances, to help with grading. All instructors and GTAs have designer access to WebCT which allows them to enter grades, upload and download files and make changes to course content. Each peer mentor and lab instructor has secondary access to WebCT in order to view the grades of the students as well as access the communication tools.

In the FEH program, each section consists of an instructor, a GTA, and three to five undergraduate teaching assistants (UTA). All members of the instructional team in the FEH program have designer access to WebCT.

**Online Environment/Key Features**

This section will outline and describe the online environment that students and the instructional team operate in when logging into WebCT. The website contains course information, course management tools, communication tools, supplemental instructional information and assessment links. All of these tools are housed in three main sections of the site: the Homepage, the Course Tools page, and the Course Materials page. To enter WebCT, students and instructional team members use their standard university logon. After logging in, the users choose which course to enter. The number of choices depends upon the number of courses they participate in as a student or member of an instructional team that utilizes WebCT. After choosing the course, users see their Homepage (see figure 1).
The homepage is the first page users see after logging into WebCT and choosing a course. It houses the syllabus, daily assignment list, academic misconduct policy and links to the IE homepage and other main pages: Course Tools and Course Materials. Contained in the syllabus is contact information about the instructional team including e-mail addresses, office locations, office hours and phone numbers; and policy information including grading, homework, attendance, and disability services. The academic misconduct policy is a detailed description of the OSU academic misconduct policy as well as a description of the policy within the IE program. The daily assignment list is a comprehensive outline of the course readings, assignments, lecture topics, and due dates broken down by week and day. The link to the IE Homepage is a hyperlink to the IE program’s description on the College of Engineering’s website.

Figure 1: The Homepage
Course Tools

The course tools page is accessed through the homepage and takes users to a page containing “tools” including links to journal entries, course evaluations, team evaluations, the grade book, calendar, chat room, the discussion boards, the Purdue Visualization Test (first IE course) and the MATLAB assignment drop box (second IE course). The grade book is the most accessed site on WebCT. Instructors and GTAs can access and enter all student grades and students can view their individual records. The “Course Sorcerer” icon takes students to an OSU surveying tool where they answer journal questions about the course, instructional team, and future plans; can question the instructional team about lectures, labs and policies; and can complete the final course evaluation. The icon takes instructional team members to the same independent site and allows them to view all the student responses for the questions and evaluations. Twice a quarter, students evaluate their team members and their own performance. Using an online tool also developed within the university (linked through “Team Evaluations”), students rank team members on a scale from 1-10. After completion are shown a summation of scores they were given by themselves and their teammates. The bulletin board, or discussion board, is a place where all members of a class can post comments, questions, and updates to the class. Chat rooms afford students and the instructional team a secure location to hold online discussions, help sessions, or group meetings.

Figure 2: The Course Tools Page
Course Materials Pages

The course materials page is also accessed from the homepage and contains all instructional materials that are considered helpful to the students. The “Labs & Basics” icon leads students to the page containing materials pertaining to the lab and class sessions. The “Team Projects” icon takes students to all materials relevant to the team projects held throughout the quarter. Materials can include animated presentations, common questions and answers relevant to student team projects, links to helpful internet sites, answers to review questions, exam study guides, images from labs, and responses to questions, comments, and concerns from the bi-weekly journals.

Figure 3: The Course Materials Pages

The course materials page is also accessed from the homepage and contains all instructional materials that are considered helpful to the students. The “Labs & Basics” icon leads students to the page containing materials pertaining to the lab and class sessions. The “Team Projects” icon takes students to all materials relevant to the team projects held throughout the quarter. Materials can include animated presentations, common questions and answers relevant to student team projects, links to helpful internet sites, answers to review questions, exam study guides, images from labs, and responses to questions, comments, and concerns from the bi-weekly journals.
Benefits & Potential

The benefits that WebCT has provided to the Freshman Programs are plentiful. The following section outlines some of the benefits provided by the aforementioned tools plus addresses the potential of these areas. The following table shows each tool used in the Freshman Programs sites and its uses and benefits.

