

## HOW TO REDESIGN A COLLEGE-LEVEL OR DEVELOPMENTAL MATH COURSE USING THE EMPORIUM MODEL

### IV. How to Set Up the Lab

Setting up the lab or computer classroom involves a lot of details and decisions. Ensuring that the lab/computer classroom is properly set up with well-functioning software and hardware, well-trained tutors and effective scheduling is crucial to success in the Emporium Model. The following questions are frequently asked by teams working on new redesigns; the answers have been collected from those who have successfully implemented and sustained a math Emporium Model. For some questions, the same answer applies to both the flexible and the fixed attendance versions of the Emporium Model. For others, the answers differ. A description of the two versions can be found in Chapter I.

#### Software

##### **Q. How do we choose the right instructional software package?**

A. Some teams initially believe that they will choose the software that accompanies the text they are currently using. Although that's certainly a possibility, it is useful for teams to consider the range of software options now on the market. Prior to making a software selection, a team should invite various vendors to demonstrate their products and discuss particular institutional needs to determine how well the software could meet those needs.

The following list was developed by Phoebe Rouse at Louisiana State University. It provides a structure for teams to use as they consider which software package would work best with their students at their institution.

#### Must Haves (Without these, nothing else matters!)

- *Reliability.* Students and faculty need to know that the software will operate consistently and without major or frequent downtimes.
- *High-quality content.* Faculty must be confident that the content included is comprehensive, current and well explained.
- *User-friendliness.* The software must be easy to use. Explanations to faculty for setting up the software with the appropriate learning resources, homework and assessments should be clear. Software should be easy for students to use so that they can focus on learning math, not learning software.

#### Other Features to Consider

- Ease of installation
- Cost to student
- Cost to institution
- Quality and accessibility of technical support
- Vendor willingness to provide training
- Browser restrictions

- Platform restrictions
- Capability for faculty to communicate with students
- Algorithmic exercises available
- Tutorial features
- Textbook included
- Videos
- Partial credit for multi-part questions
- Pooling for tests
- Sophistication of testing mechanism
- Coordinator/master course capability
- Gradebook features
- Ease of ability to export grades
- Feedback after submission
- Ability to print student work
- Multiple attempts allowed on assignments
- Settings for individual students
- Software compatibility with Americans with Disabilities Act (ADA)
- IP address restriction capability

**Q. What about using free (open-source) software?**

A. Some teams have considered using free software or resources available in repositories at the state or national level, but all of the successful implementations of the Emporium Model have based their redesigns around commercial software. Free resources should be evaluated using the earlier list. A key consideration is the decision about who will maintain and update the free resources over time. Companies are committed to doing so; free resources are often produced as one-offs as part of a particular project or grant program.

**Q: What should we do if students cannot purchase software access codes at the beginning of the term for financial aid reasons?**

A: Some of the commercial software providers have an option that gives students temporary access codes for several weeks while waiting for their financial aid. When a student buys the access code, the student retains the work done, as if the student had bought the code at the beginning of the term. If the student does not purchase the access code by the end of the grace period, the student's work cannot be accessed. When interviewing software companies, you should ask whether they provide such a grace period for students.

**Q: Do students also need a textbook?**

A: Institutions have made different decisions regarding whether or not the students need a textbook. Some believe it is important for students to see the course content in a hard copy format; others believe that the software accompanied by an online text is sufficient and view the hard-copy text as an unnecessary but temporary crutch. Still others make the hard copy textbook optional, depending on student preference. Making the decision about whether to require a textbook should occur after the software has been selected so that the kinds of resources included in the software are known.

**Q: How do we interface our instructional software with our campus student information system?**

A: It is difficult to generalize about this issue because the variety of course structures, software packages and student information systems and their interaction with one another can create multiple kinds of problems and multiple kinds of issues. Establishing an interface between instructional software packages with their built-in course management systems and the larger campus-wide systems also can present challenges. Suffice it to say, addressing these issues early in the redesign process facilitates a smoother transition, and the cooperation of IT and other campus offices is essential.

