The National Center for Academic Transformation

HOW TO REDESIGN A COLLEGE COURSE USING NCAT'S METHODOLOGY

I. The Essential Elements of Course Redesign

From working with large numbers of students, faculty, and institutions since 1999, NCAT has learned what works and what does not work in improving student learning while reducing instructional cost. 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.

Although all successful course redesigns at NCAT's partner institutions embody the Essential Elements of Course Redesign discussed later, 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. After examining the similarities and differences in the ways those common elements are arrayed in the various redesigns, NCAT has identified six distinct course-redesign models that are fully described in Chapter III. A key differentiator among them is where each model lies on the continuum—from fully face-to-face to fully online interactions with students.

NCAT has identified eight elements that are essential to successful course redesign. If *any* of those eight elements are absent, it is unlikely that student success rates will improve at reduced instructional cost. If *all* of the elements are present—and you select an appropriate cost-reduction strategy as described in Chapter V—we guarantee that student success rates will improve and costs will reduce. Through the years, faculty members have said to us, "We've done course redesign"—by which they mean they use some form of technology in their classes. Course redesign is not, however, one or two of the following elements; the combination of and interaction among *all eight* are what make course redesign so successful.

Element #1: Redesign the whole course and establish greater course consistency.
Element #2: Require active learning.
Element #3: Increase interaction among students.
Element #4: Build in ongoing assessment and prompt (automated) feedback.
Element #5: Provide students with one-on-one, on-demand assistance from highly trained personnel.
Element #6: Ensure sufficient time on task.
Element #7: Monitor student progress and intervene when necessary.
Element #8: Measure learning, completion, and cost.

#1: Redesign the whole course and establish greater course consistency.

In each course redesign model, the whole course—rather than a single class or section—is the target of redesign. The course is treated as a set of learning materials and activities that can be continuously worked on and improved by all faculty rather than as a one-off that gets reinvented by individual faculty members each term. The collective commitment of all faculty teaching the course coupled with the capabilities provided by information technology leads to success. Information technology enables best practices to be captured in the form of interactive, Web-based materials supported by sophisticated course-management software. Faculty can

systematically incorporate feedback from all involved in the teaching and learning process, thereby adding to, replacing, correcting, and improving an ever-growing body of learning materials and best practices.

In the traditional format, consistency among different instructors or different campuses within the same institution is typically lacking. Any course taught by multiple instructors faces the problem of course drift, especially when large numbers of adjunct faculty members are involved. The phrase *course drift* refers to what happens when individual instructors teach the course to suit their individual interests rather than to meet agreed-upon learning goals for students. Course drift results in inconsistent learning experiences for students and inconsistent learning outcomes. Students are usually assessed not in one single way but in a variety of ways, which in turn leads to overall grading differences and grade inflation. Contributors to grade inflation in the traditional format include (1) having no clear guidelines regarding the award of partial credit, (2) allowing students to fail a required final exam yet still pass the course, (3) failing to establish common standards for topic coverage (in some sections, entire topics are not covered, yet students pass), and (4) failing to provide training and oversight of instructors, especially part-time ones.

Course redesign creates consistency of course content and course delivery. A team of faculty is responsible for course development and course delivery strategies to ensure that all students have the same learning experience regardless of the instructor or campus location. And students are assessed on common outcomes by means of common assessment methods. Redesign that ensures consistent content coverage and consistent learning experiences for students produces significant improvements in course coherence and quality control. Training and ongoing monitoring of all instructors (full-time faculty and adjuncts) and other instructional personnel also contribute to consistent student learning experiences and outcomes.

#2: Require active learning.

In the traditional format, students spend a lot of time watching or listening to a lecture given by someone else. The three hours that students spend listening to lectures each week are three hours that could be spent actively engaged with course content.

Each redesign model makes significant shifts in the teaching-learning enterprise so that it becomes more active and more learner centered. Lectures and other face-to-face classroom presentations are replaced with an array of interactive materials and activities that move students from a passive, note-taking role to an active-learning orientation. As one math professor put it, “Students learn math by *doing* math, not by listening to someone *talk* about doing math.” Course redesign obligates students to become actively involved in learning the course material. And the role of the faculty moves from one of dispenser of knowledge to one of partner or helper in the learning process.

