COST REDUCTION STRATEGIES

Previous NCAT redesign projects in mathematics have used a variety of strategies to reduce instructional costs. Here is a summary of the strategies that have proven to be most effective.

Step 1. Identify the enrollment profile of the course

- Is the course enrollment stable?

If the course enrollment is relatively stable (and accommodating more students is not a goal), you must reduce the number of people involved in teaching the course and/or change the mix of personnel in order to produce cost savings.

- Do you want to accommodate enrollment growth?

If accommodating more students is a goal, you do not have to reduce the number of people involved in teaching the course in order to produce cost savings, although you can do this. You can reduce the cost-per-student by teaching more students with the same staffing.

Step 2. Choose the labor savings tactic(s) that will allow you to implement the chosen strategy with no diminution in quality.

Traditional formats require instructors to carry out all of the development and delivery aspects of a course on their own. Course redesign involves substituting technology for much of that effort, often with the assistance of different kinds of personnel. Making the substitutions listed below allows each instructor to teach more students than before without increasing his or her workload.

- Substitute coordinated development and delivery of the whole course and shared instructional tasks for individual development and delivery of each individual course section.
- Substitute interactive tutorial software for face-to-face class meetings.
- Substitute automated grading of homework, quizzes, exams for hand grading.
- Substitute course management software for human monitoring of student performance and course administration.
- Substitute interaction with other personnel for one-to-one faculty/student interaction.

Step 3. Choose the appropriate cost reduction strategy.

There are three ways to re-structure the course that will reduce costs.

1. Each instructor carries more students. This can be done by
   a. increasing section size, or
   b. increasing the number of sections that each instructor carries for the same workload credit.
2. Change the mix of personnel from more expensive to less expensive.

3. Do both simultaneously.

Each of these strategies can be used whether your enrollment is growing or stable. When enrollment is stable, cost reduction means that fewer resources are devoted to the course. When enrollment is growing, cost reduction means that more students can be served on the same resource base. In each case, the cost-per-student (total resources devoted to the course/total course enrollment) is reduced.

1. Each instructor carries more students.

   a. Increase section size

   Stable enrollment: If your enrollment is stable, this will allow you to reduce the number of sections offered and the number of people teaching the course.

   Examples
   Traditional: 800 students: 40 sections of 20 students each taught by 40 instructors. S/F ratio = 20:1
   Redesign: 800 students: 20 sections of 40 students each taught by 20 instructors. S/F ratio = 40:1

   Growing enrollment: If your enrollment is growing, this will allow you to serve more students with the same number of people teaching the course.

   Examples
   Traditional: 800 students: 40 sections of 20 students each taught by 40 instructors. S/F ratio = 20:1
   Redesign: 1600 students: 40 sections of 40 students each taught by 40 instructors. S/F ratio = 40:1

   b. Increase the number of sections that each instructor carries for the same workload credit.

   Stable enrollment: If your enrollment is stable, this will allow you to offer the same number of sections and reduce the number of people teaching the course.

   Examples
   Traditional: 800 students: 40 sections of 20 students each; each instructor teaches one section for the same workload credit. S/F ratio = 20:1
   Redesign: 800 students: 40 sections of 20 students; each instructor teaches two sections for the same workload credit. S/F ratio = 40:1

   Growing enrollment: If your enrollment is growing, this will allow you to serve more students with the same number of people teaching the course.

   Examples
   Traditional: 800 students: 40 sections of 20 students each; each instructor teaches one section for the same workload credit. S/F ratio = 20:1
   Redesign: 1600 students: 80 sections of 20 students; each instructor teaches two sections for the same workload credit. S/F ratio = 40:1

2. Change the mix of personnel from more expensive to less expensive.

Stable enrollment: If your enrollment is stable, this will allow you to offer the same number of sections and reduce the total cost of the people teaching the course since adjuncts, tutors and undergraduate tutors are paid less than full-time faculty, and tutors and undergraduate tutors are paid less than adjuncts.

<u>Examples</u>
Traditional: 800 students: 40 sections of 20 students each; 30 sections taught by full-time faculty; 10 sections taught by adjuncts.
Redesign: 800 students: 40 sections of 20 students; 10 sections taught by full-time faculty; 30 sections taught by adjuncts.

Growing enrollment: If your enrollment is growing, this will allow you to serve more students, offer more sections and reduce the cost-per-student since adjuncts, tutors and undergraduate tutors are paid less than full-time faculty, and tutors and undergraduate tutors are paid less than adjuncts.

<u>Examples</u>
Traditional: 800 students: 40 sections of 20 students each; 30 sections taught by full-time faculty; 10 sections taught by adjuncts.
Redesign: 1600 students: 80 sections of 20 students; 20 sections taught by full-time faculty; 60 sections taught by adjuncts.

3. Do both simultaneously.

Most redesigns employ both strategies simultaneously as the examples below illustrate.

Examples

Cleveland State Community College (CSCC): In the traditional model, Cleveland State's developmental math program comprised 55 24-student sections in fall and spring, 45 of which were taught by full-time faculty (82%) and 10 by adjuncts (18%). Each course met three times per week. The total cost of the traditional course was $270,675. In the redesigned model, Cleveland State offered 77 18-student sections in fall and spring, all of which were taught by full-time faculty at a cost of $219,258. Each section had one class meeting per week in a small computer lab and students were required to spend two additional hours in a larger lab staffed by faculty and tutors. The total cost savings was $51,418, a 19% reduction. The FTE teaching load per faculty member went from 21.2 to 26.0 with no increase in workload. Faculty used to teach five sections per semester. In the redesign, faculty members taught 10-11 sections, which met once per week, and worked 8–10 hours in the lab. Increased faculty productivity enabled the department to eliminate the use of adjunct instructors while increasing course offerings. Overloads were also reduced as a result of the redesign project.

