

HOW TO REDESIGN A COLLEGE COURSE USING NCAT'S METHODOLOGY

IIIB. Six Models for Course Redesign: Those Less Frequently Used

Although all successful course redesigns at NCAT's partner institutions embody the Essential Elements of Course Redesign discussed in Chapter I, each has chosen a redesign model that implements the elements in ways that vary according to the discipline involved, the particular student audience, and faculty preferences.

In conducting redesign programs, NCAT's approach has been first to establish a set of broad parameters (e.g., redesign the whole course, use instructional technology, reduce cost) and then to let experimentation bloom within them. From that iterative process, a number of redesign solutions have emerged—some anticipated, some not.

After examining the similarities and differences in how those common elements are arrayed in the various redesigns, NCAT has identified six distinct course-redesign models: supplemental, replacement, emporium, fully online, buffet, and linked workshop. A key differentiator among them is where each model lies on the continuum—from fully face-to-face to fully online interactions with students.

In this chapter we discuss the following three models: fully online, buffet, and linked workshop. Although only about 10 percent of NCAT redesigns have used one of these three models, we believe they are among the most innovative and effective of all of the redesigns conducted. Following are summaries of the characteristics of these three course redesign models that have emerged from NCAT's course redesign programs.

The Fully Online Model. The fully online model eliminates all in-class meetings and moves all learning experiences online, using Web-based multimedia resources, commercial software, automatically evaluated assessments with guided feedback, and alternative staffing models.

The Buffet Model. The buffet model customizes the learning environment for each student based on background, learning preference, and academic or professional goals and offers students an assortment of individualized paths to reach the same learning outcomes.

The Linked Workshop Model. The linked workshop model provides remedial or developmental instruction by linking workshops that offer students just-in-time supplemental academic support to core college-level courses.

Full descriptions of the three models with examples of each follow. Each example includes links to full case studies of the redesigns.

The Fully Online Model

- Eliminates all in-class meetings and moves all learning experiences online.
- Adopts successful design elements of the supplemental, replacement, and emporium models, including Web-based multimedia resources, commercial software, automatically evaluated assessments with guided feedback, links to additional resources, and alternative staffing models.

- Software and other Web-based materials present course content; instructors do not need to spend time delivering content.
- Software increases the amount and frequency of feedback to students. Assignments can be graded on the spot.
- May combine multiple sections into a single online section organized around modules, each taught by faculty who are expert in the module topic.
- Eliminates duplication of effort because faculty can divide tasks among themselves and aim their efforts at particular aspects of course delivery.

NCAT's fully online model differs significantly from the *traditional* online model which:

- Expects individual faculty members to design and deliver multiple course sections, each of which is relatively small in size.
- Uses Web-based materials as supplemental resources rather than as substitutes for direct instruction.
- Makes instructors responsible for all interactions, personally answering every inquiry, comment, or discussion.
- Requires faculty members to spend more time teaching online and interacting with students than they do in classroom teaching.

Examples

The redesign of Computing and Information Literacy at Arizona State University (ASU) moved a large lecture course of about 2,200 students to a fully online course. Projects and assignments were completed online with support via a discussion board forum and a laboratory. Even though only one optional lecture was provided each week, very few students attended it. The lab sessions, too, were optional for most students but mandatory for students at risk of failing the course. Course quality was enhanced by focusing on problem solving by using the kinds of technology resources that students would continue to use in school and on the job. Feedback on students' individualized progress was provided continually. Other than a textbook, no paper-based resources were used in the course. Projects, assignments, and quizzes all were completed using modern teaching technologies. Students had access to multiple options for learning with tools that included discussion boards, wikis, screencasts, video demonstrations, automated grading, feedback programs, and interactive tutorials. In the six prior terms of the course taught in the traditional format, an average of 26 percent of students earned a C or better. In the redesigned format, 65 percent of students earned a C or better in a demonstrably more difficult course. The cost per student was reduced from \$50 to \$35, a 30 percent savings.

