

Mathematics Standards in North Dakota

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Background

- ▶ Grades 7-12 Mathematics and Geography Teacher 1975-85 in Australia
- ▶ Mathematics/Mathematics Education Graduate Teaching/Research Assistant 1985-93 at Iowa State and the University of Wisconsin-Madison
- ▶ Mathematics Assessment Researcher 1989-95 at UW-Madison
- ▶ Mathematics/Mathematics Education faculty 1995-present at NDSU
- ▶ Head of NDSU School of Education since 2004
- ▶ Taught Grades 9-12 Math at Kodaikanal International School spring semester 2010 (International Baccalaureate Programs)

Some Mathematics Education Background

- ▶ Sputnik and the New Math (1960s)
- ▶ Back to Basics (1970s) and Direct Instruction (early 1980s)
- ▶ A Nation at Risk (1980s)
- ▶ Math Standards and Assessment (since 1990s)

Each era recognized shortcomings in American (and international) mathematics education. Initial responses focused on curriculum (New Math and Back to Basics) and “teacher proofing” mathematics instruction.

Student performance continued to indicate a lack of success of these interventions.

The Standards and Assessment movements changed the focus from *inputs* (curriculum and teaching) to *performance* (what students could do).

Mathematics Standards

- ▶ Rather than specifying curriculum or instructional practice, standards describe how we will recognize student achievement (mathematics power—the ability to use mathematics to solve problems)
- ▶ NCTM published a series of three standards documents in 1989 (Curriculum and Evaluation), 1991 (Professional Teaching) and 1995 (Assessment). These were revised in 2000 (Principles and Standards for School Mathematics).
- ▶ All were developed with wide national participation of teachers, administrators, professional associations (including users of math such as engineers, scientists), and university math and education faculty.
- ▶ The content of school mathematics has not changed dramatically throughout these reform efforts—the issue remains how to help all of our students develop the important mathematical capabilities they need.

ND Standards

- ▶ Two types: Standards for School Mathematics (DPI) and Standards for the Preparation of School Mathematics Teachers (ESPB).
- ▶ Both have been periodically developed and revised by collaborative teams of teachers and university faculty since at least the early 1990s.
- ▶ This development involves comparing national developments to the current existing ND standards. The process has been one of collaborative revision of ND standards in light of national trends.
- ▶ The recognition in recent decades is that there is more to high quality mathematics education than just a list of topics to be covered. The focus now is on both math *content* (such as *algebra and geometry*) and *practices* (such as *persistence, reasoning, modeling and problem solving*).
- ▶ Assessment of student performance is critical to help teachers shape their instructional practices.

Vertical Alignment

- ▶ Readiness for career and college: The issue of remediation
- ▶ Why so some/many students need to take HS mathematics when they get to college?
- ▶ Vertical alignment project: There is NOT a gap in content; there IS a gap in student performance as they move through the system. (Admission and Placement Testing reveals gaps in student knowledge)
- ▶ Variety of factors may explain why: For example, student motivation, misconceptions of the nature of mathematics, parental/administrator/societal pressures on teachers and grading
- ▶ Different perspectives: What students can do when they come to my class (focus on student performance) and what and how I teach (focus on inputs and my performance as teacher)