Chapter XXXV
Redesigning a SAD Course to Promote Problem-Based Learning

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ABSTRACT

This chapter reports on the design, development, and implementation of a hybrid introductory systems analysis and design (SAD) semester long course taught at the junior/senior level. Five online instructional modules that focus on student-centered, problem-based learning (PBL) were developed. Each module parallels and reinforces the classroom session content. The classroom "seat-time" saved by having students study and complete online materials provides the instructor and students with additional time for face-to-face and electronic discussions. To further encourage PBL throughout the semester, students use an iterative approach to the SAD life cycle to analyze, design, and implement a prototypic solution to a real world problem presented by the authentic client. The use of a learning management system allows the client to participate in the course throughout the semester regardless of the physical distance between the students and the client. Instructor experiences, hybrid module development strategies, and a summary of student and client feedback are included.

INTRODUCTION

Systems analysis and design (SAD) courses typically introduce students to the fundamental principles used in this disciple area and provide students with an opportunity to demonstrate their understanding of these principles through a project that requires the development of a software product. This allows students to examine, practice, and demonstrate understanding of each phase in the system development life cycle.

The 15 week introductory junior/senior level SAD course discussed herein is required for all computer and information science, computer engineering, and computer management information science majors. Two sections are typically taught during the year with 20-25 students enrolled in each section. In the past, it has been taught in a traditional, face-to-face environment with instructor-centered lectures. Students worked in groups, composed of four to five students each during the semester and

used systems analysis and design theory presented in the classroom to develop a prototypic software product for an instructor-selected fictitious problem. The instructor's role in this environment was one of knowledge dissemination rather than a facilitator of learning.

While it was clear that students benefited from instructor feedback throughout the semester, it is apparent that the time available using this paradigm for in-depth discussions between the instructor and individual groups was at a premium. Scheduling conflicts were a perennial problem when attempting to determine suitable student, group, and instructor meeting times outside of the assigned classroom periods. Interestingly, instructor, student, and group time conflicts, as well as difficulty evaluating individual work done within a group, are often sited as the main reasons why computer science instructors shy away from group projects (Brown & Dobie, 1999).

From the students' course evaluations, it was evident that this SAD course format was less than ideal for reaching the course's cognitive goals which focus on developing and using problem solving methodologies and social goals which stress team work and communication. Although Hazzan (2003) reports success in addressing and meeting these goals by greatly limiting the course enrollment, which allowed more time for interactions and reflection, the decrease in credit hour production is not a realistic option for many programs.

The redesign of this course focused on shifting to a student-centered, problem-based learning (PBL) environment. Edens (2000) identifies several characteristic threads of a successful PBL which, in turn, were woven in the framework of this course. These include: 1) learning is student-centered rather than instructor-centered; 2) students consistently work in small groups; 3) the instructor serves as a facilitator rather than a lecturer; and 4) problems are the focus, the stimulation for learning, and serve as the tools by which students develop problem solving skills.

It is evident that the PBL model signals a radical paradigm shift from the traditional instructor-centered classrooms to a classroom that is group-centered and stresses the development, implementation, and demonstration of higher level cognitive domain skills. The importance of infusing PBL into course design is succinctly summarized by Gibson and O'Kelly (2005) in this way: 1) Students are encouraged to think critically when analyzing and solving complex, real-world problems; and 2) Team work serves to develop and enhance participants' group skills including effective oral and written communication. While PBL and cooperative group work (Johnson & Johnson, 1989) are employed in numerous mathematics and science and engineering programs as tools to promote higher order cognitive skill development (Mehrens & Lehmann, 1984), Chinn and Martin (2005) indicate these techniques have not been readily been promoted in computer science classrooms.

At the core of this SAD course redesign are two complementary components that utilize our Web-based learning management system (LMS), Desire 2 Learn. First, a series of online course modules were developed to support learning through student participation in activities that encourage problem analysis and synthesis and interactions between classmates, group members, and the instructor. These modules parallel and reinforce a related classroom component and the phases within the SAD project development cycle. This approach shifts the responsibility of learning from one that is dependent on the instructor to that of being a shared commitment between student and instructor. The online modules are designed to be completed outside of a classroom setting. The "seat time" saved by delivering almost half of the course content online is used by groups for project-related meetings and by the instructor to provide more in-depth feedback and one-to-one interactions, both electronically and face-to-face, with students and groups.

During the course's more traditional classroom component, which encompasses approximately one half of the course, emphasis is placed on es-