A concept web created by my students hangs central on the wall above my desk. It is eleven by seventeen inches of gold construction paper with carefully distributed green sticky notes. Each sticky note is labeled with a concept such as “Invertible” or “Determinant” and is connected to a few close neighbors by a dark line drawn in Sharpie marker. Each connection is labeled with a relationship between the ideas on the stickys, e.g. “A is invertible iff detA ≠ 0”. This concept web was synthesized from six others created by small groups of students in my discussion section of an honors course in Linear Algebra and Differential Equations. Each day, this office decoration reminds me of the infectious enthusiasm of my students to devour knowledge.

Students are the motivating force behind my endeavors in mathematics. I have worked as the instructor of record and as a teaching assistant in a variety of courses at the University of Minnesota (UMN). This semester, I commute to St. Olaf College to teach a small, active classroom of exceptionally inspiring students. The following series of examples demonstrate how this inspiration manifests itself in my classroom for student benefit.

**Concept Webs** The concept web activity simultaneously promoted student learning on multiple levels. First, students reviewed fundamental concepts and identified the most important objects for the stickies. Next, students focused on the interdependence of fundamental concepts as they drew the connecting lines, highlighting the relationships that underlie an entire unit of linear algebra. After the initial web’s creation, groups compared their concept web to the synthesized one (now above my desk), evaluated the accuracy of their web, and revised it to correct any misconceptions. Thus students practiced analytical skills that develop tools for independent learning. Finally, situating the fundamental concepts in their broader structure reinforced students’ retention of the essential material.

Despite the theoretical effectiveness of such active learning projects, generating sufficient student buy-in can represent a practical obstacle. As I held up construction paper and sticky notes to introduce the concept web activity, my students weren’t necessarily ready for “an arts and crafts project” in their honors math class. However, I had introduced small-group activities early in the semester and shared personal stories about my visual relationship with mathematics; developing familiarity, respect, and trust. So, after a dorky joke about my love of crafts, they settled into their usual groups and bought into physically constructing the theory. By establishing an open and honest atmosphere early, I have successfully implemented projects outside the scope of what students might expect to find in mathematics. A second challenge in actualizing such projects is not relational, but rather a matter of time management.

**Active Classrooms** Students began my Intensive Precalculus class with plenty of small-group work and project-based learning. After the first exam I arranged for an outside consultant to collect feedback. Students expressed concern that my presentations in class did not prepare them for “an arts and crafts project” in their honors math class. However, I had introduced small-group activities early in the semester and shared personal stories about my visual relationship with mathematics; developing familiarity, respect, and trust. So, after a dorky joke about my love of crafts, they settled into their usual groups and bought into physically constructing the theory. By establishing an open and honest atmosphere early, I have successfully implemented projects outside the scope of what students might expect to find in mathematics. A second challenge in actualizing such projects is not relational, but rather a matter of time management.

Students periodically engaged in active learning through warm-up problems, mid-lecture computations, and writing exercises for self-assessment after quizzes or exams. Punctuating the efficiency of lecture with these activities stimulates higher-levels of learning, preparing students to take skills from precalculus into the next step of their lives.
**Study Kits**  Through student feedback and office-hour discussions, I discovered that most of the Intensive Precalculus students studied for the first exam using methods from high school. So in preparation for our midterm on trigonometry, I gave an optional assignment to create a “study kit”. I prescribed subject material for the kit and students could choose whatever form they deemed most helpful for themselves. They produced a wide variety of creative kits, including a zine-style pamphlet and a unit circle with fold-out angles and formulas. In return for a successful kit, students could choose to retake the trig midterm (a new version). Thus the midterm became formative, as well as summative. All students with a satisfactory kit improved their performance over earlier midterms, even if they chose not to retake the exam. While anecdotal, such evidence suggests that the students developed new study skills. I continue to implement similar projects in other courses.

**Decreasing Test Anxiety**  By allowing a retake of the exam, the “study kit” project also helped to decrease test anxiety. This is one part of my efforts to create an equitable course and classroom environment. A recent study\(^1\) suggests that test anxiety disproportionately affects the performance of young women in STEM and the authors advise, “instructors seeking equitable classrooms can aim to decrease test anxiety”. Students tell me that they feel exams in mathematics have especially high stakes. However, nothing about assessing mathematical learning outcomes requires that exams be so important. I deemphasize tests by increasing the weight of homework and other assessments in the final grade, by using test questions where students can earn partial credit, and by incorporating exam rewrites that allow students to earn back points they lost on the initial exam. In the future, I hope to explore mastery tests, which are graded pass/fail and allow numerous retakes, and to use take-home exams in upper level courses. In order to reduce student anxiety, these initiatives must be paired with clear communication as to their purpose.

The St. Olaf students in my present Calculus II course expressed usual nerves ahead of their first exam. With one week to go, we discussed the weight of the exam in their final grade (10%) and their option to rewrite the test. The weekend before the test, we discussed the number and type of questions, they were assigned a study project for extra credit, and I provided full solutions to prototype exam problems. In our last class before the test, we used small groups to generate a list of topics and students confirmed with me which concepts and techniques were particularly important. In the weeks following the exam, all students provided feedback on their experience of the test. I closed the student-instructor feedback loop by describing the anonymized results of the survey and promising necessary changes in the process for the second midterm.

**Comment Cards**  In my courses, students regularly turn in index cards with feedback on the instruction and the course structure. I pass out blank comment cards and ask directed questions about the length of a homework assignment or, “What is Jasper doing that most helps your learning?” Additionally, they can turn in comment cards at any time on any aspect of the course. I respond with written answers in a document hosted on the course website and we take a few minutes at the end of class to discuss poignant comments and intended outcomes. By asking students to provide thoughtful feedback they practice meta-cognitive skills and become more invested in their own success in the course. Finally, soliciting regular feedback helps me evolve as a teacher; I still have plenty to learn from my students.

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In my classroom yesterday afternoon, students sat four to a table and chatted as they discussed their solutions to our worksheet. A few were up at the whiteboard-painted walls, demonstrating how they took a different approach from their classmates. At 2:53pm I paused and listened, hesitant to interrupt and wrap up class.

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