<table>
<thead>
<tr>
<th>Tool</th>
<th>Use(s)</th>
<th>Benefit(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syllabus</td>
<td>❖ Provide electronic copy of the syllabus for students</td>
<td>❖ Students can look at the syllabus at any time where there is internet access</td>
</tr>
<tr>
<td></td>
<td>❖ Contains instructional team information, policies, and grading criteria</td>
<td>❖ Less questions to the instructional staff about dates/times/grading policies</td>
</tr>
<tr>
<td>Daily Assignment Schedule</td>
<td>❖ Provides daily schedule of assignments, drawings, and readings</td>
<td>❖ Less questions to instructional team on dates and assignments</td>
</tr>
<tr>
<td></td>
<td>❖ Constantly accessible</td>
<td>❖ Constantly accessible</td>
</tr>
<tr>
<td>Course Materials</td>
<td>❖ Provide electronic copy of multi-use course materials (e.g. equipment proposal and project schedule)</td>
<td>❖ Provides students with as many resources as possible</td>
</tr>
<tr>
<td></td>
<td>❖ Provide enlarged JPEG pictures of lab images too small in notes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>❖ Post study guides, journal replies, or homework solutions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>❖ Post any new or updated course material or those materials only distributed to groups</td>
<td></td>
</tr>
<tr>
<td>Grade Book</td>
<td>❖ Provides grades and final grade calculations electronically</td>
<td>❖ Allows students to continually check their progress throughout the quarter</td>
</tr>
<tr>
<td></td>
<td>❖ FUTURE: Linked to the Registrar’s office so grades can be sent electronically!!</td>
<td>❖ Promotes individual responsibility</td>
</tr>
<tr>
<td></td>
<td>❖ FUTURE: Linked to the Registrar’s office so grades can be sent electronically!!</td>
<td>❖ Allows for teaching team to monitor student progress on a daily or weekly basis</td>
</tr>
<tr>
<td></td>
<td>❖ FUTURE: Linked to the Registrar’s office so grades can be sent electronically!!</td>
<td>❖ Provides online link between instructors and TAs so that grade books coincide</td>
</tr>
<tr>
<td>Course Sorcerer</td>
<td>❖ Bi-weekly journal entries</td>
<td>❖ Improve program content, teaching styles, course materials</td>
</tr>
<tr>
<td></td>
<td>❖ Final Course Evaluation</td>
<td>❖ Provide feedback to students on a biweekly basis about questions</td>
</tr>
<tr>
<td></td>
<td>❖ Evaluate student attitudes towards course materials, program content</td>
<td>❖ Make long-term changes to course content</td>
</tr>
<tr>
<td></td>
<td>❖ Evaluate course on ABET criteria</td>
<td>❖ Provides flexibility in response location</td>
</tr>
<tr>
<td>Chat Rooms</td>
<td>❖ Online discussions between teammates, classmates, instructors, and TA’s.</td>
<td>❖ Provides students with flexible resources</td>
</tr>
<tr>
<td></td>
<td>❖ Online study sessions and homework help hours could be posted</td>
<td>❖ Furthers communication between student and instructional staff</td>
</tr>
<tr>
<td>Bulletin Board</td>
<td>❖ Permanent postings for class policies, changes in course, reminders, notices by students and instructional staff</td>
<td>❖ Live discussion</td>
</tr>
</tbody>
</table>

Table 2: Uses and Benefits of WebCT Tools
Table 2: Uses and Benefits of WebCT Tools

<table>
<thead>
<tr>
<th>Tool</th>
<th>Use(s)</th>
<th>Benefit(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team Developer</td>
<td>Online peer evaluations</td>
<td>Provides flexibility in response</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Provides students with immediate feedback on the rating received from their teammates</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Allows for improvement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Allows for group members to influence grades of teammates based on performance</td>
</tr>
<tr>
<td>Assignment Drop box</td>
<td>Submission of electronic assignments (i.e. CAD drawings or MATLAB programs)</td>
<td>Saves resources</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Allows for testing of program code</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flexibility in homework submissions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Better use of time (in final exam or midterm situations)</td>
</tr>
</tbody>
</table>

Course information that is provided twenty-four hours a day includes the syllabus, policies & procedures, daily assignment schedule, instructional team information, and a direct link to the IE and College of Engineering Homepage. This benefits both students and the instructional team by conveniently locating common information in a constantly accessible area. In all cases where an online connection is available, students can find contact information about their instructional teams. This information is also included on the paper syllabus provided at the beginning of the quarter. However, this information can be lost or can change, in which case it is available online. The same convenience goes for the other course information. In the same return, this common area of information benefits the instructional team as it lowers the instance where a student cannot reach a member of the instructional team, has lost a paper copy of the syllabus, or is unclear about a policy.

The electronic grade book provides twenty-four hour access to individual grades. This allows students to double-check their progress and report errors to the instructional team giving those students more of a sense of independence and responsibility over their own progress. The grade book gives the instructional team a standard location where grades are located in case students can’t come and see a member of the team to check their progress. The grade book also allows the administrative staff access to a repository of grades to check student progress and to measure evolution of grades over time, and it provides a means of assessing students and instructional team members. An example of one use of the grade book in the IE program is to weigh individual lab scores based upon team evaluations. Each quarter, students work in teams of four to complete lab and project assignments. At the end of the quarter, students are given an opportunity to grade one another on their contribution to the group work. These scores are entered into the WebCT grade book and run through a formula, then used to weigh the lab grade of each individual. In a similar fashion, the grade book calculates final scores of the students which the instructional team can then use to figure final grades.

The assignment drop box allows students to submit assignments within a given period of time from any location that provides internet access. This provides students the convenience of turning in assignments from their home or dorm. The drop box also benefits the instructional
team with the use of less paper and is especially beneficial to grading computer programs. In the case of grading computer programming, the actual program can be run, instead of reading through pages of code to find mistakes.