Rio Salado College based its redesign of four precalculus mathematics courses on using mathematics software and adding a nonacademic course assistant. The software presented the content of the course so well that instructors did not have to spend time delivering content. The software's large bank of problems and answers for each topic increased the amount and frequency of feedback to students. All assignments were completed within the context of the software and were graded on the spot. Because of that immediate feedback, students knew which course aspects they had not mastered and were able to take corrective actions. The software enabled each student to work as long as needed on any particular topic. The addition of a course assistant to address non-math-related questions (which constituted 90 percent of all interactions with students!) and to monitor students' progress freed the instructor to concentrate on academic rather than logistical interactions with students. As a result, one instructor was able to teach 100 students concurrently enrolled in any of four math courses. Before the redesign,

the instructor typically had taught 35 students in one section. By using these techniques, Rio Salado increased completion rates from 59 percent to 65 percent while tripling the number of students taught by one instructor.

Florida Gulf Coast University (FCGU) originally redesigned its required fine arts course by using the buffet model. Twenty-five sections of 30 students each were consolidated into a single section using a common syllabus, textbook, set of assignments, and course Web site. Students were placed into cohort groups of 60 and, within those groups, into peer learning teams of 6 students each. The redesigned course consisted of six modules, each designed by a faculty expert. A structured buffet of learning experiences tied to each content module was developed to meet the varying needs of students with different learning styles as measured by the Myers-Briggs Type Indicator instrument. Options for learning included live lectures and discussions, taped lectures, labs and other hands-on experiences, textual-based material, practice exams, commercially produced videos, Web-based resources, and learning experiences related to the arts in the students' home communities. FCGU discovered two things: that students did not attend any of the live learning experiences, sticking instead with the textbook and online materials and that they did very well—better than students who attended lectures in the face-to-face courses. The average score on standardized exams in the traditional course was 70 percent versus 85 percent in the fully implemented redesign, and the percentage of D and F grades decreased from 45 percent in the traditional course to 11 percent in the redesigned course. As a result, FCGU eliminated some of the live course elements and built on the strengths of the online materials. In addition, FCGU reduced the cost per student from \$132 to \$81 in the first year of implementation.

Arizona State University (ASU) redesigned Emergent Literacy, a graduate course required for state certification in early childhood education. Previously taught in small face-to-face sections of 30 students each, the traditional course required faculty to travel among the school's three campuses, amounting to a major time commitment for them. Further, providing access for practitioners in rural parts of state was difficult. The online model enabled the team to combine all sections into one—regardless of which campus the students were enrolled on. Duplication of effort and inconsistencies across campuses were eliminated. Students were placed in small learning teams of 10 to 12 students to engage in collaborative learning activities directed by graduate teaching assistants and adjunct faculty. Students received individualized assistance in both content and technology issues as well as ongoing assessment and immediate feedback through automated comprehension checks, peer feedback, and written and oral comments from the instructor. Adjunct faculty and graduate teaching assistants monitored student participation and assignment completion and were available to help with content issues. The team was in the fortunate position of redesigning a high-quality traditional course with high student success. The primary concern was whether students would continue to meet the stated learning objectives once the course was fully online. The team found that students in both the traditional and redesigned formats performed the same on different assignments within the course and in the overall course. There was no significant change in drop, failure, or withdrawal rates. Once the redesign was fully implemented, total enrollment increased from about 100 to about 300 to 500 students; and the number of full-time faculty involved in the course was reduced from three to one. The result of these actions decreased the cost per student from \$556 to \$145, a 74 percent reduction.

The fully online model can be implemented in any discipline and at any academic level. See http://www.theNCAT.org/PCR/model_online_all.htm for case studies of course redesigns using the fully online model.

