

## CHARACTERISTICS OF ALL REDESIGN MODELS

**Whole course redesign.** In each case, the whole course rather than a single class or section is the target of redesign. Faculty begin the design process by analyzing the amount of time that each person involved in the course spends on each kind of activity, which often reveals duplication of effort among multiple faculty members. By sharing responsibility for both course development and course delivery, faculty save substantial amounts of time while achieving greater course consistency. Consistent content coverage means that all students have the same kinds of learning experiences, resulting in significant improvements in course coherence and quality control.

**Active learning.** All of the redesign projects make significant shifts in the teaching-learning enterprise, making it more active and learner-centered. Lectures are replaced with a variety of learning resources that move students from a passive, note-taking role to an active, learning orientation. As one math professor puts it, "Students learn math by doing math, not by listening to someone talk about doing math."

**Computer-based learning resources.** Instructional software and other Web-based learning resources assume an important role in engaging students with course content. Resources include tutorials, exercises and low-stakes quizzes that provide frequent practice, feedback and reinforcement of course concepts.

**Mastery learning.** While adding greater flexibility for when students engage with the course, the redesign projects are not self-paced. Rather than depending on class meetings, student pacing and progress are organized by the need to master specific learning objectives, frequently in modular format, according to scheduled milestones for completion.

**On-demand help.** An expanded support system enables students to receive help from a variety of different people. Helping students feel that they are a part of a learning community is critical to persistence, learning, and satisfaction. Many projects replace lecture time with individual and small-group activities that take place either in computer labs--staffed by faculty, graduate teaching assistants (GTAs) and/or peer tutors--or online, enabling students to have more one-on-one assistance.

**Alternate staffing.** By constructing support systems of various kinds of instructional personnel, the projects apply the right level of human intervention to particular student problems. Highly trained, expert faculty are not required for all tasks associated with a course. By replacing expensive labor (faculty and graduate students) with relatively inexpensive labor (undergraduate peer mentor and course assistants) where appropriate, the projects increase the person-hours devoted to the course and free faculty to concentrate on academic rather than logistical instructional tasks

## SUPPLEMENTAL MODEL

- Retains the basic structure of the traditional course, particularly the number of class meetings.
- May simply supplement lectures and textbooks with technology-based, out-of-class activities to encourage greater student engagement with course content and to ensure that students are prepared when they come to class.
- May add technology-based, out-of-class activities and also change what goes on in the class by creating an active learning environment within a large lecture hall setting.

### Examples that Add Out-of-Class Activities and Do Not Change In-Class Activities

- Students use a two-disc CD-ROM--which contains interactive activities, simulations, and movies--to review and augment text material. Students receive credit for completing four online mastery quizzes each week and are encouraged to take the quizzes as many times as needed until they attain a perfect score. Only the highest scores count.
- An automated, intelligent tutoring system monitors students' work as during lab exercises, providing feedback when students pursue an unproductive path, and closely tracking and assessing a student's acquisition of skills—in effect, providing an individual tutor for each student.

### Examples that Add Out-of-Class Activities and Change In-Class Activities

- Students review learning objectives, key concepts and supplemental material posted on the class Web site prior to class and complete online quizzes, which provide immediate feedback to students and data for instructors to assess student knowledge levels. During class, the instructors use a commercially available, interactive technology that compiles and displays students' responses to problem-solving activities. Class time is divided into ten- to fifteen-minute lecture segments followed by sessions in which students work in small groups applying concepts to solve problems posed by the instructors. Instructors reduce class time spent on topics the students clearly understand, increase time on problem areas, and target individual students for remedial help.
- A 200-student class meets twice a week in an auditorium. The first meeting focuses on an instructor overview of the week's activities. About a dozen discussion questions are posted on the Web. Students meet for one hour in small learning teams of 10-15 students (supervised by undergraduate learning assistants) to prepare answers collaboratively and to carry out inquiry-based team projects. Teams post written answers to all questions. At the second class meeting, the instructor leads a discussion session, directing questions to the learning teams. The instructor has reviewed all posted answers prior to class and devotes class time to questions with dissonant answers among teams.

## REPLACEMENT MODEL

- Reduces the number of in-class meetings but does not eliminate all in-class meetings.
- Replaces (rather than supplements) some in-class time with online, interactive learning activities.
- Gives careful consideration to why (and how often) classes need to meet in face-to-face .
- Assumes that certain activities can be better accomplished online--individually or in small groups--than in a face-to-face class.
- May keep remaining in-class activities more or less the same.
- May make significant changes in remaining in-class meetings.
- May schedule out-of-class activities in 24\*7 computer labs or totally online so that students can participate anytime, anywhere.