Communication tools including the chat rooms and the bulletin (or discussion) boards exist so students can communicate with their student groups, other students in their class and other classes, and their instructional team. The instructional team can use these tools to communicate policies, changes in due dates, answer questions about homework and hold office hour sessions. Currently communication tools are not being used as much as possible; however, the administration and instructional team is encouraging the increased use of these tools among the students. Potentially the communication tools could greatly enhance the students’ experience in their classes by providing them with another means of reaching their instructional team and each other despite schedule conflicts. The communication tools also serve as a means to foster a sense of community within the program and among first-year student students. The figure below is an example of a discussion board on WebCT.

Instructional materials online include animated presentations, common questions and answers relevant to student team projects, links to helpful internet sites, answers to review questions, exam study guides, images from labs, and responses to questions, comments, and concerns from the bi-weekly journals. Oftentimes journal entry responses contain much-needed answers to questions about the class or projects that students feel they cannot ask in class or have not received a sufficient answer to already. Images from labs include pictures and schematics that can help students with their lab reports. As much information as possible is provided in the printed course material, but often a larger, color picture can provide more detail and is easier to read. Animated presentations on graphics instruction provide students with a chance to review class presentations. For example, in some hand-drawing lessons, students are expected to draw in 3-D. In order to do this properly, a step-by-step process is needed. Due to the capabilities of PowerPoint to provide animations within one slide, instructors can show each step during the

Figure 4: Example of a discussion board on WebCT
presentation. However, because PowerPoint doesn’t print these steps, students often see only the final version of the object in their printed materials. Therefore, if a student needs to review a drawing process, he or she can go to WebCT and review the animated presentation.

Links to independent assessment sites provide a convenient location for all assessment portions of the course. Here students can complete bi-weekly journals, final course evaluations, instructional team evaluations, and team member evaluations. This provides the students with an easily accessible area to complete these tasks as well as allowing them to complete the tasks on their own schedule, instead of using valuable in-class instructional time. All the evaluation sites are secure and password accessible. GTAs and instructors then have access to anonymous student responses for their individual sections as well as the entire group of students.

The completion of journal entries, instructional team evaluations, and course evaluations are beneficial to students, the administration and instructional team members. Journal entries are a secure and anonymous venue in which students can voice complaints, compliments, questions and concerns. In return they benefit from the response by the administration to their various messages that are posted on WebCT. The instructional team gains a better understanding of the general feeling within their classroom and can adjust teaching approaches based upon student response. Administratively, responses are read and used to assess course progress and student satisfaction.

In the past, responses have been used to assess the use of technology in the classroom, and measure student satisfaction of the instructional team, teaching styles, curriculum decisions, policies, and programs. This assessment has resulted in short-term and long-term changes in all the above-mentioned areas. For example, in the winter of 2001 as in previous quarters, students had many complaints about labs containing circuit work. They were upset with the difficulty level, the amount of work expected, and the time constraint in which they had to perform the necessary tasks to complete the labs. In the same journal entry, students were asked to make suggestions for change to make the labs more manageable. They responded with suggestions pertaining to changes in presentations, examples and helpful ways to adjust instruction. The instructional team responded with a revised presentation containing new information, created a new lab procedure to accommodate more examples, and put full color pictures of difficulty areas on WebCT for spring quarter. Again in the spring the students were asked about the circuit labs. There was a substantial decrease in complaints coupled with a sharp increase in positive experiences.

Problems & Pitfalls

The most common problems involved with managing a large-scale course online are the amount of time put into course creation and management as well as troubleshooting problems that arise throughout the quarter.

The creation of courses online can be described in two stages: preparation and customization. Currently, the Information Associate, TELR intern, and the local WebCT administrative staff
work together to create the online template and courses for the Freshman Programs. Different individuals complete various parts of the creation process.

Course preparation is the lengthiest process involving the gathering of necessary instructional materials, instructional team information for each class, setting up accounts for new users, and requesting initial templates. The Information Associate and TELR intern complete most of the preparation stages. After gathering pertinent information and materials, the Information Associate and TELR intern work closely with the local WebCT administrative staff to develop and create the initial template and copy it for the necessary number of courses. Length of time on this stage of the process is heavily dependent upon the number of different courses the staff is working with at the present time as well as the number of new materials, changes, server changes, etc. In the fall quarter, there are two different courses in the Freshman Programs. In the winter there are three courses involved and in the Spring Quarter, there are two. This quarterly process of preparation generally takes about two to three weeks to complete.

The second step of the process involves customizing the templates for each individual class within each course. Requests have to be made to the local WebCT administration staff to get accounts activated, development templates prepared, and student access completed. Depending on the lag time between when a request is made and when it is completed, this process can take from one to three days per task. A typical quarter containing two classes can involve requests for twenty to twenty-five classes, all of which need to be customized to reflect instructional teams, course times, and syllabi.

The TELR intern and Information Associate perform weekly management tasks of the course. These tasks include uploading additional course materials, posting material requests, updating grade books when necessary and other various issues. These issues can take around ten hours per week, depending on the type of task or volume of tasks involved. During the first two and last weeks of the quarter, this responsibility is extremely time-consuming for both the TELR intern and the Information Associate as many of the changes to the course content and grade book are made during this time.

