Chapter XVI

Web-Based Support
of a Programming Class

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Programming classes present a unique set of instructional and student support problems. These problems can be addressed with a combination of readily available Internet and Web-based technologies including communication via e-mail, classroom materials distribution via a Web site, and file transfer via a Web and/or FTP server. Application of these technologies can improve many aspects of student support including technical support for completing programming assignments. Successful implementation of Web-based support requires specific attention to many details including creating and maintaining Web content, administering server resources and specific Web standards and software. Resource requirements are not large, but administrative resources are required and instructor activity patterns differ from those of a traditional class.

This chapter describes how Web technologies are currently used to support a second semester programming class. The technology applications described herein have not significantly altered or expanded the learning process or nature of in-class instruction. Instead, they have been used to streamline the distribution of class materials and programming examples, the collection and evaluation of programming assignments, and out of class communication between the instructor and students.

The technology applications described herein are not fundamentally new approaches to instruction or learning. Rather, they are applications that significantly improve the efficiency of any approach to instruction, learning and student evaluation. The impact of these Web-based technology applications on student learning is indirect but significant nonetheless. Class time is used more efficiently and student support is effectively increased.

As a result, course content is maximized while maintaining sufficient student support for completing required assignments.

Course Content Overview

MGT 331 is a one semester three credit hour course covering business applications programming in C++. It is the second of two programming courses required of all undergraduate majors in management information systems (MIS) at the Anderson Schools of Management (ASM), University of New Mexico (UNM). The prerequisite course (CS 151) introduces the student to basic programming concepts and reinforces those concepts with a number of projects programmed in C++ using a text editor and batch-oriented compiler in a UNIX environment.

MGT 331 students develop object-oriented interactive business application programs using modern development tools. Programs are developed with Microsoft Visual C++ 6.0 for a Windows 95/98/NT target environment. The course is taught in an interactive hands-on fashion. An approximate breakdown of MGT 331 classroom time by activity is provided in Table 1 (percentages shown are an average for the entire semester). Presentation and demonstration are typical larger proportions of class time early in the semester and smaller proportions later in the semester.

Significant time periods are dedicated to Q&A and one-one support to improve student performance but this reduces the amount of class time available for other activities and additional topical content. Thus, a tradeoff exists between depth and breadth of topical coverage and the amount of in-class support provided to students.

Computing Environment

MGT 331 is taught in a computer classroom with 40 workstations running Windows NT Workstation 4.0. The classroom is served by a single file and print server running Windows NT Server 4.0. The classroom is used as a computing laboratory when not in use as a classroom. The classroom is part of a campus network consisting of many classrooms, computer labs, building and departmental LANs, a fiber optic backbone network and two T3 Internet connections.

Students are provided with free e-mail and UNIX accounts by the UNM computing organization. Students can obtain modem-based access to the campus network through an external Internet Service Provider contracted by UNM. ASM provides FTP support for MGT 331 and other classes through a school-wide Web and FTP server. Files stored on the classroom file server are accessible via the school Web site. Additional FTP and Web site

Table 1. Classroom time percentage allocated to various types of learning activities.

Content Type	Time Allocation (%)
Presentation of factual and conceptual material	35
Presentation and discussion of application examples	25
Tool-oriented demonstration and tutorial	10
Semi-structured and unstructured question and answer	10
Individual face-to-face consulting and technical support	30

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(). *International Journal of Web-Based Learning and Teaching Technologies (pp. 0-0).*
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