# The Role of Content in Countering Math Anxiety

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# Two Populations

1. **Mathematics Survey Courses**

   - General education requirement for non-science, non-engineering majors.

2. **Content Courses for Elementary Education Majors**

   - 1-3 course sequence reviewing the mathematics taught in elementary and middle school grades from an "advanced perspective".

# Population 1 - Survey Courses

- **Overview of Mathematics**: logic, set theory, numeration, number theory, algebra, calculus, probability, statistics, geometry, . . .

- **Isolated Novelties**: voting theory, apportionment problems, routing problems (Euler and Hamiltonian circuits), Fibonacci numbers, the golden ratio, fractals, probability and statistics.

- **Mongrel**

# What I Want to Accomplish in a Survey Course

- I want students to see that mathematics is not just arithmetic and algebra.
- I want students to see that mathematics is $rich$.
- I want students to see that mathematics is $vast$.
- I want students to see that mathematics is $open$.
- I want to positively affect their beliefs and attitudes about mathematics.

# The Role of Content

Content is the $means$ to the end.

But one person's means may differ greatly from another's; i.e.

Content should be personal.

# Population 2 - Math for Elementary Educations Majors

- 1-3 course sequence

- Plethora of modern textbooks

- Topics: problem solving, numeration systems, arithmetic with whole numbers, number theory, proportional reasoning, arithmetic with fractions, real numbers, data analysis, measurement, geometry of shape, geometry of measurement, geometry of transformation

# In Their Own Words

- **Confidence**: "Knowing that I am not good with math..."; "I have never been very good at math..."; "The single greatest challenge I face in math is having confidence in myself."; "To this day I fear that a proof will come up in one of my math classes!"; ". . . I was devastated and very afraid of the future math classes . . . "

- **Attitude**: ". . . I found math to be so boring."; "If I never have to use algebra again I'll be happy."; "Till this day I still hate the multiplication tables."; "(failing algebra) turned me off to math completely and is still my underlying reason for disliking the subject."

# Conflicting Goals

1. **Overwhelming Amount of Content**

   - See Ch.2 of CBMS, or NCATE/NCTM Program Standards (2003)

2. **Overhauling Their Beliefs**

   - "(the instructor) must believe that mathematics is about ideas that make sense . . . "
   - "They need to see the topics they teach as embedded in rich networks of interrelated concepts, . . . "
   - "They will have to learn to notice patterns and think about why those patterns hold . . . "
   - "In short, developing these new mathematical habits means learning how to continue learning."

# Overhauling Beliefs is Primary

Our primary goals in the mathematical teaching of elementary education majors ought to be

1. that the students come to believe that mathematics makes sense.

2. that the students develop skills which allow them to make sense of mathematics.

The choice of content is secondary. The question we should ask ourselves is

- What content (from the mathematics they are going to teach) can $I$ best use to achieve these goals?