### Examples that Substitute Out-of-Class Activities for Some In-Class Time and Do Not Change In-Class Activities

- Reduce lectures from 3 to 1 per week (keeping 1 lecture the same) and change 2 recitation sections to 2 computer-studio labs, where students work individually and collaboratively on computer-based activities. Students are tested on assigned readings and homework using Readiness Assessment Tests (RATs) 5-7 times during the term for 30% of their grade. Students prepare outside of class by reading the textbook, completing assignments, and using Web-based resources. Students take the tests individually and then immediately in groups of four. RATS motivate students to keep on top of the course material and enable faculty to detect areas in which students are not grasping the concepts.
- Reduce lectures from 2 to 1 per week (keeping 1 lecture the same) and reduce discussion sessions from 2 to 1 per week. Substitute Web-based tutorial modules that lead students through a topic in 6 to 10 interactive pages. Then, a debriefing section includes questions that test whether the student has mastered the content. Diagnostic feedback points out why an incorrect response is not appropriate. Students can link directly from a difficult problem to additional tutorials that help them learn the concepts.

### Examples that Substitute Out-of-Class Activities for Some In-Class Time and Change In-Class Activities

- *Spanish*: Reduce class-meeting times from 3 to 2 per week. Move grammar instruction, practice exercises, testing, writing, and small-group activities focused on oral communication to the online environment. Use in-class time for developing and practicing oral communication skills.
- *English composition*: Reduce class-meeting times from 3 to 1 per week and substitute 2 workshops. Use online resources to provide diagnostic assessments resulting in individualized learning plans; interactive tutorials in grammar, mechanics, reading comprehension, and basic research skills; and discussion boards to facilitate the development of learning communities. Use in-class time to work on writing activities.

## EMPORIUM MODEL

- Eliminates all class meetings and replaces them with a learning resource center featuring online materials and on-demand personalized assistance.
- Replaces multiple sections with one large section of all students.
- Depends heavily on instructional software, including interactive tutorials, practice exercises, solutions to frequently asked questions, and online quizzes and tests.
- Allows students to choose when to access course materials, what types of learning materials to use depending on their needs, and how quickly to work through the materials.
- Uses a staffing model that combines faculty, GTAs, and peer tutors who respond directly to students specific needs and direct them to resources from which they can learn.
- Requires a significant commitment of space and equipment.
- More than one course can be taught in an emporium, thus leveraging the initial investment.

### Example with Open Attendance

- An open attendance model can be used when students are highly motivated, respond well to greater flexibility and are accustomed to scheduling work in the emporium around their other course responsibilities.

### Examples with Required Attendance

- Elements of required attendance should be added when students are not highly motivated, founder when faced with greater flexibility and are inexperienced in scheduling work in the emporium around their other course responsibilities.
- Mandatory attendance (e.g., a minimum of 3.5 hours in the emporium) ensures that students spend sufficient time on task.
- Mandatory weekly group meetings enable instructors to follow up where testing has identified weaknesses or emphasize particular applications. Group activities helps build community among students and with instructors.

## ONLINE MODEL

- Eliminates all in-class meetings and moves all learning experiences online.
- Adopts successful design elements of Supplemental, Replacement and Emporium models including Web-based, multi-media resources, commercial software, automatically evaluated assessments with guided feedback, links to additional resources and alternative staffing models.

### What This Model Is Not

- Individual faculty members design and deliver multiple course sections, each of which is relatively small in size.
- Web-based materials are used largely as supplemental resources rather than as substitutes for direct instruction.
- Instructors are responsible for all interactions, personally answering every inquiry, comment, or discussion.
- Faculty members spend more time teaching online and interacting with students than in classroom teaching.

### Example that Depends on Heavy Use of Instructional Software

- Software presents course content; instructors do not need to spend time delivering content.
- Software increases the amount and frequency of feedback to students. All assignments are graded on the spot.
- Software enables self-pacing: each student can work as long as needed on any particular topic, moving quickly or slowly through the material.
- Software provides a built-in tracking system that allows the team to know every student's status, both time-on-task and progress through the modules.
- May add a course assistant to address non-content-related questions and to monitor students' progress, thus freeing the instructor to concentrate on academic rather than logistical interactions with students.