Jackson State Community College (JSCC): In the traditional model, Jackson State offered 89 sections of developmental math of 20–24 students each during fall and spring, 63 of which were taught by full-time faculty (71%) and 26 by adjuncts (29%). The cost of tutors was $4,510, bringing the total cost of the traditional course to $333,159. In the redesigned model, JSCC offered 71 sections during fall and spring; 44 sections enrolled 30 students and 27 enrolled 24 students. The number taught by full-time faculty

was 37 (52%), and the number taught by adjuncts was 34 (48%). The cost of tutors was $38,298, bringing the total cost of the redesigned course to $258,529. The cost-per-student of offering developmental math was reduced from $177 to $141, a 20% decrease. These changes enabled Jackson State to reallocate faculty time for other tasks within the mathematics department.

Louisiana State University (LSU): The redesign of College Algebra at LSU produced cost savings by serving the same number of students with one-half of the personnel used in the traditional model. Section size stayed at 40-44 students, but the number of class meetings each week was reduced from three to one. The redesigned format allowed one instructor to teach twice as many students as in the traditional format without increasing class size and without increasing workload. In the traditional format, each instructor taught one three-day-a-week section with 44 students. In the redesigned format, that same instructor taught two sections of 44 students and spent four hours tutoring in the lab. This could be accomplished because the class only met once a week and because no hand-grading was required. While the cost of adding tutors in the learning center as well as increased time for coordination and systems administration reduced the net savings, the redesign reduced the cost-per-student from $121 to $78, a 36% savings

Northeast State Technical Community College (NSTCC): NSTCC redesigned its developmental reading course, a traditional three-credit hour, lecture-based course. The course was taught in 24 small sections (~17 students) annually, 12 taught by full-time faculty and 12 taught by adjuncts. Employing multiple instructors led to course drift, creating inconsistency in the quality of course delivery. Small sections entailed a high delivery cost: the total cost of offering the traditional course was $80,832. The redesigned course included one section each term of 275 (fall) and 137 (spring) students each. Each section was team-taught by two full-time faculty, and no adjuncts were used. The team added trained reading professionals to work with students in the Reading Center at $15 per hour. The total cost of the redesigned course was $39,639, which represents a savings of $41,119, a 51% reduction. The savings generated by the redesign were placed into NSTCC's general fund to improve the education of all NSTCC students.

Tallahassee Community College (TCC): In its redesign of English Composition, TCC reduced the number of full-time faculty involved in teaching the course from 32 to 8 and substituted less expensive adjunct faculty without sacrificing quality and consistency. In the traditional course, full-time faculty taught 70% of the course, and adjuncts taught 30%. In the redesigned course, full-time faculty taught 33% of the course, and adjuncts teach 67%. Further savings were realized by reducing the amount of time and resources that the Writing Center staff had traditionally spent in working with students on basic skills. Mid-stage drafts were outsourced to SMARTHINKING, an online tutorial service. Overall, the cost-per-student was reduced from $252 to $145, a savings of 43%. Full-time faculty were freed to teach second-level courses where finding adjuncts was much more difficult.

University of Alabama (UA): The redesign of Intermediate Algebra at the University of Alabama generated cost savings by decreasing the number of faculty needed to teach the course while providing greater student interaction and consistency in learning outcomes. The university combined all sections into one and moved all structured learning activity to a Math Technology Learning Center (MTLC) open 65 hours per week. Students also attended a thirty-minute class session each week that focused on student

problems and built community among students and instructors. The number of instructors needed to teach the course decreased from 10-12 to six. Faculty time spent on the course declined by more than 20% and was redirected from presentation of material to interaction with students. A significant savings was realized through the use of undergraduate tutors to provide individualized student assistance in the lab in place of more costly graduate students. The redesign reduced the cost-per-student from approximately $122 to $82, a 33% savings. Savings from the redesign were used to expand the MTLC facilities and fund redesigns of other math courses.

University of Idaho (UI): The University of Idaho redesigned three pre-calculus courses enrolling a total of 2,428 students by moving them to the Polya Learning Center modeled after the Virginia Tech Math Emporium. In the traditional format, the courses met three times per week in sections of ~50 students taught by lecturers and graduate students using the didactic lecture format. Out-of-class assistance was provided by a tutoring center. The university moved all structured learning activity to the Polya center where students received just-in-time assistance from instructors and undergraduate assistants. Instructors also met students in a once-a-week focus group that focused on student problems and built community among students and instructors. Faculty preparation hours were reduced by 27% while interaction time with students more than doubled. One faculty member coordinated the course and a Lab Manager supervised personnel in the lab. The redesign reduced the total cost of offering all three courses from approximately $338,000 to $235,000, a reduction of 31%. Savings generated from this redesign remained with the department to be reinvested in redesigning additional math courses to be taught in the Polya Center.

Further Opportunities for Cost Savings

After several terms of fully implementing your redesign strategy, you <u>may</u> achieve further savings through such things as improved retention (increased course completion rates), the impact of modularization and/or reduced space requirements. There are, however, a number of variables that may influence whether or not you are able to realize those additional savings such as the number of students who accelerate vs. the number who move at a slower pace, scheduling complexities, and so on. Because it is difficult to predict how these various elements will play out until you have some experience with the redesign over time, your plan for cost reduction must include one of the strategies listed above which will result in immediate savings during the first term of full implementation.