Troubleshooting tasks can include account and access problems, helping GTA’s with grade book issues, and in-class troubleshooting for the students. Throughout the quarter, the Information Associate or TELR intern can expect any number of troubleshooting requests daily. In the first and last two weeks of the quarter, the volume of troubleshooting tasks typically rises as students and instructional team members are beginning for the quarter and just finishing the quarter. In the beginning of the quarter, most requests are about students dropping and/or adding a course, and access issues. In the last few weeks of the quarter, typical requests involve grade book questions, final grade calculations, and dropped students. Any requests along these lines that cannot be handled by the Information Associate, TELR intern, or program manager are sent on to the local WebCT administrative staff.

Many of the technical issues cannot be addressed by the local Freshman Programs staff. These issues are handled by the WebCT administrative staff at the University and can include server
outages and documented and undocumented bugs within the program. In the past, minor server outages have not created major problems aside from inconvenience and have been handled promptly by the local WebCT staff and help desk. Documented bugs within the program are solved or put to rest for the next version. Undocumented bugs, including drop box upload issues or materials upload are either dealt with or requested for change in the next version of the software. Technical issues do not take up a large amount of time for the Information Associate or TELR intern, but can cause headaches for all users.

Training

All members involved in using WebCT in the Freshman Programs have to be trained in its uses, functions, and features. Each group: instructional team, students, and administration require different levels of knowledge and are given appropriate information on these areas in the form of presentations or written materials. Students require an awareness that the online version of the course exists, a basic knowledge of the potential of its tools and the extent of the resources with which they are provided. The instructional team requires a deeper understanding of how to use the features to keep the course up to date for their individual students. Those needing the most knowledge and providing the bulk of training materials and sessions are the TELR intern and Information Associate.

The instructional team is provided with a detailed outline of what the features within WebCT are, how they can be used, and how to function within the program at the beginning of the school year. Informational sessions are held yearly, and training is available whenever necessary to discuss changes, updates or address concerns. The training guide (a full version is located in the appendix) contains detailed information on how to enter grades, manage rosters, and use the communication tools. The Information Associate provides the guide. Since the course environment and tools are updated each quarter, new guides are provided as needed.

Students spend part of the first class session learning about the uses and benefits of WebCT during their first week of class. This presentation focuses on what the online environment can provide to them with an emphasis on the use of assessment tools. Students are kept aware of new additions to materials and are refreshed on quarterly updates.

TELR interns go through a quarter-long training program held by the local WebCT staff on campus. Interns are then hired by departments to work with them in developing and managing their WebCT courses. In the Freshman Programs, the Information Associate further trains interns by helping them develop and troubleshoot all courses and also trains instructional team members.

The Information Associate provides all training materials to all members involved. He or she is expected to have a high level of knowledge regarding all functions and features of WebCT. The local WebCT staff provides weekly and quarterly training sessions on features and tools within WebCT as well as providing open hours for questions.
Updates, Improvements, and Evolution

The Freshman Programs have been using WebCT in their classrooms since the winter quarter of 2001. In that short time the local staff has made the decision to upgrade versions twice.

- When the courses first went online in the autumn of 2000, only graduate teaching associates and instructors had access to the courses and used them to maintain a grade book. In the winter of 2001, WebCT had a server upgrade from Version 2.1 to Version 3.0.

- In the winter quarter of 2001, students had the use of a basic grade book and communication tools, and were given instructions on how to use the tools. During the course of the quarter, a course materials page was added; pictures and presentations were incorporated as the need arose.

- In the spring quarter of 2001, the IE Program upgraded to the Version 3 server. Links to independent assessment tools to the online environment, chat rooms, an assignment drop-box to monitor the submission of MATLAB programs, and more course materials were added throughout the quarter, including JPEG images and journal responses. Some of the Engineering Graphics course personnel requested the use of WebCT and were added to the list of clientele for the Freshman Programs staff.

- In the fall quarter of 2001, the Freshman Engineering Honors program and the Engineering Graphics department requested full involvement in WebCT and now have the use of a basic grade book and links to independent assessment sites. In the same quarter, the IE course materials pages underwent a major transition. Instead of adding material when necessary throughout the quarter, it was decided that all courses would contain graphics presentations containing animations and all lab materials from the beginning of the quarter. Answers to review questions were also posted. A new page within the course materials page was added to cover materials pertinent to team presentations.

- Prior to the winter quarter of 2002, WebCT underwent another upgrade to Version 3.6 and adjustments were made to the grade book and communication tools. The Purdue Visualization Test was added as an online tool to the first course of the sequence and the MATLAB drop box was updated for the second course based on experiences from the winter of 2001. On the Team Projects pages, previous quarter’s journal responses were converted to a common question and answer format and posted along with links to online help sites.

See the appendix for course site maps and screen captures that illustrate examples of changes to the second Introduction to Engineering course.
What works: how the instructional team has reacted

Instructors were skeptical about the incorporation of WebCT into the IE Program, of the use of the course sites, and whether or not it would enhance the program or hinder it. In the context of Freshman Programs, WebCT is meant to enhance the students’ experience by providing further resources within the classroom as well as outside of class rather than provide a distance learning opportunity.

