

**Los Medanos College
Developmental Math Program
Summary of Work
2006-2007**

Arithmetic:

In the spring 2007, the Math DE Committee offered a series of four Basic Skills retreats with the goal of analyzing our current arithmetic courses and making a recommendation for updating these courses to reflect the Math DE Program Student Learning Outcomes and better serving our students. We currently offer five different arithmetic courses, each originally designed to address the needs of specific populations. Eight faculty attended the retreats, four of whom were adjuncts. They identified the following problems:

- Course descriptors in the catalog make this a confusing array of courses. Anecdotal evidence suggests that students do not end up in the right arithmetic course; for example, the Disabled Students Program advises students to take a course designed for students in occupational programs because it can be completed 0.5 units at a time.
- There has been significant curriculum “creep”; for example, the curricular materials and texts used by instructors in courses designed for occupational programs do not contain applications pertinent to those programs.
- For all courses except one, the course outlines are outdated and do not reflect Math DE Program SLOs for communication, problem-solving in real world contexts, use of multiple representations connected to quantitative literacy skills, and effective learning skills.
- We do not have recent OIR research on completion of any of the possible basic skills sequences. An earlier study of three small cohorts taking the popular computer-based variable-unit course showed that fewer than 20% of any cohort finished the 3 units required for the certificate. The study did not indicate whether students had moved into prealgebra after finishing 1.5 units of arithmetic review.

After interviewing faculty teaching in occupational programs, reviewing the math components of several certification and job-training entrance exams, and discussing how the Math DE Program SLOs could be achieved through an arithmetic course, the group recommended that the department

- consolidate the current course offerings into one arithmetic course and write a course outline aligned with the Math DE Program SLOs (the group drafted a set of course-level SLOs that reflected the program-level SLOs);
- design a “project-based” curriculum where students work in teams to use quantitative literacy skills and arithmetic reasoning to solve and present solutions to problems based in real-world and occupational contexts;
- integrate multiple modes of instruction into the course, including lecture, lab, computer-aided instruction, and mastery-based learning.

Prealgebra

We built on the work of a SP 06 Prealgebra Teaching Community, which is documented in a KEEP snapshot entitled *Prealgebra Classroom Research: Working Together to Improve Student Learning*. See <http://www.cfkeep.org/html/stitch.php?s=21223071051038&id=58310652392274>. After reading LiPing Ma's *Knowing and Teaching Elementary Mathematics*, the SP 06 Teaching Community developed an appreciation for the conceptual richness of arithmetic and a realization that that we needed to do more to understand these concepts before we could teach them effectively. So in SP 07 we sponsored weekly meetings for a group of seven instructors, two of whom were adjuncts, to read and discuss Susan Lamon's *Teaching Fractions and Ratios for Understanding*. For the first month we had the instructors do think-alouds with problems from the book, with the caveat that they could not resort to algorithms to solve the problems. This forced instructors to think about the concepts and to analyze their own reasoning. This introductory exercise brought many previously unexamined arithmetic reasoning skills to light. Each instructor then took responsibility for leading the discussion on an assigned chapter and produced the following:

- (1) Summary of the key ideas from the chapter.
- (2) Set of problems that address the key ideas (perhaps drawing heavily from the problem sets in the chapter but changing contexts to adult settings).
- (3) Snapshot of Math 12 students' thinking relative to the ideas in the chapter.
 - Identify one assessment problem that reflects the key points (perhaps just use the opening problem from the chapter);
 - Give the problem to prealgebra students and analyze their responses;
 - Compare our prealgebra student responses to the examples of student work in the chapter.
- (4) Framework for understanding developmental stages of student thinking (perhaps a rubric developed from our discussion of student work). We plan to use this framework as an instructional resource to help instructors make instructional decisions during class when they are using teaching this material.

Elementary Algebra

In January, we assessed student work on final exams from 7 of the 10 sections of Elementary Algebra to gauge attainment of program-level SLOs. Relative to FA 03, we found significant decreases in the percent of students rated as proficient in communication and use of multiple representations, with no improvement in problem-solving. This contrasts with the sustained improvements in learning for Intermediate Algebra students. To understand this decline in learning, the Math DE Committee analyzed the activities written by Teaching Communities for alignment with these SLOs, surveyed instructors about the use of these activities, and reviewed exams given by Elementary Algebra instructors. See the attached "Measuring the Impact of Professional Development: Two Case Studies" for more analysis. The committee concluded that, in

general, instructors were not teaching to the SLOs. In an attempt to improve learning, we implemented a three-step plan:

- SP 07: four retreats focused on pedagogy that promotes problem-solving; 16 instructors, 13 of whom were adjuncts, read and discussed case studies from *Improving Algebra Instruction: Using Cases to Transform Mathematics Teaching and Learning* and conducted a classroom-based project. See attached “Algebra Retreat Assignment;”
- SU 07: overhaul of the classroom activities to more fully integrate communication, problem-solving, and multiple representations along with the development of our first instructors’ manual;
- FA 07: weekly Japanese Lesson Study based on new classroom activities with instructors sharing set-up and implementation strategies used for each activity, analyzing student work on a previous activity, and preparing for the next activity by reviewing a draft of an instructors’ manual.

Scholarship of Teaching and Learning (SoTL)

At the end of the Spring 2006 semester we had a two day workshop facilitated by Randy Bass as the kick-off event for our SoTL seminar for math and English faculty teaching developmental education courses. Randy provided a theoretical framework for SoTL projects, and helped faculty think about questions they might investigate in the classroom. In addition, he modeled several strategies for conducting some classroom research and introduced them to Keptools as a way of representing their work.

In Fall 2006, 11 faculty members teaching developmental math and English participated in bi-monthly seminars in which we explored questions of teaching and learning relevant to their SoTL projects. Each participant produced a website documenting their classroom research project. To see the gallery of websites go to

http://www.cfkeep.org/users/msnell/lmc_sotl_fa_06