An Integrated Laboratory-Classroom for Calculus and Precalculus

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Before applying for our ILI grant, our department had experimented with various ways of using computers with our calculus classes: sessions dedicated to laboratory projects, integrating the computer with other group work in one of the college computer laboratories. We had also done various experiments with using groups and with using one of the calculus reform texts in preparation, Ostebee and Zorn. Having found out what worked and what didn’t with our students, we applied for computers to equip a classroom in which we could easily move from one type of activity to another.

Thus, we have a classroom with 15 tables, each large enough for two students to sit comfortably or three closely, one computer per table, with the tables separated enough that the instructor can move around the room freely. The point of the flexible sized groupings is that some of us prefer have students work in groups of two, others in groups of three, and this way the whole department can use the room comfortably. We found that in the traditional computer laboratory, computer screens obscure the line of sight between students and board, and between teacher and student. To avoid this as much as possible while still having the computer available without moving around the room, we just have one machine per desk and have it mounted on a swing arm which permits moving it off the desk when not in use. We also had the monitors wired separately from the computers so they could be switched off when not in use to minimize distractions from computer games, e-mail, etc. To allow the instructor to move between groups easily when the students are working in groups, it was important to avoid the long rows of tables found in computer laboratories. Finally, there are blackboards around the room so that students can also work in groups at the blackboards when appropriate.

All sections of calculus are using Calculus T/L II (a front-end for Maple) because its point-and-click style seems to take less start-up time for the students. Sections of precalculus are using Mathematica, since they’re basically only using graphing commands. The machines are Macintosh Power PC’s which also have MATLAB installed on them for use with linear algebra. There is also an overhead projection system. We are using this classroom with Ostebee and Zorn’s “Calculus from Graphical, Numerical and Symbolic Points of View” and with an experimental precalculus text. Time in class is spent on a range of activities most days: interactive discussion between the class as a whole and the instructor; group work on problems with pencil and paper as well as with the machine; overhead demonstrations by the instructor of appropriate ways to use the computer; and sometimes the class as a whole at the blackboard. The classroom makes this variety of activity convenient.

At the poster session we will have, in addition to a description of the project, diagrams and pictures of the room and its use.