Each time a new tool is incorporated into WebCT, the instructional team and administrative staff has to adjust to potential problems that occur with the implementation. In the past, this has created some tension as malfunctions and usability of each tool has to be discovered through use. The addition of the assignment drop box initially created headaches within the classroom as students had some trouble uploading assignments and redoing assignments. However, by the end of the quarter, the team and students had become more accustomed to using the drop box. The final accomplishment was the use of the drop box on the final exam. This provided students and the instructional team with a convenient way to submit and grade these problems; in the end creating a better situation.

In providing students with enhanced course materials online, many questioned whether or not students would be able to access them, and the fairness of not providing paper copies to all students. However, incoming students are more apt to have higher computer skills and are used to using this technology in the classroom. Instructional team members are still somewhat reserved regarding the usability of the course materials; however, students like the versatility and the commitment the administration is making towards the use of technology in the classroom.

WebCT communication tools have not been well-used in the past and there are questions as to their value in the program. Are these tools necessary or are they just taking up valuable space? Another question is whether or not students already have access to and have been using other means of electronic communication. These tools within the program are believed to be an efficient method of providing students with another means of communication with each other, the instructional team, and the administration. The administration has seen limited but increasing use of the tools in the past quarter. The administration is attempting to incorporate these tools into the classroom and encourage students and instructional team members to take advantage of their potential.
WebCT Use in the Freshman Programs and the University

Since the first quarter that WebCT was established in the Freshman Programs, enrollment has continued to rise. The table below shows the growth in student number on a per quarter basis as they were involved with WebCT.

<table>
<thead>
<tr>
<th>Academic Quarter</th>
<th># of Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>AU2000</td>
<td>483</td>
</tr>
<tr>
<td>WI2001</td>
<td>548</td>
</tr>
<tr>
<td>SP2001</td>
<td>241</td>
</tr>
<tr>
<td>AU2001</td>
<td>533</td>
</tr>
<tr>
<td>WI2002</td>
<td>989</td>
</tr>
<tr>
<td>SP2002**</td>
<td>863</td>
</tr>
</tbody>
</table>

* N.O. = course not offered  
** Projected enrollment

Table 3: Enrollment in Freshman Programs

The table below shows the growth in the number of courses maintained by the staff in the Freshman Programs since the incorporation of WebCT into the IE program in the fall of 2000. In the spring of 2001, some Engineering Graphics course personnel asked to be added to WebCT and were managed by the Freshman Programs staff. In the fall of 2001 all Engineering Graphics and FEH courses were added to WebCT.

<table>
<thead>
<tr>
<th>Academic Quarter</th>
<th># of Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>AU2000</td>
<td>181</td>
</tr>
<tr>
<td>WI2001</td>
<td>182</td>
</tr>
<tr>
<td>SP2001</td>
<td>Honors</td>
</tr>
<tr>
<td>AU2001</td>
<td>N.O.</td>
</tr>
<tr>
<td>WI2002</td>
<td>182</td>
</tr>
<tr>
<td>SP2002**</td>
<td>N.O.</td>
</tr>
</tbody>
</table>

* N.O. = course not offered  
** Projected enrollment

Table 4: WebCT Requests in the Freshman Programs

Proceedings of the 2002 American Society for Engineering Education Annual Conference & Exposition  
Copyright © 2002, American Society for Engineering Education
The following tables illustrate the growth of WebCT student users and course requests as shown by the University server. These figures are approximations; they vary in time of quarter they were measured, and they only reflect the number of courses on the Office of Information Technology (OIT)/TELR WebCT server. At one point, there were about twenty-four other WebCT servers on Ohio State’s campus. There are still six others at the present time; including College of Math and Physical Sciences which run their own and have nearly the same number of classes and students involved; plus the Health Sciences campus and some regional campuses and departments are running their own. Those other servers are not included in the tables provided below. Also, one might notice in the past three quarters little change in the total number of “courses”. This is misleading because some of those course accounts have thirty or more sections; others have grown from having two or three sections involved to having double or triple that number. In terms of total sections, the OIT/TELR server has continued to grow tremendously. The numbers depend on how an individual department or group handles a large section. To put that in perspective, there are about 10,000 ”sections” offered at Ohio State each major quarter. (1) The first table shows the growth in the number of courses requested at Ohio State on the OIT/TELR server. The second table reflects the number of distinct seats versus the number of seats each academic quarter on the server. A “distinct seat” refers to distinct user in the system. A “seat” refers to the number of total students using WebCT per quarter. Therefore, in the chart, the number of seats may be higher than the number of “distinct” seats due to the fact that some users may be using WebCT in more than one of their courses.

---

**Figure 7:** Courses on OIT/TELR server

**Figure 8:** Distinct Seats and Seats on OIT/TELR server
Summary and Conclusions

A systematic method was needed to ensure continuity of materials and instruction across multiple sections of the courses involved in the Freshman Programs; to support communication among student teams; and to provide a coordinated vehicle for program assessment. It was determined that an online system would best coordinate all parties involved: approximately 1000 students, approximately 100 instructional team members, and the administrative staff.

