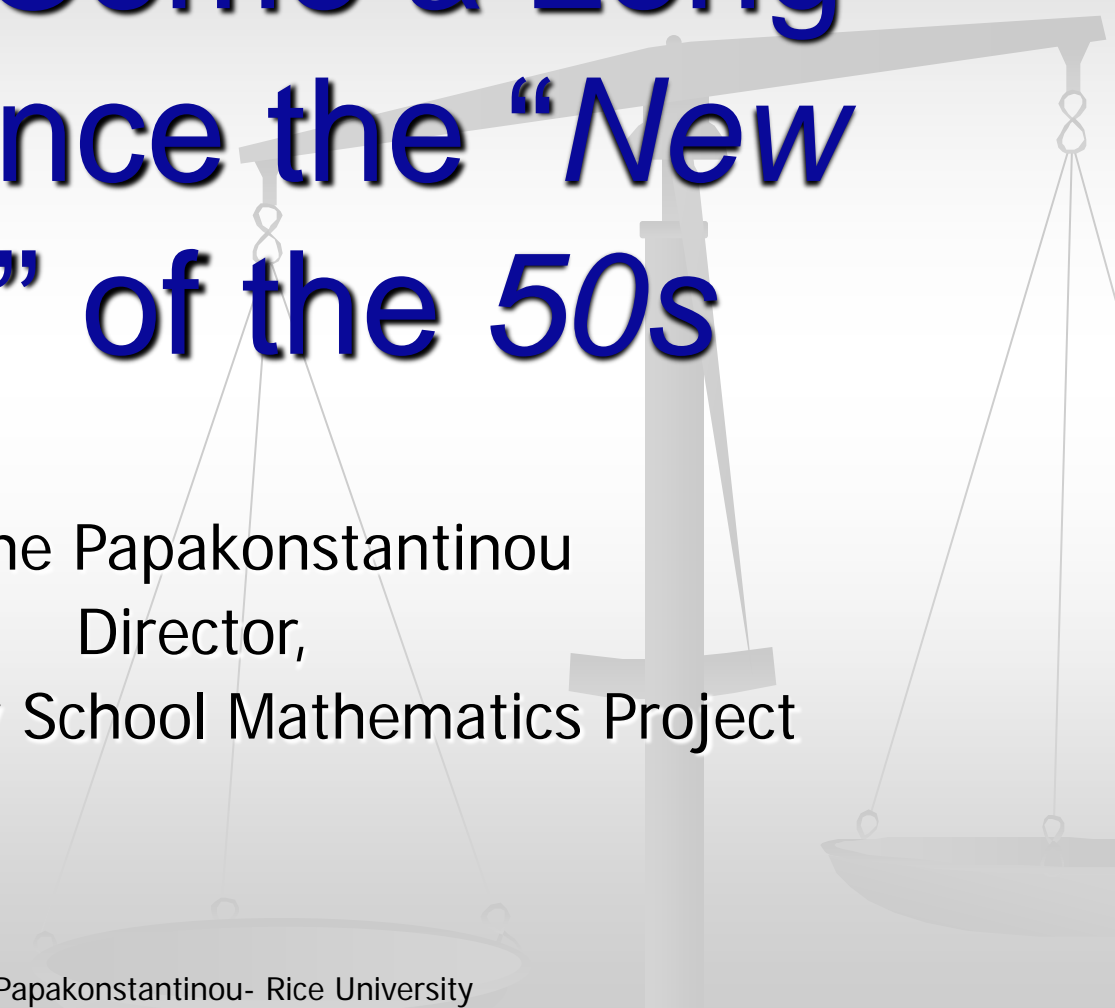


We've Come a Long Way Since the “*New Math*” of the 50s



Dr. Anne Papakonstantinou
Director,
Rice University School Mathematics Project

*Educational reform follows the
socio-political tide.*

Schools are often held captive.