Instructional software and other Web-based learning resources assume important roles in engaging students with course content. Resources include tutorials, exercises, and low-stakes quizzes that provide frequent practice, feedback, and reinforcement of course concepts. Students may be required to spend a minimum number of hours each week online or in a lab using interactive software for instruction and practice with support from instructors and other instructional personnel.

Online tutorials present course content with links to a variety of additional learning tools: video lessons, lecture notes and exercises, animated examples, step-by-step explanations, electronic textbooks, study plans, homework assignments, quizzes, practice tests, and posttests. Navigation is interactive; students can choose to see additional explanations and examples along the way. The software gives students multiple resources (hints on how to solve problems and exercises, videos, animations, solutions to frequently asked questions, and links to the e-textbook) to correct their understanding if they do not master a skill. Instructional software supports auditory, visual, and discovery-based learning styles. All resources are in the same online location and can be accessed anywhere, anytime. And students can work on assignments from any computer with Internet access.

Software both provides support and frees up in-class time for other active-learning practices such as in-class or online team-based learning and use of personal response systems, which are discussed in Chapter 6. In moving from an entirely lecture-based to a student engagement approach, learning becomes less dependent on words uttered by instructors and more dependent on interaction with the content undertaken actively by students.

#3: Increase interaction among students.

Students in lecture classes large or small tend to be passive recipients of information, and student-to-student interaction is often inhibited by class size. Course redesign restructures courses explicitly to increase discussion and group work among students. Small-group interaction can be created in large lecture halls, in labs, online, or in a combination of formats.

It is possible to create an active learning environment within a large lecture hall setting by using a combination of group work and student-response systems (clickers). Class time can be divided into 10- to 15-minute lecture segments followed by sessions in which students work in small groups applying concepts to solve problems posed by the instructor. Group responses can be reported through a student-response system. The instructor moderates the discussions and draws out key issues to reinforce specific ideas or reveal misconceptions. Students can peer-mentor each other during in-class discussions. More-knowledgeable students can quickly answer questions from less-knowledgeable ones in their groups, thereby preventing the latter from falling behind.

Lecture time can also be replaced with individual and small-group activities that take place in computer labs staffed by faculty, graduate teaching assistants and/or peer tutors. Increased lab hours enable students to receive more one-on-one assistance. Students welcome the reduction in lectures and the opportunity to work in groups to apply what they have learned from resource materials. Students learn from each other, and they increase their skills in working collaboratively on projects. In addition, peer pressure within groups is a powerful incentive for students to keep up with their work.

Small online discussion groups provide useful and convenient opportunities to increase discussion among students. In smaller discussion forums, students can participate actively. For instance, groups can read and comment on a relevant article in response to questions posed by the instructor, collaborate on homework assignments, and work on group projects. Software enables instructors to more easily and more carefully monitor the frequency and the quality of students' contributions to discussions than they can in a crowded classroom.

Increasing the interaction among students is a well-accepted pedagogical principle that leads to improved student learning. As Arthur W. Chickering and Zelda F. Gamson note in their 1987

Seven Principles for Good Practice in Undergraduate Education, “Learning is not a spectator sport. Students do not learn much just sitting in classes listening to teachers, memorizing prepackaged assignments, and spitting out answers. They must talk about what they are learning, write reflectively about it, relate it to past experiences, and apply it to their daily lives. They must make what they learn part of themselves. Working with others often increases involvement in learning. Sharing one’s own ideas and responding to others’ reactions sharpens thinking and deepens understanding.”

#4: Build in ongoing assessment and prompt (automated) feedback.

Increasing the amount and frequency of feedback to students is a well-documented pedagogical technique that leads to increased learning. In the traditional model, students typically turn in homework that is hand graded and then returned days after they do the homework and make mistakes. By the time students see the graded homework, they are not sufficiently motivated to review their errors and correct their misunderstandings.

Course redesign utilizes computer-based assessment strategies. A major advantage of using interactive software is the immediate feedback provided for students. Students receive individualized help from the tutorials, practice exercises, and guided solutions that are built into the software. Instant feedback lets students review their errors at the time they make them. A large bank of quizzes for each course topic is built into instructional software, and assignments are graded on the spot. When working a homework assignment, students get immediate feedback that tells them whether an answer is correct or incorrect. Automation of the feedback process grades every problem or question, and students receive specific information about their performance. That automated process in turn leads to more-efficient and more-focused time on task and higher levels of learning.

