
**Increasing Student Success with Large Course
Redesign Strategies:
An Overview and Recommendations for NC State**

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Executive Summary

In light of the need for NC State to increase student success in large-enrollment introductory courses, as well as increase access, enhance quality, increase retention, and potentially reduce costs, I have studied the National Center for Academic Transformation's Pew Program in Course Redesign. This program, which spanned the years 1999 – 2003, funded and guided the redesign of 30 large-enrollment introductory courses. In the overview section, I examine the five models used for redesign, the findings of the program, as well as the characteristics and strategies of the redesigns.

In the recommendations section of this document, I explore the possibilities for a Large Course Redesign Program at NC State, potentially led by DELTA. Drawing heavily on the programs developed by the Arizona Board of Regents and the University System of Maryland, I recommend that courses to be redesigned should have a large enrollment, face an academic and/or resource problem, be at an undergraduate level, and have participants that are fully committed to a redesign initiative. The seven stage process I discuss recommends that institutional teams be formed, the course gets identified based on course readiness criteria, workshops be delivered to educate participants in the process, a project plan be developed, a pilot program be planned and developed, the pilot course(s) be delivered with an eye to collecting initial assessment data, and the fully redesigned course be delivered while collecting data on comparative student learning.

Overview of the Pew Program in Course Redesign

Universities today face several challenges including enhancing quality, improving retention, expanding access, and increasing institutional capacity. The National Center for Academic Transformation's Pew Program in Course Redesign advocates an approach that seeks to increase student learning outcomes and contain costs by focusing on the redesign of large introductory university courses.

The Program defines large courses as those that are among the top 25 in enrollment. Nationally, on average, at the baccalaureate level, these largest 25 courses generate about 35 % of student enrollment. Successful completion of these courses is essential to student progress toward a degree. High failure rates in these courses—typically 15% at research universities—can lead to significant drop-out rates between the first and second years of enrollment. By redesigning these large introductory courses, virtually every student that attends the university can be affected.

Additional impetus toward large course redesign comes from a number of consistent concerns. These include (Morgan 2006):

- Problems with course completion rates in many large enrollment introductory or required courses (high drop-failure-withdrawal (DFW) rates)
- The need to cope with high enrollment

- The need to alleviate problems caused by “chokepoint” and “roadblock” courses that inhibit student progress toward degree
- Inconsistency in course offerings
- Inability of students to apply knowledge learned to other courses
- Rising costs, and the need to contain these

The Program’s redesign approach makes use of technology to refashion the course activities according to one of five models: a supplemental model, a replacement or hybrid model, an emporium model, a buffet model, or a fully online course model. Each of these models falls along the continuum of blended learning.

- The *supplemental model* retains the same number of class meetings, but adds technology-based out-of-class activities to encourage greater student engagement with course content. Some redesigns that used this model also changed activities within the classroom.
- The *replacement or hybrid model* reduces class meetings, replacing face-to-face time with online interactive learning activities for students. In some cases, the face-to-face class meetings are reconceived as well.
- The *emporium model* allows students to choose when to access course materials, what types of materials to use depending on their needs, and how quickly to work through the materials with the support of sophisticated instructional software and one-on-one on-site help. This model, as developed at Virginia Tech, is based on having staffed computer lab space available to support the students’ activities.
- The *buffet model* assesses student learning styles and provides varied learning options within the course to allow students greater choice in the method they use to learn course material.
- The *fully online model* adopts many of the design principles used by the supplemental, replacement, and emporium models. This model often requires more time teaching online and interacting with students than is the case in classroom teaching.

Each of these models is used in the Program, but the most frequently used model is the replacement or hybrid model.

The findings of the Program in Course Redesign show:

- Out of the 30 institutions that redesigned courses, 25 showed improved learning, while the remaining 5 showed learning outcomes equivalent to traditional formats;
- Of the 24 institutions that measured retention, 18 resulted in reductions in drop-failure-withdrawal (DFW) rates; and,
- All 30 institutions reduced the cost of instruction—by 37 % on average, with a range of 15% to 77%.