The Buffet Model

We know that students bring different academic appetites and backgrounds, interests, and abilities to college courses, yet what do we offer them most of the time? A fixed meal! The meals may be different from course to course in that some may be lecture based and others fully online, but most courses employ single strategies. One way to avoid either/or choices in course redesign is to offer students a buffet of learning opportunities or a menu of choices that enable them to take different paths to achieve the same learning outcomes.

- Customizes the learning environment for each student based on background, learning preference, and academic/professional goals.
- Requires online assessment of a student's learning styles and study skills.
- Offers students an assortment of individualized paths to reach the same learning outcomes.
- Provides structure for students through an individualized learning contract.
- Includes an array of learning opportunities for students—in the forms of lectures, individual discovery laboratories (in class and Web based), team or group discovery laboratories, individual and group review both live and remote, small-group study sessions, videos, remedial/prerequisite/procedure training modules, contacts for study groups, oral and written presentations, active large-group problem solving, homework assignments either graded by graduate teaching assistants or self-graded, and individual and group projects.
- May modularize course content.
- May allow students to earn variable credit based on how many modules they complete successfully by the end of the term, thus reducing the number of course repetitions and letting students complete the remaining modules in the next term.
- Enables the institution to evaluate the choices students make vis-à-vis the outcomes they achieve (e.g., if students do not attend lectures, the institution can eliminate lectures).

Example of a Buffet Model

The Ohio State University (OSU) redesigned its introductory statistics course, which enrolls 3,250 students each year. OSU created a buffet strategy that offered students an assortment of interchangeable paths that matched their individual learning preferences at each stage of the course. Because students learn in different ways, even the best fixed menu of teaching strategies will fail for some students. In contrast, OSU's buffet of learning opportunities included the array described earlier. Thus, for a specific objective, students could choose to hear and discuss a familiar vivid example in lecture, view and read about a real example in an annotated video presentation, encounter an example in a group problem-solving session, or generate an example through a group project. Students could elect to explore a concept by working in a data analysis laboratory, by participating in an individual Web-based activity, by attending a facilitated study session, or by explaining the concept to others.

Students were initially given a set of default, software-generated study options to match their learning styles and study skills. The finished contract gave each student a detailed listing of what needed to be accomplished, how the list related to the learning objectives of the unit, and by when each part of the assignment had to be completed. Based on their own experiences in the initial unit and on reading students' testimonials from earlier academic quarters, students could decide to make changes in their contracts for subsequent units. Course software monitored students' progress on an individualized basis throughout each unit, suggesting alternative learning strategies when needed.

OSU redesign students had greater success on common exams than traditional daytime students and about the same scores as students in the evening class, which had smaller class sizes and older students and had previously outperformed the daytime class. OSU's redesign reduced the cost per student at the main campus from \$190 to \$142, a 25 percent reduction.

Example of a Modified Buffet Model

The goals of the redesign of General Psychology at Chattanooga State Community College were to provide greater consistency in the course and greater flexibility for students. The school modified the buffet model to give students choice—but not as much choice as at Ohio State. Students were offered two different ways to take the course: online or face-to-face. But the key idea is that they could choose which option to employ on any particular day of the course. The face-to-face sections were taught consistently: the same lecture was given at different times on the same day; schedules of the topics and times were provided on the course website. Students could go to any lecture session that was offered—regardless of the section in which they were enrolled. All students had access to the course website, to classroom lectures and activities, and to faculty team members. They could attend as many or as few classes as they chose with any team faculty member. Some students always attended the face-to-face classes; some viewed the lecture as an online video on some days and attended face-to-face lectures on other days; and some students took the entire course online. Thus students could choose the option that suited their schedules on any given day. Similarly, they could submit assignments and take exams either online or in the classroom. Certain interactive activities—like online simulations that illustrated concepts, theories, and research methodologies or low-stakes quizzes—were completed by all students online.

Students evaluated their learning styles by using the North Carolina State University Index of Learning Styles Questionnaire. Student learning styles were addressed by multimodal teaching materials such as PowerPoint presentations, online discussions, open-book quizzes, an audience-response system, class activities, lectures, and Web resources.