Course redesign also shifts the traditional assessment approach from one that relies on midterm and final examinations to one of continuous assessment. Students can be tested regularly on assignments via short quizzes that probe their preparedness and conceptual understanding. Such low-stakes quizzes motivate students to keep on top of the course material, structure how they study, and encourage them to spend more time on task. Quizzing encourages a do-it-till-you-get-it-right approach, meaning that students can be allowed to take quizzes as many times as they want to until they master the material. Automation of assessment facilitates repeated practice and provides prompt and frequent feedback—pedagogical techniques that research has consistently shown to enhance learning.

#5: Provide students with one-on-one, on-demand assistance from highly trained personnel.

The traditional model increases the likelihood that students will get discouraged and stop doing the work for two reasons: First, they have to do most of their work (homework) without immediate support, and those who are unable to receive help at the time they need it will too often give up and not complete the assigned task. Second, in traditional lecture and classroom formats, students are usually unlikely to ask questions because of having to admit in front of fellow students what they do not understand. Most students would rather remain invisible than interact with the instructor in that public way—to protect themselves from embarrassment—and so they usually do not get answers to their questions. Office hours attempt to mitigate that problem, but students notoriously do not take advantage of them. Students need help at the time they are stuck rather than during fixed times or by appointment.

Course redesign either replaces or supplements lecture time with individual and small-group activities that take place in computer labs or help rooms staffed by faculty, graduate teaching assistants, and/or peer tutors and/or online, which enables students to access more one-on-one assistance. Highly trained instructional staff are available to provide individual assistance if students encounter difficult concepts while working on course work. The availability of on-demand individual assistance in the lab or in the computer classroom or online ensures that students receive immediate help when needed.

Offering students help when they need it rather than according to a schedule not only addresses the particular problems they encounter but also helps keep them on task. Students cannot live by software alone. When they get stuck, the tutorials built into most software programs are not enough to get them moving again. Students tune out less when they receive targeted information to meet their perceived needs. They need human contact as well as encouragement and praise to assure them that they are on the right learning path. Helping students feel they are a part of a learning community is critical to persistence, learning, and satisfaction.

An expanded support system enables students to receive help from a variety of people. The varying levels of personnel let students seek help from someone with whom they are most comfortable and whose teaching style is best suited for their individual learning needs. So-called teachable-moment opportunities in the lab or classroom enable instructors and students to build relationships and further foster learning. In addition to providing individualized assistance for students, faculty and others responsible for the course can learn which areas are most difficult for students and can continuously improve the learning activities included in the course.

By constructing support systems comprising various kinds of instructional personnel, course redesign applies the right level of human intervention to particular student problems. Highly trained, expert faculty members are not required for all of the tasks associated with a course. By replacing expensive labor (full-time faculty members and graduate teaching assistants) with relatively inexpensive labor—less expert (adjunct faculty members, undergraduate peer mentors, and course assistants) when appropriate—it is possible to increase the person-hours devoted to the course and the amount of assistance provided for students.

#6: Ensure sufficient time on task.

As Chickering and Gamson note in *Seven Principles for Good Practice in Undergraduate Education*, “Time plus energy equals learning. There is no substitute for time on task. Learning to use one’s time well is critical for students and professionals alike. Students need help in learning effective time management.” Even though we know that time on task is essential to effective learning, it is difficult for faculty members in traditional formats unaided by technology to first ascertain how much time on task each student is actually spending and to then take corrective action.

NCAT has learned that student participation in all course activities—whether in the classroom, in the lab, or online—*must be required*. As NCAT’s Redesign Scholars have repeatedly said, “Don’t even bother to redesign if you are not going to require participation in all learning activities.” It is absolutely necessary to have an incentive for attending lab or class as well as for participating in online activities and to have a penalty for not attending lab or class and not participating in online activities. At successful institutions, attendance/participation counts as 5 to 10 percent of the final grade, which provides sufficient motivation for most students to attend lab or class and participate online. Some institutions penalize students for lack of attendance (e.g., students who miss, say, 12 hours of class are administratively withdrawn from the course).

