

Reflections across the Curriculum Rethinking Pre-Algebra through Calculus... Questions and Actions...

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There are many responsibilities for mathematics faculty, but few are more challenging or more critical than thinking seriously about revitalizing mathematics courses and programs. The need for more quantitative literacy and mathematics reasoning skills in our global technological society is more important today than ever.

Did you know?

- ❖ The top 10 jobs projected for 2010 didn't exist in 2004.
 - ❖ The amount of technical information is doubling every two years. For college students, half of what they learn will be outdated by their third year.
- We are preparing students for jobs that don't currently exist, using technologies that haven't yet been invented, to solve problems we don't even know are problems yet. In this environment, it is not only *what* our students know, but *how they learn* that will set them apart. In order to prepare our students to be informed citizens and successful in their careers, we need to examine *what* we are teaching and *how* we are teaching that content.

Remedial and Developmental Mathematics

In 2005, the total number of "precollege" mathematics course enrollments at two-year colleges was 964,000 students, an increase of 26% from 2000 (Lutzer, et.al., 2007, p.134). Some of our students are taking arithmetic, pre-algebra, and beginning algebra for the first time, but many more students have taken these courses before, often more than once.

In jest, some say the definition of insanity is "doing the same activity in the same way a second time and expecting different results." Is this what we are doing in our developmental mathematics courses—providing the same mathematics experience for student a second or third time and expecting different results? Are students really learning to think abstractly and develop reasoning skills to solve new problem situations, or are they memorizing routine procedures?

College Algebra

College algebra had the largest enrollment in 2005 (206,000 students) of any college credit-bearing mathematics course (Lutzer, et.al., 2007, p.139). This course, along with precalculus, is the gateway to college mathematics for the large number of students. Instead, college algebra may be serving as a filter, rather than a pump for other mathematics courses, closing the door to future mathematics course enrollments for many students. Are we emphasizing the appropriate content in this course? Does the content of this course prepare students for their life's work—not just for their next math class?

Calculus

It is time to take an honest look at the mainstream calculus sequence. Enrollment in calculus courses, which made up 8% of total mathematics enrollments in 2000, decreased to only 6% of enrollments in 2005 with a total of 81,000 students (Lutzer, et.al., 2007, p.139). In contrast, there was a 31% surge in "non-mainstream" Calculus I, perhaps reflecting a growth in calculus enrollment by biology and life-science majors. What can we do to encourage students to take more calculus and consider majoring in mathematics? What are the backgrounds and needs of the students taking calculus? How can we re-imagine the calculus courses to better serve our students?

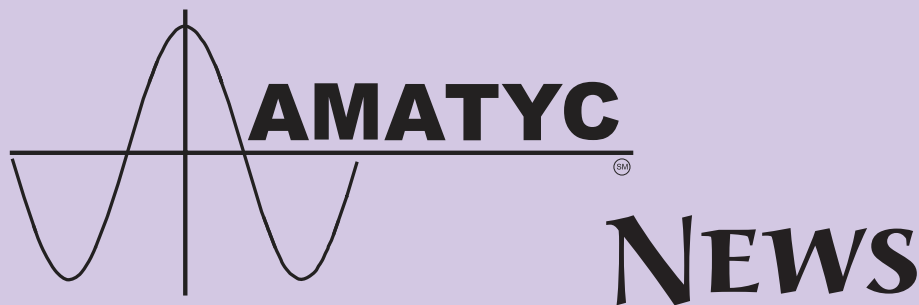
What can you do?

The challenges of developing innovative curricula are daunting for two-year colleges, positioned between the K-12 and four-year college sectors. Finding solutions for improving two-year college courses and programs begins with each professional accepting the responsibility for taking the first step. Successful implementation of innovations will be more beneficial to students when collaboration with our colleagues in high schools and four-year colleges and universities takes place. The changes occur one class at a time.

Consider one of these activities in your department:

- ❖ Organize a department meeting to open dialogue about how your mathematics curriculum can be structured to meet the needs of today's students.

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- ❖ Plan a meeting with mathematics faculty and faculty from other disciplines to integrate quantitative and reasoning skills into other courses and develop student outcomes in quantitative literacy.
- ❖ Search for models that work. Study the components and activities of such models and incorporate those components into a course at your college.
- ❖ Use the Implementation Cycle of *Beyond Crossroads* (AMATYC, 2006) to design an implementation plan to re-imagine your college class or department's program.
- ❖ Engage in the scholarship of teaching to build the research base of innovations in two-year college mathematics education. Share those results with others in our community.
- ❖ Attend professional development workshops or design a traveling workshop at your college.
- ❖ Bring together a consortium of high school, two-year and four-year college mathematics faculty in your region or state to discuss curricular improvements.

Most importantly, don't be satisfied with the status quo. Think outside of the box. Embrace change. Take the first step and try something new in one of your classes. Collaborate with your colleagues to develop mathematics courses and programs that will prepare our students with the reasoning skills they need for tomorrow. Working together, we *can* provide a meaningful mathematics experience that will have positive results for our students.

References:

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