

# **Assessment in Mathematics: What do our Students Know?**

William O. Martin  
North Dakota State University

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# Three Problems

- Cubes
- Sum
- Poison

# A Private Universe

- What did you think about while watching this video?
- What does it show about teaching and learning?
- How does it relate to mathematics?
- What implications are there for assessment in mathematics departments?

# Assessment Issues

- What mathematics content is important?
- What skills and knowledge do our students possess?
- How do people learn mathematics?
- What are the implications for our teaching?

# Quantitative Assessment Background

- University of Wisconsin—Madison (1990-1995)
- North Dakota State University (1995-2004)
- MAA Project SAUM (2002-2005)

# An Assessment Process

- Focus on two things:
  - What do students need for success in a course?
  - Do they have that knowledge and those skills?
- Create and give a test
- Report results
- Discuss and respond to results
- Repeat as necessary

# Creating a Test

- Instructor questionnaire, interview, course materials
  - What skills do students *require* for success in the course?
  - Prerequisite knowledge needed at start of semester
  - Content and skills that will not be taught in the course

# Giving the test

- All participants (assessors, instructors, students, departments) must have something to gain
- Student motivation:
  - Give them information about their knowledge in relation to course expectations
  - Provide the instructor with information about student capabilities
  - Chance to review mathematics and statistics

# Reporting Results

- Sample course report (Ag Econ)
- Sample course report (Mech Egr)
- Related data about student backgrounds in math and stats
- Reactions to test (students and instructors)
- Information for students, instructors, departments, institution
- Broader patterns emerge over time

# Impact

- Students
- Instructors
- Departments
- Institutions

# Scoring the Test

- Open response
- Quick feedback to students and instructors
- Useful data for further analysis across assessments
- Reliability and validity

# Summary of Themes

- Student Knowledge: Even our best student can have surprising misconceptions
- Learning involves making connections between new and existing knowledge
- Meaningful learning requires active intellectual engagement
- Successful instruction requires some understanding of what students know and can do
- Assessment is a process that helps instructors and students make connections between existing and new knowledge

# Using a rubric to rate work in mathematics

- Scoring Key
- Student Work
- Use the key to score some of the sample student work. Problems #3, 5, 6, 7, and 8 are probably most relevant.

# Using Scores and Related Data

- Sample Upper Level Mathematics Report
- NDSU Assessment Report

# Case Studies

- Keene State
- NDSU
- Portland State
- UA Little Rock