Since 1999, NCAT has repeatedly seen that when institutions have neither an attendance/participation policy nor a reward (points) for meeting that policy, most students do not attend or participate consistently. “Freshmen don’t do optional” is another mantra of successful course redesign. Whenever optional activities are offered, the vast majority of students fail to take advantage of them. When students participate and do the work, they become able to master the concepts and succeed. Students participate more, score higher, and spend longer amounts of time on learning activities when course credit is at stake.

Even though course redesign may add greater flexibility to the times and places of student engagement with the course, the redesigns are *not* self-paced. Some institutions initially thought of their designs as self-paced, open entry/open exit, but they quickly discovered that students need structure (especially first-year students and especially in disciplines that may be required rather than chosen) and that most students simply will not succeed in a self-paced environment.

Course redesign ensures student pacing and progress by requiring students to complete learning activities and master specific learning objectives according to reasonably established milestones for completion. Students need a concrete learning plan, especially in more-flexible learning environments. Weekly, achievable schedules provide a guideline for students in terms of the pace of work necessary to complete the course on time. Such schedules are of significant value in helping students see what they have left to accomplish in the course and in ensuring that each course can be finished within one semester.

#7: Monitor student progress and intervene when necessary.

Requiring attendance and awarding attendance points are essential, but they are only the starting points. Two additional steps need to be taken: First, someone—typically, the instructor but sometimes another person—must monitor each student to see who is and who is not meeting the attendance policy. Which students are lagging behind? Which students are not coming to class and not doing the work? Second, once those students have been identified, follow-up is crucial. Someone must consistently contact them—by e-mail, telephone, text, or tweet or in person—and indicate clearly that they are expected to come to class and do the work.

Most software packages have excellent tracking features, enabling faculty members and others to monitor the time each student spends using the software and completing assignments plus how well the student performs on quizzes and exams. Record keeping is made easy through an online Gradebook. Instructors who require that students spend hours in an open lab can be provided with logs in which they indicate the dates and time intervals that students visit the open labs.

Other options for monitoring student progress include use of (1) a weekly score sheet that shows points for staying up-to-date with videos, worksheets, homework, and quizzes as well as points for class and lab attendance and (2) a paper workbook or notebook that students are required to maintain that contains class notes, notes from the software’s learning tools, and solutions to exercises and that facilitates working through the steps of problems by hand. By recording the progress of all students every week in each student’s respective workbook or notebook, instructors can knowledgeably discuss progress in the course with each student.

At many institutions, instructors or other personnel meet weekly with each student individually to assess the student’s progress and help the student design a course of action for the next week. That face-to-face meeting helps students develop a sense of personal responsibility for their

work. Such weekly meetings enable both students and instructional personnel to become more comfortable with each other, and they provide additional support and encouragement for students. Whatever the method, instructors must monitor each student's progress as well as time on task and take appropriate action when needed.

#8: Measure learning, completion, and cost.

Very few institutions consistently measure student learning under the traditional model. Almost none measure instructional costs. Some may know their "pass" rates based on final grades, but few have examined whether or not those grades are awarded fairly. National statistics show that exit rates from many introductory courses are not what they should be at most institutions, yet few are changing how they teach; and even fewer are measuring the impact of any changes they try to implement.

An important element of course redesign is measurement—both initially and on an ongoing basis. To demonstrate that course redesign (1) increases student-learning outcomes, (2) improves student success rates, and (3) reduces instructional costs, NCAT's redesigns measure those three factors under the traditional format and again after a redesign is fully complete. As a result, we have hard data that demonstrate conclusively that course redesign accomplishes those three goals.

Measurement of whether redesign has in fact met the three aforementioned goals provides clear evidence of course redesign's efficacy for those who feel uncertain about whether redesign is a good idea. Having data that demonstrate that students learn more content and complete courses in greater numbers while costing both students and the institution less is persuasive to both faculty and administrators. Data that show no change or poor results are clear signals to the redesign team that something has gone amiss in the implementation.

Measurement of the three factors must be ongoing. NCAT has found that over time, initial learning and completion results after the first term of full implementation have continued to improve at higher rates. The only way to know that such improvements occur and continue—and the only way to know whether the results do not continue—is to consistently collect data and analyze the results. By annually assessing student-learning outcomes, course completion rates, and instructional costs, an institution can assure all stakeholders that redesign continues to work as initially conceived and implemented.