Each of the redesign efforts showed similar characteristics including:

- Focusing on the redesign of a whole course, not just a single class;
- Emphasizing active learning, allowing greater student engagement with the material and one another;

- Relying heavily on readily available interactive software and other Web-based learning resources, used independently and in teams;
- Enabling mastery learning by organizing student pace and progress based on the successful completion of learning objectives—often in modular format, according to scheduled milestones for completion—rather than by class meeting times;
- Increasing on-demand, individualized assistance;
- Automating only those course components that can benefit from automation (e.g., homework, quizzes, exams);
- Focusing on improving student learning and increasing retention; and,
- Replacing single mode instruction with differentiated personnel strategies which helps decrease the costs of instruction

Cost savings were accomplished by:

- Reducing/substituting instructional resources while keeping enrollments constant;
- Increasing course enrollment while keeping course expenditures constant; or,
- Reducing the number of repetitions required to pass the course.

Strategies used to accomplish the reduction or substitution of instructional resources while keeping enrollments constant include:

- using online tutorials;
- utilizing Learning Management Systems;
- automating online assessment of exercises, quizzes, and tests;
- sharing resources;
- substituting staff;
- reducing space requirements; and,
- employing Undergraduate Learning Assistants

Participating institutions have used the cost savings to:

- offer additional or new courses that previously could not be offered;
- satisfy unmet student demand by serving more students on the same resource base;
- break up courses that delay forward progress of students within a subject area or program because they are oversubscribed (“academic bottlenecks”)
- increase faculty release time for research, renewal, or additional course development; and,
- combinations of these.

The Pew Program in Course Redesign has illustrated effective ways to improve student learning and reduce instructional costs. Their methodology is effective and reusable and should seriously be considered when implementing a large course redesign initiative.

Recommendations for NC State's Approach to Large Course Redesign

NC State University can benefit by the lessons learned by the Program in Course Redesign by creating an institutionalized way of approaching large course redesign. An initiative to redesign large-enrollment, multi-section courses using technology-supported active learning strategies can be accomplished at NC State. The purpose would be to achieve improvements in learning outcomes as well as reductions in instructional costs. The redesign efforts should help in achievement of the Student Success Initiative proposed by the Provost.

These introductory courses are good prospects for technology-enhanced redesign because they have a more or less standardized curriculum and outcomes that can more easily be delineated. They also serve as foundation studies for future majors. Successful learning experiences in them will influence students to persist in key disciplines like the sciences. Finally, because those courses are feeders to other disciplines, success in them will help students make the transition to more advanced study.

According to a similar initiative from the Arizona Board of Regents, key elements of the initiative should be:

- A focus should be on large-enrollment courses, which are defined as courses with very large sections (e.g., traditional lecture courses) or courses that offer large numbers of smaller sections.
- Courses selected to be redesigned should face an academic problem (e.g., high DFW rates), a resource problem (e.g., an inability to meet demand based on current resources), or a combination of both.
- Courses to be redesigned must be at the undergraduate level
- Participants must be fully committed to completely redesigning and delivering a large-enrollment course currently offered at NC State University

Grant funding would be necessary to accomplish this type of project. The University of Calgary grants \$30,000 for course redesign through their Inquiry Through Blended Learning program. The University System of Maryland Course Redesign Initiative provides \$20,000 for each project, which is to be matched by the individual institution. The Arizona Board of Regents expects to grant up to \$100,000 each for university-initiated redesign projects.

The goals of initiative should be to:

- Adopt new ways to improve student learning outcomes
- Demonstrate these improvements through rigorous assessment
- Increase consistency across multiple sections
- Free up instructional resources for other purposes
- Develop the internal capacity of university faculty and staff to continue the redesign process

According to the Institutional Readiness Criteria identified by the NCAT, NC State seems to be ready to embark on a large course redesign project. These criteria include:

1. The institution must want to reduce costs and increase academic productivity
2. The institution must view technology as a way to achieve strategic academic goals rather than as a general resource for all faculty and for all courses.
3. The institution's goal must be to integrate computing into the campus culture
4. The institution must have a mature information technology organization(s) to support faculty integration of technology into courses or it must contract with external providers to provide such support
5. A substantial number of the institution's faculty members must have an understanding of and some experience with integrating elements of computer-based instruction into existing courses.
6. The institution must have a demonstrated commitment to learner-centered education.
7. The institution must have established ways to assess and provide for learning readiness to engage in IT-based courses.
8. The institution must recognize that large-scale course redesign using information technology involves a partnership among faculty, IT staff, and administrators in both planning and execution.