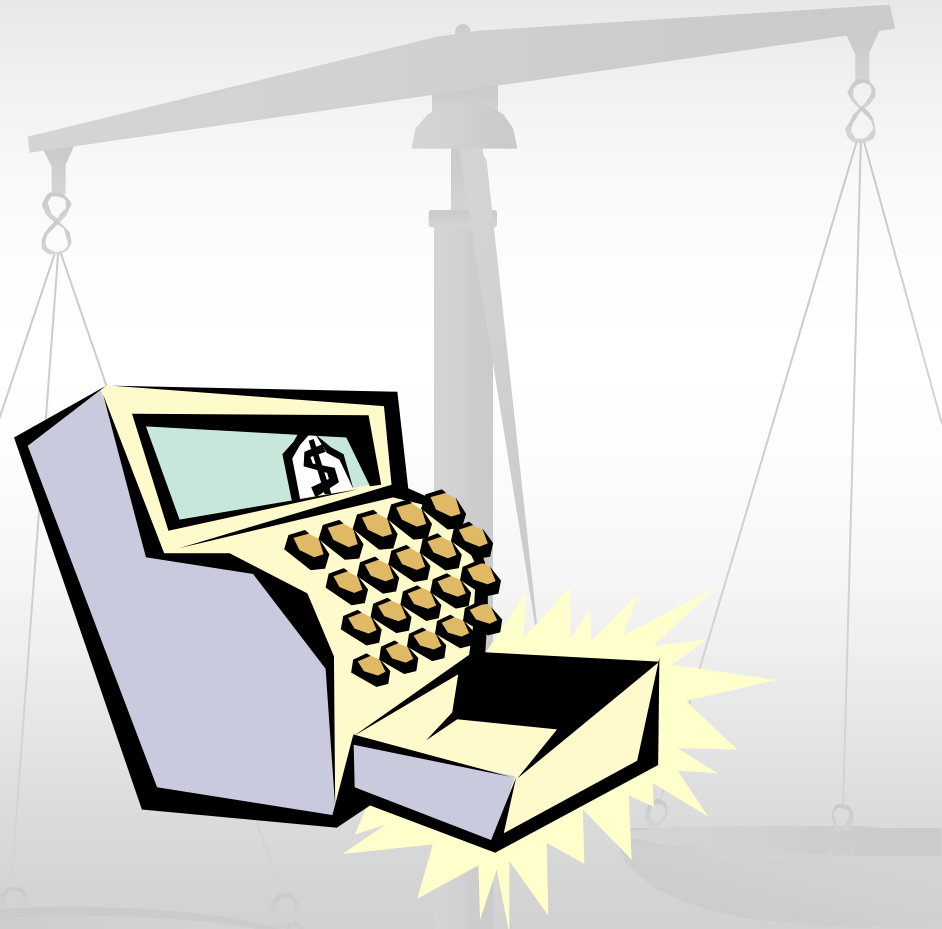
REFORM/COUNTER-REFORM

Mathematics Education in U.S. Schools

- *1957: Launch of Sputnik “New Math” of the early 1960s*
- *Late 1960s & Early 1970s: Humanistic Era*
- *1970s: “Back to Basics”*
- *Late 1980s through Late 1990s: Standards-based Education vs Back to Basics*
- *2000 and Beyond: Standards-based Education supported by research*

Pre-Sputnik Era (prior to 1957)

- Rote calculations
- Focus on developing arithmetic skills
- Behaviorist model of learning
- “Shop-keeper” mathematics



Sputnik Era (1957 to early 60s)

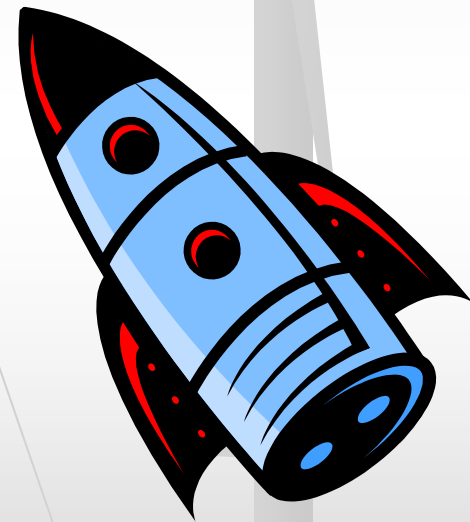
New Math

- Abstract approach
- Focus on conceptual understanding
- Understanding the “why” of mathematics
- Discovery learning
- The structure of mathematics
 - Set theory and its notation
 - Field properties
 - Number theory
 - Bases other than base 10
 - Logic and proof

The creation of “little scientists”

Sputnik Era (1957 to early 60s)