The use of WebCT in the classrooms of the Freshman Programs provided this online vehicle to meet the management needs of the program. By using the tool, students assume more responsibility over their own progress by submitting assignments, reviewing their grades throughout the quarter and accessing resources to help with the course. Instructional team members are directly connected to their students outside of the classroom through the use of the electronic grade book and the various communication tools. All parties benefit from having assessment tools online rather than on paper in terms of convenience, appropriate use of in-class instructional time, and review.

Some of the pitfalls that exist in using this type of tool are the amount of time to prepare and load materials, and occasional problems with the server or computer equipment. Although server outages and minor troubleshooting can create headaches for all involved parties, the potential and benefits of WebCT far outweigh these issues.

Overall, the online environment provides the Freshman Programs with a means to keep a large-scale program organized and to achieve its goals of organization, management, assessment, and communication for the instructional team, students, and administration.

Reference

(1) Office of Information Technology at Ohio State (p. 17)
Authors

JOHN A. MERRILL
John A. Merrill is the Program Manager for the IE Program (IEP) at The Ohio State University. His current responsibilities include long-range planning, faculty development, and curriculum management. He also collaborates with the Associate Dean for Academic Affairs and Student Services, and with key faculty, in the establishment of outcome-based assessment processes. He has an extensive background in public education, corporate training, and contract research. Dr. Merrill received his Ph.D. in Instructional Design and Technology from The Ohio State University in 1985.

MARY M. LAMONT
Mary M. Lamont received her B.A. from the College of Arts and Sciences at The Ohio State University in December 2000. She is currently working with the Freshman Programs at the College of Engineering as an Information Associate, where she is involved in the creation, summary, and response to student’s electronic journal entries; course materials management; strategic curriculum development; management and development of WebCT; and program assessment.

RICHARD J. FREULER
Richard J. Freuler is a Senior Researcher in the Aerospace Engineering and Aviation Department at The Ohio State University. Dr. Freuler is the Associate Director of the department's Aeronautical and Astronautical Research Laboratory and conducts scale model investigations of gas turbine installations for jet engine test cells and for marine and industrial applications of gas turbines. He is also the Faculty Coordinator for the OSU Freshman Engineering Honors (FEH) Program and teaches the three-quarter FEH engineering course sequence. Dr. Freuler received the B.S. and M.S. degrees in Aeronautical and Astronautical Engineering in 1974, a B.S. in Computer and Information Science in 1974, and a Ph.D. in Aeronautical and Astronautical Engineering in 1991 all from The Ohio State University.
APPENDIX

Section 1: Evolution of the Course via Site Maps ........................................................ 20
  Introduction to Engineering 182: Spring 2001 ........................................................... 20
  Introduction to Engineering 182: Winter 2002 ......................................................... 21
  Introduction to Engineering 182: Spring 2002 ......................................................... 22

Section 2: Evolution of the Course via Screen Captures............................................. 23

Section 3: Detail: Journal Entries ................................................................................. 27
  Example Journal Questions ....................................................................................... 27
  Example: Response Summary to Instructional Team ............................................... 28
Section 1: Evolution of the Course via Site Maps
(Example: Engineering 182; Spring 2001-Spring 2002)
The following course maps provide a listing of the resources and tools available to the students on WebCT per quarter. The important concept to note from these examples is the addition of course materials and useful tools. The following pages show screen captures as well to illustrate these maps.

Introduction to Engineering 182: Spring 2001

Homepage
- Syllabus
- Instructional Team
- IE Home Page
- Course Tools
- Course Materials

Course Tools
- Check Grades
- Course Sorcerer
- Bulletin Board
- Calendar
- Group Chat Rooms
- Team Evaluations
- Tracking Record

Course Materials
- WebCT Instructions
- Introduction To Circuits (Lab 3 Slides)
- Lab 3 Procedure & Worksheet
- Lab 3 Solutions
- Midterm Study Guide
- Reply to Journal Entry #3
- Final Exam Study Guide
- Team Project Materials
  - Written Report Outline
  - Supplemental Equipment Proposal
  - Project Schedule
  - Team Project Description
  - Materials Cost Sheet
  - Reply To Journal Questions
- Lab 4 Reference Materials
  - Lab 4 Procedures
  - Lab 4 Presentation
  - Circuit 1
  - Circuit 2
- Challenger Pictures
Introduction to Engineering 182: Winter 2002

Homepage
- Syllabus
- Daily Assignment Schedule
- Academic Misconduct Policy
- IE Home Page

CourseTools
- Team Evaluations
- Course Sorcerer
- Grade Book
- Chat Rooms
- Bulletin Board
- Calendar
- MATLAB Dropbox

Course Materials
Labs & Basics
- Lab 1 Presentation
- Lab 2 Presentation
- Challenger Student Handout
- Rectilinear Paper
- Challenger Pictures
- Electronic Circuit Labs
- Lab 3 Presentation
- Lab 3 Procedure
- Lab 4 Presentation
- Circuit 1
- Circuit 2
- Lab 4 Parts List
- Lab 4 Procedure
- Debounce Circuit
- LED

- Online Help: All Circuits
- Online Help: Interactive Circuits
- Online Help: Series Circuits
- Online Help: Parallel Circuits