A method has been identified by the University System of Maryland for the Maryland Course Redesign Initiative. This seems to be a very good model for embarking upon this type of initiative. The plan is detailed below.

Stage One: Establishing an Institutional Team

An institutional team must be established to work on this type of project; neither faculty, nor technologists can work on this alone. These teams should consist of the following people:

- *Faculty Experts.* Course redesign projects require faculty experts to explicitly identify the course's desired learning outcomes and agree on course content. Typically, large enrollment courses include more than one faculty member. These faculty experts must work together on the redesign to ensure course consistency, resolve any differences in how the course will be offered, and collaboratively plan the most effective way to accomplish the redesign goals.
- *Administrators.* As redesign projects impact multiple sections, large numbers of students, and academic policies and practices, it is important to include academic administrators on the team. These team members play an important role when institutional issues such as changes in scheduling or the use of classroom space arise. If unexpected implementation issues are encountered in the process of implementing the redesign, administrators can help the team resolve them quickly and effectively across institutional offices.
- *Instructional Designers and Technologists.* These team members provide expertise so that the redesign goals are accomplished in ways that make the

technology as easy for students to use as possible. Instructional Designers and Technologists contribute ideas about how to increase interaction with content as well as with other students. They also suggest design approaches to ensure that the technology does not limit students' learning options.

- *Assessment Experts*. It is useful to include someone who is knowledgeable about assessment and research design on the team, particularly if the institution seeks to measure not only the comparison of student learning in the redesigned course to that of the traditional course, but also additional facets of the redesign such as performance in downstream courses or student satisfaction, to name a few.
- *Subject Specialist Librarians*. To help determine good resources and activities for learning, it is important to involve librarians that specialize in the particular discipline of a course that is to be redesigned.

Stage Two: Identifying the Course

Some courses may be more ready than others to be the focus of a large-scale redesign project. Some faculty members, also, may be more ready to embark upon a large-scale redesign effort due to prior experiences with technology-enhanced teaching and learning, as well as numerous attitudinal factors. Several course readiness criteria have been identified by the NCAT:

Course Readiness Criteria

1. Improvements in the course potentially must have a high impact on the curriculum.
2. The courses must offer the possibility of capital-for-labor substitution.
3. Decision about curriculum in the department, program, or school must be made collectively—in other words, beyond the individual faculty member level.
4. The faculty must be able and willing to incorporate existing curricular materials into the project in order to focus work on redesign issues rather than on materials creation.
5. Project participants must have the requisite skills
6. The course's expected learning outcomes and a system for measuring their achievement must be identified.
7. The faculty members involved must have a good understanding of learning theory or access to expert partners.
8. In order for the innovation to be self-sustaining in the future, one must have a business plan to support the ongoing operation of the redesigned course.

A large course redesign initiative should require a brief narrative addressing these criteria as they apply to the large-enrollment course that is under consideration for redesign.

Stage Three: Planning for the Redesign

The people involved in the team(s) should receive training in a workshop, or series of workshops, that detail the concepts and processes of large course redesign. This workshop(s) should focus on selecting an appropriate redesign model, determining how

the redesign model will embody key pedagogical principles, planning for cost savings, assessing student learning outcomes, and developing a budget for the redesign project. NCAT provides a spreadsheet-based Course Planning Tool that enables teams to analyze the activities and costs of both the traditional course and the redesigned course in such a way as to improve student learning while reducing instructional costs.

This workshop could be available to all interested in embarking upon large course redesign initiatives.