Comparative student learning was measured by using pre- and posttests. Students in the redesigned courses showed significant improvements in content knowledge as well as significantly better absolute posttest performances. Students in the traditional course had a pretest mean of 21 and a posttest mean of 26. Students in the redesigned course had a pretest mean of 25 and a posttest mean of 36, which is significant at the .01 level. The cost per student decreased from \$130 to \$42, and the total semester course cost decreased from \$67,857 (serving 522 students) to \$25,311 (serving 600 students).

The buffet model can be implemented in any discipline. See http://www.theNCAT.org/PCR/model_buffet_all.htm for case studies of course redesigns using the buffet model.

The Linked Workshop Model

- Retains the basic structure of the college-level course, particularly the number of class meetings.
- Replaces the remedial or developmental course with just-in-time workshops designed to remove deficiencies in core course competencies.
- Uses computer-based instruction, small-group activities, and test reviews to provide additional instruction on key concepts in workshops.

- Assigns students software modules individually based on results of diagnostic assessments.
- Employs students as workshop facilitators who have previously excelled in the core course and are trained and supervised by core course faculty.
- Comprises workshop activities that are just-in-time—that is, designed so that students apply the concepts during the next core course class session, which in turn helps them see the value of the workshops and motivates them to do the workshop activities.

Austin Peay State University (APSU) redesigned two developmental math courses—Elementary Algebra and Intermediate Algebra—by eliminating them entirely. Enhanced sections of two core college-level courses—Fundamentals of Math and Elements of Statistics—were created for students whose admissions test scores placed them in developmental mathematics. These core courses did not change in content but were linked to structured learning assistance workshops. Students requiring developmental instruction enrolled in the core course required for their majors and received supplemental academic support on a just-in-time basis to remove deficiencies in the mathematical competencies required for success in the core course. The workshops consisted of computer-based instruction, small-group activities, and test reviews to provide additional instruction on key mathematical concepts within the courses. Structured learning assistance workshops were facilitated by students who had excelled in math and been recommended by math faculty. During the initial meeting of the workshop, students were assessed to determine their specific math deficiencies. Only the deficiencies deemed necessary for success in the core mathematics course were addressed during the workshops. Just-in-time instruction on prerequisite competencies was designed so that students could apply the concepts during the following class session, which in turn helped them see the value of the workshops and motivated them to do the exercises. Prior to the redesign, 33 percent of developmental students who enrolled in Fundamentals of Math successfully completed the course (earned grades of C or better.) After the redesign, that rate averaged 71 percent. Prior to the redesign, 23 percent of developmental students who enrolled in Elements of Statistics successfully completed the course. After the redesign, that rate averaged 54 percent. In addition, APSU reduced the cost of offering developmental math by 52 percent.

The linked workshop model appears to be most appropriate for developmental courses. See http://www.theNCAT.org/PCR/model_linked.htm for a full description of APSU's course redesigns using the linked workshop model.

Conclusion

All six NCAT course redesign models—supplemental, replacement, emporium, fully online, buffet, and linked workshop—treat a course not as a one-off but, rather, as a set of products and services that can be continuously worked on and improved. Two factors in the design strategies used by each model are key: (1) the collective commitment of all faculty teaching the course, and (2) the capabilities provided by information technology. Would it be possible for a single instructor conducting an online class to develop such creative, comprehensive, learner-centered designs as exemplified by the redesigns described here? Perhaps—if the instructor spent the greater part of a career working on the class. Would it be possible for institutions to offer buffets of learning opportunities to thousands of students annually without the aid of information technology? Most certainly not. Information technology enables the capture of best practices in the form of interactive Web-based materials and sophisticated course-management software. Faculty can add to, replace, correct, and improve an ever-growing, ever-improving body of learning materials. Sustaining innovation depends on a commitment to collaborative development and continuous quality improvement that systematically incorporates feedback from all of those involved in the teaching and learning process.