Team Project Materials
- Lab Report Description
- Written Project Report
- Design Project Description
- Final Test Scoring Sheet
- Project Notebook Description
- Project Notebook Checklist
- Oral Presentation Description
- Oral Evaluation Criteria
- Supplemental Equipment Proposal
- Price List
- Project Schedule Document
- Team Evaluation Material
- Common Q&A
Introduction to Engineering 182: Spring 2002

Homepage
- Syllabus
- Daily Assignment Schedule
- Academic Misconduct Policy
- IE Home Page

CourseTools
- Team Evaluations
- Course Sorcerer
- Grade Book
- Chat Rooms
- Bulletin Board
- Calendar
- MATLAB Dropbox

Course Materials
Midterm Study Guide

Labs & Basics
- Brainstorming & Project Management
- Assembling the Conveyor (Presentation from Class)
- Assembling the Conveyor (Full Page Photos)
- Challenger Student Handout
- Rectilinear Paper
- Power Point Presentation
- Electronic Circuit Labs (Presentations & Online Help)
  - Circuits 1 Presentation
  - Circuits 1 Procedure
  - Circuit 1 Photo
  - Circuit 2 Photo
  - Circuits 2 Presentation

Team Project Materials
- Lab Report Description
- Written Project Report
- Design Project Description
- Final Test Scoring Sheet
- Project Notebook Description
- Project Notebook Checklist
- Oral Presentation Description
- Oral Evaluation Criteria
- Supplemental Equipment Proposal
- Price List
- Project Schedule Document
- Team Evaluation Material
- Common Q&A
- Inside of a Breadboard
Section 2: Evolution of the Course via Screen Captures
Example: Engineering 182

Homepage (Spring 2001 to Winter 2002)

<table>
<thead>
<tr>
<th>Home</th>
</tr>
</thead>
</table>

**ENGINEER 182: Introduction to Engineering - Section 3A**

*Instructor: Amos Gilat*

Lecture: Mondays 11:30-1:15
Thursdays 11:30-12:15
Lab: Tuesdays 11:30-1:15 (HI 214)

<table>
<thead>
<tr>
<th>Syllabus</th>
<th>Instructional Team</th>
<th>Course Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Student View</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>IE Home Page</th>
<th>(Hidden)</th>
<th>Course Materials</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Home</th>
</tr>
</thead>
</table>

**Engineering 182: Winter 2002**

<table>
<thead>
<tr>
<th>Course Tools</th>
<th>Syllabus</th>
<th>Daily Assignment Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Materials</th>
<th>Academic Misconduct Policy</th>
<th>IE Home Page</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Course Tools Page (Spring 2001 to Winter 2002)
Course Materials Pages
Example: Getting to the Electronic Circuits Lab Help:
Spring 2001:

![Diagram of course materials page]

- WebCT Instructions
- Team Project Materials
- Introduction To Circuits (Lab 3 Slides)
- Lab 3 Procedure & Worksheet
- Lab 4 Reference Materials
- Lab 3 Solutions
- Midterm Study Guide
- Reply to Journal Entry #3
- Challenger Pictures
- Final Exam Study Guide

This page has been accessed 2129 times

![Diagram of lab 4 reference materials page]

- Lab 4 Procedure
- Lab 4 Presentation
- Circuit 1
- Circuit 2

This page has been accessed 2129 times
Example: Getting to the Electronic Circuits Lab Help:
Spring 2002:

Labs & Basics

Lab 1 Presentation
Challenger Student Handout
Electrolyte Circuit Labs
Power Point Presentation

Lab 2 Presentation
Challenger Pictures
Rectilinear Paper

This page has been accessed 00033 times

Electronic Circuits

Circuits 1 Presentation
Circuit 1 Photo
Circuits 2 Presentation
Circuits 2 Procedure
LED
Online Help: All Circuits
Online Help: Series Circuits

Circuits 1 Procedure
Circuit 2 Photo
Parts List
Debounce Circuit
placeholder
(Hidden)
Online Help: Interactive Circuits
Online Help: Parallel Circuits
Section 3: Detail: Journal Entries

Example Journal Questions
The following are examples of the types of journal questions asked in present and past courses in the Introduction to Engineering sequence. Every other week students are asked to complete about five or six questions pertaining to the course.

