

# Prolems in Mathematics Education

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Before I try to send these proposals to the MAA/AMS, I would greatly appreciate input from those here, to see if what I am observing is just anecdotal, or a set of trends.

I recently stepped down as the associate chair of our department. Some of my duties included placement of students with prerequisite issues, including freshmen and transfers from other universities and colleges. In that process, I noticed some disturbing trends, to wit:

1. A significant number of freshmen come to us with high GPA's, including in mathematics courses, and claim to have taken a calculus course in high school, yet place into our Intermediate Algebra (basically an Algebra I course), on several measures, including ACT, SAT, COMPASS test, and our old department placement test.
2. Transfers from many other universities and colleges show that the math requirement at a lot of schools is at the level of our remedial Intermediate Algebra.
3. Many other transfers come from private and public colleges and universities with A's in mathematics, yet immediately fail the courses in our department.
4. Talking with some of our part-time faculty, many of whom are retired or moonlighting high school teachers, I have discovered that:

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a) Most local students taking AP Calculus do not bother to actually take the test, which leads me to believe that they are simply padding their records.

b) I am informed that many Algebra/Trig (or PreCalculus) courses offered in high schools move quickly through all of the material in functions and trigonometry, and then start doing the rudiments of differential calculus, since it sounds more advanced.

As background, I am at an open enrollment urban state university, admitting about 4,600 students per year. The least prepared are sent first to our community college. There, they are put into one of our basic math courses, the first being roughly 4th grade, the second about 6th grade. These courses enroll 3,000 to 4,000 students per year, about 50% in each. Students who succeed in both then go on to either our Intermediate Algebra course (1,200 per year), or to our baby Statistics course (1,000 per year), which satisfies the university math requirement. This leaves only 20–30% to directly enter college-level math courses. These figures reflect the national trend, according to a recent report which found that 15% of 12th-graders are prepared for college-level mathematics.

The buzzword on our campus is retention, and I have attended many meetings on the topic. Our university college dean (Ed.D. in Administration) has not said, but strongly implied, that the reason for our low graduation rate (32% after 6 years) is mathematics, despite the very real evidence that the failing students are failing orientation, sociology, and pretty much everything else.

On the political front, our arts & sciences dean (Ed.D. in Counselling Psychology) and provost (M.A. in Creative Writing, Ed.D. in Administration), are "concerned" about our failure rates, and claim that all the students could pass, with proper motivation. A previous associate provost (Ed.D. in Statistics) stated

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in public that those same rates were too high and that "no-one needs to study algebra". Our engineering dean's office regularly implies that we are too hard on their students, although the engineering faculty express the opposite opinion. Our business college, like several others in the country, thinks that requiring a College Algebra and then business calculus is too much for their students to handle, and have tried several times to eliminate any math for them at all. Lastly, but not leastly, faculty in our college of education have tried to tell us how and what to teach in our calculus sequence, and discrete math courses.

In order to partially address some of these problems, I propose the following:

A. The MAA, AMS, SIAM (and, if necessary, NCTM) should put together a process for accrediting mathematics courses, programs and faculty, similar to that done by ABET in Engineering.

B. Since AP Calculus is an anachronism from the days when all college students started in calculus (or so I am told by the "old folks"), the same groups should prepare national certification exams in College Algebra and PreCalculus, so that universities would have some better gauge of the preparedness of students.

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