Hardware

**Q: How do we determine how many computers we need in the lab for students?**

A (*Flexible Attendance*): Here are some things to consider:

- There is obviously a relationship between the number of hours that the lab is open and the number of computers needed. (The more hours open, the fewer computers needed and vice versa regardless of the number of students enrolled in the course.)
- You should carefully stagger due dates and weekly class meetings to even out the times students go to the lab.
- Even with careful scheduling, all open labs experience peak attendance periods. For some it's late afternoon and early evening; for others it's early afternoon and early evening. Planning must take this into account—that is, you don't want students routinely arriving at the lab to find that all computers are taken.
- You should determine when the lab will be open based on your institution's demographics, especially when students tend to be on campus.
- If possible, create a space within the lab for students to use their *own* laptops to supplement the number of PCs needed.

Many of the redesigns that use the Emporium Model have large numbers of students and keep their labs open 60 or more hours per week. In addition, campuses may be primarily residential, which means that student participation is relatively evenly distributed throughout the day. Those institutions' experience, based on requiring three hours of lab participation per week per student and keeping the lab open 60 or more hours per week, translates into the following rule of thumb:

The number of computers required = the number of students/15 if you do not test in your lab or the number of students/11 if you do test in your lab.

Examples without testing

1000 students/15 = 67 computers

800 students/15 = 53 computers

500 students/15 = 33 computers

Examples with testing

1000 students/11 = 91 computers

800 students/11 = 73 computers

500 students/11 = 46 computers

Even though the calculations translate roughly to 4 computer hours per student if you do not test and to 5.5 hours per student if you do test, the large numbers of open hours and the relatively even distribution of student participation are necessary components of making those ratios work. Once your lab is open fewer hours, which might be necessary because of staffing constraints or lab availability or student attendance patterns, these ratios do not hold. Smaller numbers of students and smaller numbers of open hours create additional constraints that require special attention in order to make an open lab work.

Example

200 students

Lab is open 20 hours per week

Requires 40 computers

Ratio = 5:1

Example

240 students

Lab is open 12 hours per week

Requires 120 computers

Ratio = 2:1

A (*Fixed Attendance*): If you do not have a large lab and/or your numbers are small, we strongly recommend that you schedule lab hours for students rather than rely on an open lab. This would ensure that the number of computers available matches student demand. What is most important in the Emporium Model is that students be working in the lab the requisite number of hours, not the flexibility of those hours. Block scheduling can be as effective as open scheduling in this model.

The lab should have sufficient numbers of computers for each student to have one during scheduled times, but some additional computers should be available for those students who would like to work additional hours in the lab beyond the scheduled meeting times.

**Q: What kinds of technological problems can we anticipate?**

A: Most technological problems occur during the early stages of implementation and concern, for example, periodic Internet outages (sporadic interruptions in access to the course software or campus network interruptions), late-arriving equipment and software server glitches. Course management systems and delivery servers may need to be upgraded to a more robust enterprise version. When the Internet is not available, it is important to have an alternative plan to engage students.

**Q: Should students bring their own computers to the lab or should they use those already in the lab?**

A: Different institutions have made different decisions. Institutions with a laptop requirement create emporia consisting of tables, and students use their own laptops. In essence, every classroom can be an emporium. The downside to this approach is that students may be more likely to visit other websites and neglect their coursework. Thus, other institutions believe that students should use only computers that are in the lab where access locations can be limited to those related to the modules. For testing, using lab computers with restricted Web access is

important so that it is clear that the students are doing their own work. Walk-around proctoring can address both problems.

## Tutors

### **Q: How many tutors will we need in the lab?**

A (*Flexible Attendance*): For the first three to four weeks, you will need one tutor for every 15 students. As the semester progresses and students become familiar with the lab and the software, that ratio drops down to 1:25 and often is as low as 1:40 by the end of the semester. If testing is done in the lab, be sure to have an appropriate test proctor rather than student tutors.

A (*Fixed Attendance*): In this version of the Emporium Model, instructors meet with their individual sections in the lab at fixed times. Additional tutors may be needed during those times and are definitely needed at times when the lab is open but there are no scheduled classes. The ratios described above for later in the semester then apply. If testing is done in the lab when classes are not scheduled, be sure to have an appropriate test proctor rather than student tutors.