### Example that is Web-based

- Combines multiple sections into a single 800-student online section organized around four four-week modules, each taught by faculty who are expert in the topic of the module.
- Faculty members are responsible for content materials, quizzes, and exams.
- A course coordinator is responsible for overall course administration; graduate teaching assistants grade and respond to student problems.
- Students complete a pre- and post-quiz for each module. Links to additional required readings, audio and/or video files, and other resources are provided.
- Eliminates duplication of effort for faculty who divide tasks among themselves and target their efforts to particular aspects of course delivery.

## **BUFFET MODEL**

- Customizes the learning environment for each student based on background, learning preference, and academic/professional goals
- Requires an 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 which gives each student a detailed listing, module by module, of what needs to be accomplished, how this relates to the learning objectives, and when each part of the assignment must be completed.
- Includes an array of learning opportunities for students: lectures, individual discovery laboratories (in-class and Web-based), team/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 (GTA graded or self-graded), and individual and group projects.
- Uses an initial in-class orientation to provide information about the buffet structure, the course content, the learning contract, the purpose of the learning styles and study skills assessments, and the various ways that students might choose to learn the material.
- Modularizes course content.
- May allow students to earn variable credit based on how many modules they successfully complete by the close of the term, thus reducing the number of course repetitions. Students complete the remaining modules in the next term.
- Eliminates duplication of effort for faculty who divide tasks among themselves and target their efforts to developing and offering particular learning opportunities on the buffet.
- Enables the institution to evaluate the choices students make vis a vis the outcomes they achieve (e.g., if student do not attend lectures, the institution can eliminate lectures)

# EXAMPLES FOR FUTURE REFERENCE

## SUPPLEMENTAL MODEL

### Added Out-of-Class Activities and Did Not Change In-Class Activities

- University of New Mexico (UNM)'s redesign of general psychology  
<http://www.center.rpi.edu/PewGrant/RD3 Award/UNM.html>
- Carnegie Mellon University's redesign of introductory statistics  
<http://www.center.rpi.edu/PewGrant/RD2 Award/CMU.html>

### Added Out-of-Class Activities and Changed In-Class Activities

- University of Massachusetts-Amherst's (UMass) redesign of introductory biology  
<http://www.center.rpi.edu/PewGrant/RD2 Award/UMA.html>
- University of Colorado-Boulder's (UC) redesign of introductory astronomy  
<http://www.center.rpi.edu/PewGrant/rd1award/UCB.html>

## REPLACEMENT MODEL

### Substituted Out-of-Class Activities for Some In-Class Time and Did Not Change In-Class Activities

- Penn State's redesign of introductory statistics  
<http://www.center.rpi.edu/PewGrant/rd1award/PSU.html>
- University of Wisconsin at Madison's redesign of general chemistry  
<http://www.center.rpi.edu/PewGrant/rd1award/UWM.html>

### Substituted Out-of-Class Activities for Some In-Class Time and Changed In-Class Activities

- University of Tennessee–Knoxville's redesign of introductory Spanish  
<http://www.center.rpi.edu/PewGrant/RD2 Award/UTK.html>
- Portland State University's redesign of introductory Spanish  
<http://www.center.rpi.edu/PewGrant/RD3 Award/PoSU.html>
- Tallahassee Community College's redesign of college composition  
<http://www.center.rpi.edu/PewGrant/RD3 Award/TCC.html>

## EMPORIUM MODEL

- Virginia Tech's redesign of linear algebra  
<http://www.center.rpi.edu/PewGrant/RD1award/VA.html>
- The University of Alabama's redesign of intermediate algebra  
<http://www.center.rpi.edu/PewGrant/RD2 Award/UA.html>
- The University of Idaho–Moscow's redesign of pre-calculus  
<http://www.center.rpi.edu/PewGrant/RD2 Award/UI.html>

## FULLY ONLINE MODEL

- Rio Salado College's redesign of pre-calculus math  
<http://www.center.rpi.edu/PewGrant/rd1award/rio.html>
- University of Southern Mississippi's redesign of world literature course  
<http://www.center.rpi.edu/PewGrant/RD3 Award/USM.html>
- Florida Gulf Coast University's redesign of fine arts  
<http://www.center.rpi.edu/PewGrant/RD3 Award/FGCU.html>

## BUFFET MODEL

- Ohio State University's redesign of introductory statistics  
<http://www.center.rpi.edu/PewGrant/RD3%20Award/Ohio.html>