

NCAT: Five Principles of Redesign and How Santa Fe Applied Them in the Redesign

Principle #1: Redesign the whole course.

Mathematics faculty volunteered to be part of the redesign team, and six faculty members worked together to redesign the course. Once the book was chosen, the team used the course outline previously developed by the department to set the pace and depth of material to be covered. They created the homeworks, quizzes, tests, and final that will be used by all redesigned sections. The final will also be used in the traditional sections as well, at a set weight of 25% of the course grade. At each step, the team presented their recommendations to the full department for their feedback and review to ensure as much support as possible.

Principle #2: Encourage active learning.

Part of the focus group time will be reserved for group work, resulting in the writing and discussion of good mathematics. Attendance is counted as part of the overall grade, and in the Math Studio, the students will spend the entire time working on math, practicing skills and working with concepts.

Principle #3: Provide students with individualized assistance.

When students work on their homework, they will have access to help-me resources the instant they have a question, and they can access similar resources when they review their quiz work. In addition, when students are in the Math Studio, faculty and tutors will be wandering around, both to answer questions when asked and to seek out students who may need additional assistance. A common statement made by students taking the current traditional Intermediate Algebra course is that they understand the material in class, but they get frustrated when they attempt their homework. This approach should help alleviate that frustration.

Principle #4: Build in ongoing assessment and prompt (automated) feedback.

Because students complete their homework online, they know after each problem whether they got it right or wrong and can access assistance immediately. Quizzes will be graded by the software as soon as the student submits the quiz. Students will have unlimited attempts to work on each homework until it is due, and will get 10 attempts on each quiz. By insisting on weekly deadlines, we hope to encourage students to work on their mathematics regularly.

Principle #5: Ensure sufficient time on task and monitor student progress.

We have tried to design the course in ways to encourage students to take advantage of their resources: time in the lab is required and counts as part of the grade, assignments are due each week, and make up lab time will be allowed (to an extent). We are requiring mastery throughout this course (by allowing a retake, after set conditions are met, of any test not passed with a 70%; if the student does not earn a 70% or better on the second try, they are then required to earn an 80% on a corresponding gateway which can be worked on all semester). It will be one of each instructor's most important tasks to keep an eye on which students have not met the minimum requirements for the course, and encourage them to continue working throughout the semester.

AMATYC: Implementation Standards of Beyond Crossroads and How Santa Fe Applied Them in the Redesign

1. Student Learning and the Learning Environment: Mathematics faculty and their institutions will create an environment that optimizes the learning of mathematics for all students

The Math Studio is staffed with both instructors and tutors so that students have a supported environment to continue working with the math they are introduced to in the focus groups. The idea is to have a scheduled work time as part of the class, to avoid the common pitfalls of students not finding the time to work or getting stuck and frustrated if they cannot move forward on their own. By providing enough staff to work individually with students in the Math Studio, students get the attention they need to succeed. In addition, while mastery is required, students are given multiple attempts on all assignments (except the final exam) to help reduce anxiety.

2. Assessment of Student Learning: Mathematics faculty will use the results from the ongoing assessment of student learning to improve curricula, materials, and teaching methods

The instructors in the Studio meet frequently to discuss what is working and what isn't, and have made changes each semester to address any issues that have arisen during the semester. Assignments have been tweaked to make them more appropriate and policies have been adjusted to accomplish the goal of student learning. Faculty also get together to discuss how to best use the focus group time, and share worksheets and ideas with each other to make each setting as helpful as possible.

3. Curriculum and Program Development: Mathematics departments will develop, implement, evaluate, assess, and revise courses, course sequences, and programs to help students attain a higher level of quantitative literacy and achieve their academic and career goals

The Title III grant helped Santa Fe implement several college-wide policies, including mandating that full-time AA seeking students take the placement test to start at the appropriate level, begin their math sequence when they arrive, and continuing taking their math courses until they complete their requirements. Data is being collected to verify these policies are being followed and are resulting in increased retention and success.

4. Instruction: Mathematics faculty will use a variety of instructional strategies that reflect the results of research to enhance student learning

The Studio model incorporates both class time and work time, and the students are asked to not only practice problems but to reflect on the concepts and write good mathematics in their notebook. If a student needs help with a skill or concept, they have access to example buttons – both static and dynamic – in the software system, as well as videos and animations. They also have access to instructors and tutors, and are encouraged to work with each other as well.

5. Professionalism: Institutions will hire qualified mathematics faculty, and these faculty will engage in ongoing professional development and service

The Title III grant allowed Santa Fe to send instructors off to site visits to see and question how other institutions were redesigning their math courses, and invite national speakers to come to campus and run workshops for math faculty. In addition, professional development funds have also been used to simply get the Santa Fe faculty together to share ideas with each other.