- *National Defense Education Act of 1958*
- College Board
- Advanced Placement
- Gifted and Talented Programs



Humanistic Era (mid 60s to early 70s)

- A result of poverty, homelessness, drugs, civil rights movement, women's movement, and the Vietnam war
- Student-centered classrooms
- Open classrooms
- Rise of educational research
- No accountability for lack of student learning

Back-to-Basics Movement (1970s)

- A result of the decline of test scores and general illiteracy of the “Humanistic Era”
- NAEP (1972) accountability, focus on skills, minimum competency, “excellence in education”
- In Texas, the birth of minimum competency testing, TABS

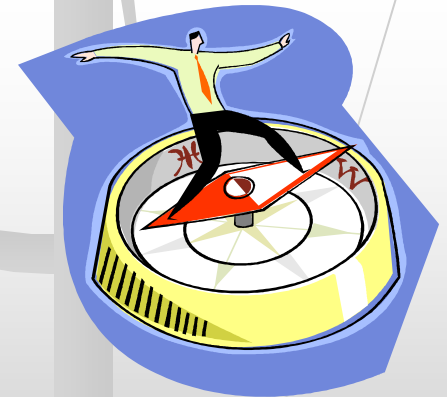


Forces For Change

- NCTM's *Agenda for Action* (1980)
- *National Defense Education Act of 1980*
- *A Nation at Risk* (1983)

Forces For Change

- Poor student performance: NAEP, FIMS, SIMS
- Redundancy in American curriculum
- Changing expectations of business and industry
- Access to technology
- Research on how students learn
- Inequities in opportunities
- Global society



NCTM's *Agenda for Action* (1980)

- Problem-solving must be the focus of school mathematics.
- Basic skills in mathematics must encompass more than facility in computation.
- Mathematics programs must take full advantage of computers and calculators.
- Student learning must be evaluated by a wider range of measures than conventional testing.

National Defense Education Act of 1980

- Funded math/science curricular reform as and professional development for teachers as in the 1958 Act
- Learned from the failures of the *New Math*
- Birth of the Rice University School Mathematics Project (RUSMP)

A Nation at Risk (1983)

- President Reagan commissioned a national study on the state of the schools in the U.S. expecting a positive report.
- Instead, he received a negative report about U.S. education.
- U.S. was not competitive internationally.
- The greatest threat to U.S. boundaries was our uneducated youth.

A Nation at Risk (1983)

- Educational focus again on mathematics/science
- Gifted and Talented
- Accountability and minimum competency for *all* students



NCTM's *Standards*

- 1989 *Curriculum and Evaluation Standards for School Mathematics*
- 1991 *Professional Standards for Teaching Mathematics*
- 1995 *Assessment Standards for School Mathematics*
- 2000 *Principles and Standards for School Mathematics*

NCTM's *Standards*

To develop a national consensus:

- core set of expectations for *all* students
- extended core for those intending a math-intensive university coursework and careers
- serving a diverse constituency

Standards-Based Education

- Problem solving
- Reasoning and proof
- Communication
- Connections
- Representation



Standards-Based Education

- Research based
- Active learning
- Cooperative learning
- Use of technology
- Real-world applications
- Conceptual and procedural knowledge
- Authentic assessment

Math Wars

- Traditional *versus* reform
- Procedural skills *versus* conceptual understanding



NCTM *Principles and Standards* (2000)

- Best from both approaches
- Not “either/or”
- Conceptual understanding *and* fluency in mathematical computations
- Research based

Why did earlier reforms fail?

- Represented top-down reform
- Did not involve all constituents in decision-making and reform process
- Lacked consequences for poor student achievement
- Did not make mathematics accessible to all students
- Did not make use of educational research on how students learn

Why are reforms aligned to the NCTM *Principles and Standards* more successful?

- Learned from the failures of *New Math*
- Involved all constituents in decision-making and reform process
- Promoted mathematics access for *all*
- Grounded on research on teaching and learning

Next Steps...



*No Child Left Behind
Act of 2001*

Building upon
NCTM's *Principles and
Standards*

How do we stop this cycle of reform/counter-reform that occurs every 12-14 years?

- Knowledgeable teachers stop the cycle at the classroom level.
- An informed society stops the cycle for good.



**This presentation appears on the
Rice University
School Mathematics Project
web site:
<http://rusmp.rice.edu>**