### **Q: Who are the lab tutors? What qualifications and background do lab tutors need to have?**

A: You will need your instructors to tutor in the lab; their presence is essential. In addition, undergraduate math majors and other interested undergraduate students make excellent tutors. Volunteers from the community such as retired high school teachers can tutor. Adjunct faculty may be paid extra to work additional hours in the lab. Math graduate students can also tutor if they are available.

### **Q: How much training is needed for lab tutors?**

A: Many institutions experience problems because they underestimate the degree of training—both initial and ongoing—that is required in order to implement their redesigns successfully. The new format inevitably requires certain kinds of interactions with students that are very different from those in the traditional teaching format. Developing a formal plan for initial and ongoing training of all personnel rather than assuming they will pick up the new methods on their own will go a long way to ensuring a successful redesign. Tutors working in a redesigned setting for the first time need enough training to understand the new philosophy of teaching.

### **Q: What should tutor training include?**

A: The most important aspect of tutor training is how to teach in the Emporium Model because the one-on-one assistance the computer-based format requires is very different from the teaching format that instructors have used and/or experienced in the past. Tutors need to be coached in how to facilitate and engage students in problem-solving rather than in resorting to lecturing or providing answers for students. Training should include:

- A full explanation of the Emporium Model, including its rationale and benefits
- Clear guidelines on tutors' responsibilities in the new model
- Instruction in use of the instructional software

- Discussion of all emporium policies and procedures
- The importance of maintaining consistency in implementation of all elements of the redesign

**Q: Do tutors need to work through the course modules?**

A: It is helpful for new tutors to work through the modules. Doing so enables them to become familiar with the order in which the material is presented, grow accustomed to the wording of questions and recognize the ways the software expects answers to be entered.

**Q: How often do we need to train tutors?**

A: The desire to go back to old ways of doing things has to be overcome. Ongoing mandatory training of tutors is the only way to ensure that success will be achieved. All personnel need to be reminded of the policies and procedures and learn about changes in the software. We recommend holding a meeting with all experienced tutors at least once each semester to review old policies and point out any new ones.

As new tutors are brought into the course over time, it is important to help them go through the same steps of accepting a different learning model and to point out ways of creating the type of connections attributed to the traditional lecture format. We recommend holding a workshop for tutors new to redesign at the beginning of each semester and then monitoring their work throughout that initial term of working in the Emporium Model.

Scheduling

**Q: How should we track lab participation?**

A (*Flexible Attendance*): You will need a system to track students when they arrive and when they leave using a commercial product or a homegrown program. Most institutions use a card swipe with student IDs and have some mechanism to move this information to specific instructors on a weekly basis by email or by direct download to grading software.

A (*Fixed Attendance*): Instructors take attendance via a sign-in sheet when their sections meet in the lab. For institutions that also require students to spend additional hours in the lab, you will need a system as described earlier.

**Q: How can we smooth out demand for the lab throughout the week?**

A (*Flexible Attendance*): There are typically peak usage times in the lab, so it is important to stagger due dates and weekly class meeting times to spread out demand on the lab because most students tend to do their work at the last minute—that is, don't schedule all weekly class meetings on the same day of the week and don't have all assignments due on the same day of the week. Spread assignment deadline dates across each day of the week; thus, 20 percent of students have deadline dates for assignments, tests and quizzes on Monday, 20 percent on Tuesday, and so on.

A (*Fixed Attendance*): In this version of the Emporium Model, demand is smoothed out by scheduling weekly class meetings appropriately.

**Q: What are the peak times in the lab?**

A (*Flexible Attendance*): Of course, this varies among institutions, but many institutions have peaks around 10:30 a.m., 1:30 p.m., and again around 6 p.m. For some unknown reason, it appears that Tuesday afternoon is the busiest time at many institutions. Keep track of lab attendance every quarter hour—entering numbers in a table—and study the table to determine staffing decisions for future semesters. Colleges have also found it useful to communicate information about peak demands with their students. Then students can plan their time so that they don't arrive when the lab is already full.

A (*Fixed Attendance*): In this version of the Emporium Model, peaks are managed by scheduling section meetings appropriately. Most institutions include extra computers beyond the number needed for the scheduled section(s) so that students can drop in for additional help or stay beyond their scheduled time if they desire to do so.