1. What was your motivation for choosing Engineering at Ohio State?
2. Please rank your experience and skill with PowerPoint.
3. Do you feel as though you need or would like more instruction with PowerPoint?
4. Please rate your current ability to visualize and draw objects.
5. The following statement was written by Haim Baruh, associate professor of mechanical and aerospace engineering at Rutgers University, in an article entitled, 'Are Computers Hurting Education?' "It's my belief that the proliferation of computers, software, and Internet has had a 'dumbing down' effect on today's men and women." Do you agree with this statement? Why?
6. Please describe the effectiveness of your team’s interactions thus far.
7. Please rank your experience in the Bridge Competition Lab (Lab 3).
8. Do you have any suggestions for improving the Bridge Competition?
9. Please rank the performance of your Graduate Teaching Assistant so far this quarter.
10. Please rank the performance of your Peer Mentor so far this quarter.
11. Please list any questions you may have about the oral presentation requirements.
12. Do you feel as though the midterm was a fair assessment of the skills you have learned so far in the course?
13. Do you think that the midterm was of reasonable length considering the time period of 48 minutes?
14. Have you added any contact with the Technical Communications Resource Center?
15. If yes, how have they helped you with your course work?
16. Please choose the number of times you have used the following resources:
   a. TA Office Hours
   b. Faculty Office Hours
   c. Lab Instructor Office Hours
   d. Advisors
   e. Region One Computer Lab
17. Describe the high point of your first quarter at Ohio State.
18. Describe a low point of your first quarter at Ohio State.
19. If you have not already done so, please read through the "Conveyor Project" handbook at the end of your course material. Please share any comments and concerns, and ask any questions that you have at this time about the project and its requirements.
20. How would you rate the effectiveness of your team's interaction thus far?
21. Do you have any additional concerns/questions/or comments about MATLAB?
22. What improvements do you see your team making in preparation for the final system test?
Example: Response Summary to Instructional Team

The following is an example of how the instructional team summarizes the answers, questions, and comments from the students for their instructional team meetings. Also, there is an example of the type of response the students receive. This is not a full summary or response but a small piece to demonstrate how it is used.

What was your motivation for choosing Engineering at Ohio State?

Influences
A large number of students said that their fathers influenced them in their decision to go into engineering. Close behind in influences were other family members, teachers, friends, as well as programs such as the Minority Engineering Program, PREFACE (pre-freshman engineering program), and Women in Engineering Workshops. Several students also mentioned professors who inspired and influenced them with their knowledge and leadership. One of these professors was Dr. Herrera!

Reasons for an interest in engineering
An overwhelming majority of students responded that they were motivated to become an engineer was because of their interest and skill in math, science, building, problem solving, design, and creativity. Almost just as many students were drawn to engineering because of their interest in how things work and how they can be designed to work better. A strong interest in computers also ranked high. Many students revealed that they loved to take things apart and put them back together as a child, a favorite was LEGOS. Of course, money and the job marketability also ranked high on the list of motivators, but there seemed to be a genuine interest in engineering as well. Students repeatedly stated that they love the application of textbook material and knowledge to the real world. Specifically, several students mentioned that they enjoy finding a better way to do things and making things better.

A reason for specific interest in Ohio State’s Engineering program is that students like the wide range of engineering disciplines offered here. Often students commented on the great reputation of the department. Several had been recommended by teachers or role models graduating from the Engineering Department. Many students have been drawn here because of nationally accredited engineering program and the strong academic reputation.
Other Comments & Administrative Response to Students

First of all I feel that it requires too much time to complete the assignments and labs (at least for a 3 credit hour class. I think that psychology is a 5 credit hours class...and psychology is a cake class). This problem could be solved by making the course worth 5 credits. Many other courses that I have taken that involve a lab session have all been at least 4 credits, and many have been 5.

A lot of you had this concern about the number of credit hours that the class is worth versus the amount of time you spend in class plus the amount of homework and work you do outside of the class. We realize that you are being kept very busy in this class. The reason is two-fold. One, there is simply a lot of material that we need to cover in order for you to begin to understand the basics of engineering. Two, the workload in your major is not going to get any easier. So, although your engineering class may be worth less credit hours, it will always require you to work hard and understand the concepts. Remember, this class is the first building block to your degree. The issue of additional credit has been discussed and will be given additional consideration, but we cannot change the amount of hours awarded this academic year.

Also, there are too many assignments going on at any particular time, its difficult to keep track of what has been assigned, when its due, and what is required in each assignment.

Keep in mind that your assignment schedule lists all the assignments and when they are due. Refer to this often to stay on top of the schedule. Manage your time wisely and do assignments as soon as possible to avoid overload on any given day. Sometimes, your instructor will have to change the date an assignment is due. Please bear with us… oftentimes this is to afford you more time to work on an assignment.

When dividing the class into groups to give them a feel for the team environment, I would suggest a less random approach. There should be some attempt to assign a diverse collection of engineering specialties to each group. I feel this would greatly enhance the usefulness of this technique and more accurately simulate a real world environment where one might be expected to collaborate with other kinds of engineers in a common goal.

I think it would be better if when groups were assigned, class schedules and availability were considered. My group can't meet all together at once because our class schedules don’t match up close enough to each other.

Thanks for the suggestion! We are always looking for ways to make the groups more diverse. However, the concern that you raise is one that is hard to deal with most of the time. The reason for this is that over 68% of the total population in Engineering 181 is made of students who are undecided, CIS majors, mechanical majors, or electrical &
computer science majors. Where we could we made the groups as diverse as possible regarding the major or interest area of the students in the groups. The other thing we try to do is split up the women over the groups; however, with only 15% of the total population being women, this is difficult as well. The other suggestion concerns scheduling difficulties within your groups. Class schedules & availabilities is too huge of a project to undertake each quarter and still get the groups ready for the first day of class. With almost 600 students, this would be a major undertaking. However, one thought that we had was to consider dorms when choosing groups. What do you think of this?