Stage Four: Developing a Final Project Plan

Groups that have attended the workshop should develop a project plan that

- Details a proposed redesign model, an explanation for why it was chosen, and how it embodies the Five Principles of Successful Course Redesign;
- Describes the learning materials that would be used;
- Describes a cost-reduction strategy, explains why it was chosen, and what will be done with the savings; and,
- Includes a brief timeline for the redesign project.

The Five Principles of Successful Course Redesign are:

1. *Redesign the whole course.* Collective commitment of all faculty teaching the course coupled with the capabilities provided by information technology leads to success.
2. *Encourage active learning.* Make significant shifts in the teaching-learning enterprise, making it more active and learner-centered.
3. *Provide students with individualized assistance.* For example, replace or supplement lecture time with individual and small-group activities that take place in computer labs—staffed by faculty, graduate teaching assistants and/or peer tutors—and/or online, enabling students to have more one-on-one assistance.
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.
5. *Ensure sufficient time on task and monitor student progress.* Each redesign model must add greater flexibility in the times and places of student engagement with the course. Redesigns ensure student pacing and progress by requiring students to master specific learning objectives, frequently modular in format, according to scheduled milestones for completion.

Stage Five: Planning and Developing the Pilot

The institutional team(s) selected will engage in focused on-campus planning over the first part of the year(s). They will complete redesign preparations, finalize project teams, train faculty and staff, complete redesign activities, modify existing course materials when necessary, and incorporate additional content into course materials.

Stage Six: Piloting the Redesign

During the second part of the year(s), the project team will conduct a pilot implementation of their course redesign. The team will collect initial assessment data that compares student learning outcomes in the traditional course with those in the redesigned format. The team will make adjustments in the course materials and organization, if needed, in preparation for a full implementation the next term.

Stage Seven: Implementing the Full Redesign

In this last stage, the institutional team will fully implement their course redesigns and collect data on comparative student learning outcomes and on final instructional costs.

Using the Maryland model, and provided there is grant money to give, NC State should be able to create and sustain a Large Course Redesign Program. Leadership for this program could be based in DELTA. Before any course is redesigned, though, these essential readiness criteria need to be met:

- There needs to be a high level of commitment and buy-in from administrators and departments.
- Decisions about curriculum in the department, program, or school must be made collectively.
- The faculty must be able and willing to incorporate existing curricular materials in order to focus work on redesign issues rather than materials creation. Avoid the “not invented here” syndrome.
- A model for assessing and evaluating outcomes needs to be developed.
- The institution must have established ways to assess and provide for learner readiness to engage in IT-based courses.
- There needs to be a baseline level of academic technology infrastructure in place.
- Technology and faculty development support needs to be provided.

Having met these criteria, I believe NC State can embark on a successful redesign initiative.

Resources

Arizona Board of Regents, Learner Centered Education Course Redesign Initiative (LCE CRI): Call to Participate, 2007.

<http://www2.nau.edu/facdev/funding/AZ%20Call%20to%20Participate.pdf>

Morgan, Glenda, CSU Office of the Chancellor. Best Practices in Academic Transformation, September 2006.

http://www.calstate.edu/ats/transforming_course_design/documents/Academic-Transformation-best-practices.pdf

R2R The Roadmap to Redesign, Five Principles of Successful Course Redesign.

http://www.center.rpi.edu/PlanRes/R2R_PrinCR.htm

Twigg, Carol A. Policy Alert: Course Redesign Improves Learning and Reduces Cost, The National Center for Public Policy and Higher Education.

http://www.highereducation.org/reports/pa_core/core.pdf

Twigg, Carol A. Improving Learning and Reducing Costs: New Models for Online Learning, EDUCAUSE Review, September/October 2003.

<http://www.educause.edu/ir/library/pdf/erm0352.pdf>

Twigg, Carol A. Improving Learning and Reducing Costs: Redesigning Large Enrollment Courses, The Pew Learning and Technology Program 1999.

<http://www.thencat.org/Monographs/ImpLearn.html>

University System of Maryland, Maryland Course Redesign Initiative, Participation Guidelines, 2006. <http://www.usmd.edu/usm/academicaffairs/courseredesign/>