

Research on Mathematics Education

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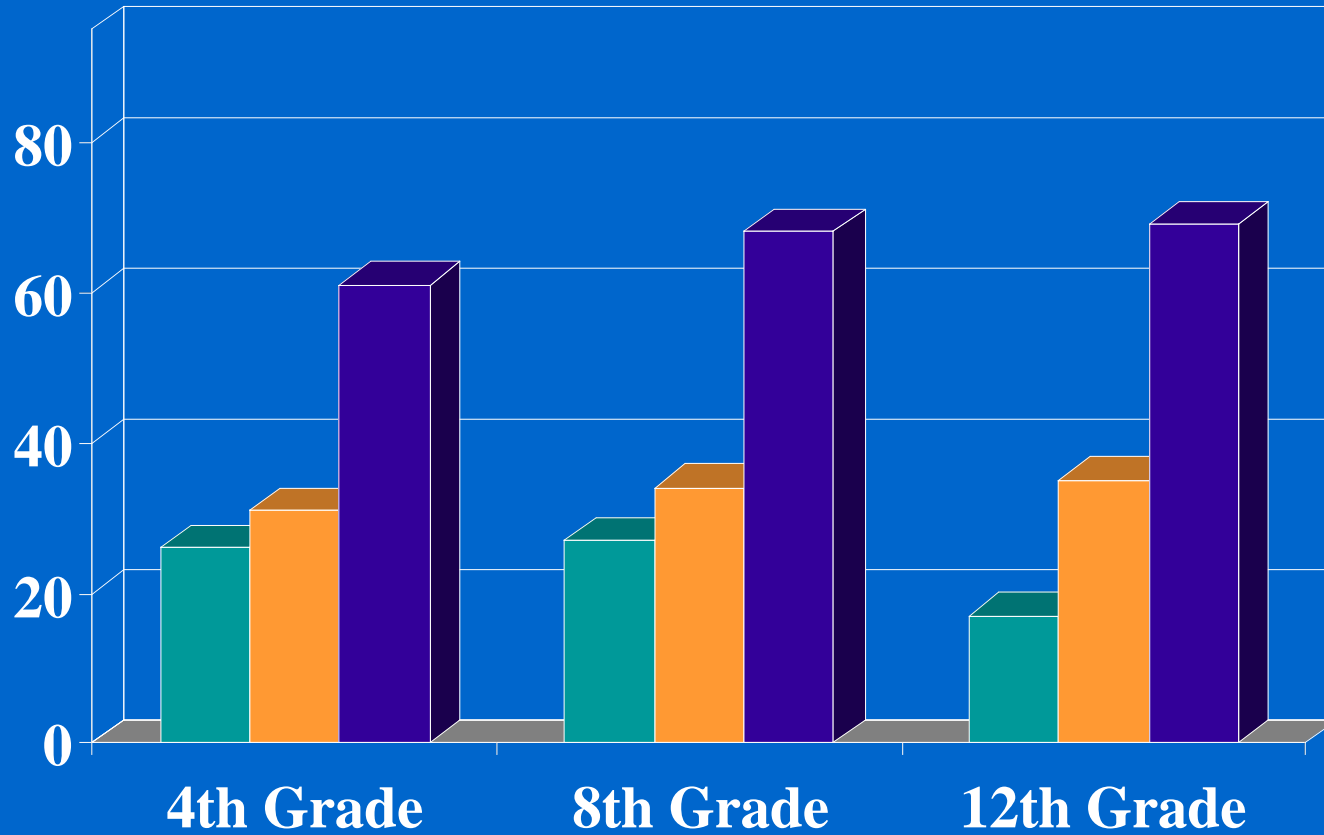


Achievement

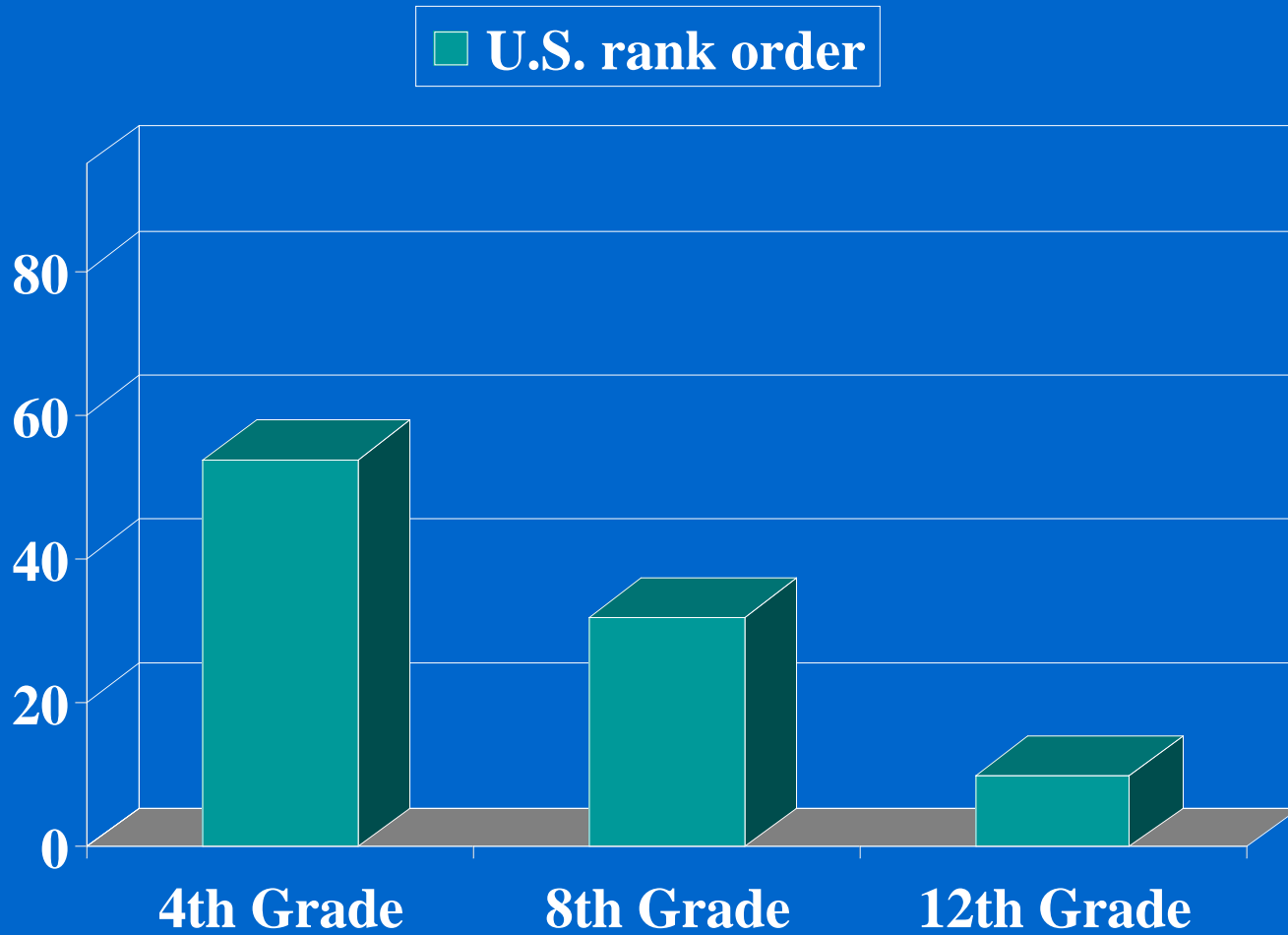


NAEP 2000 Proficiency

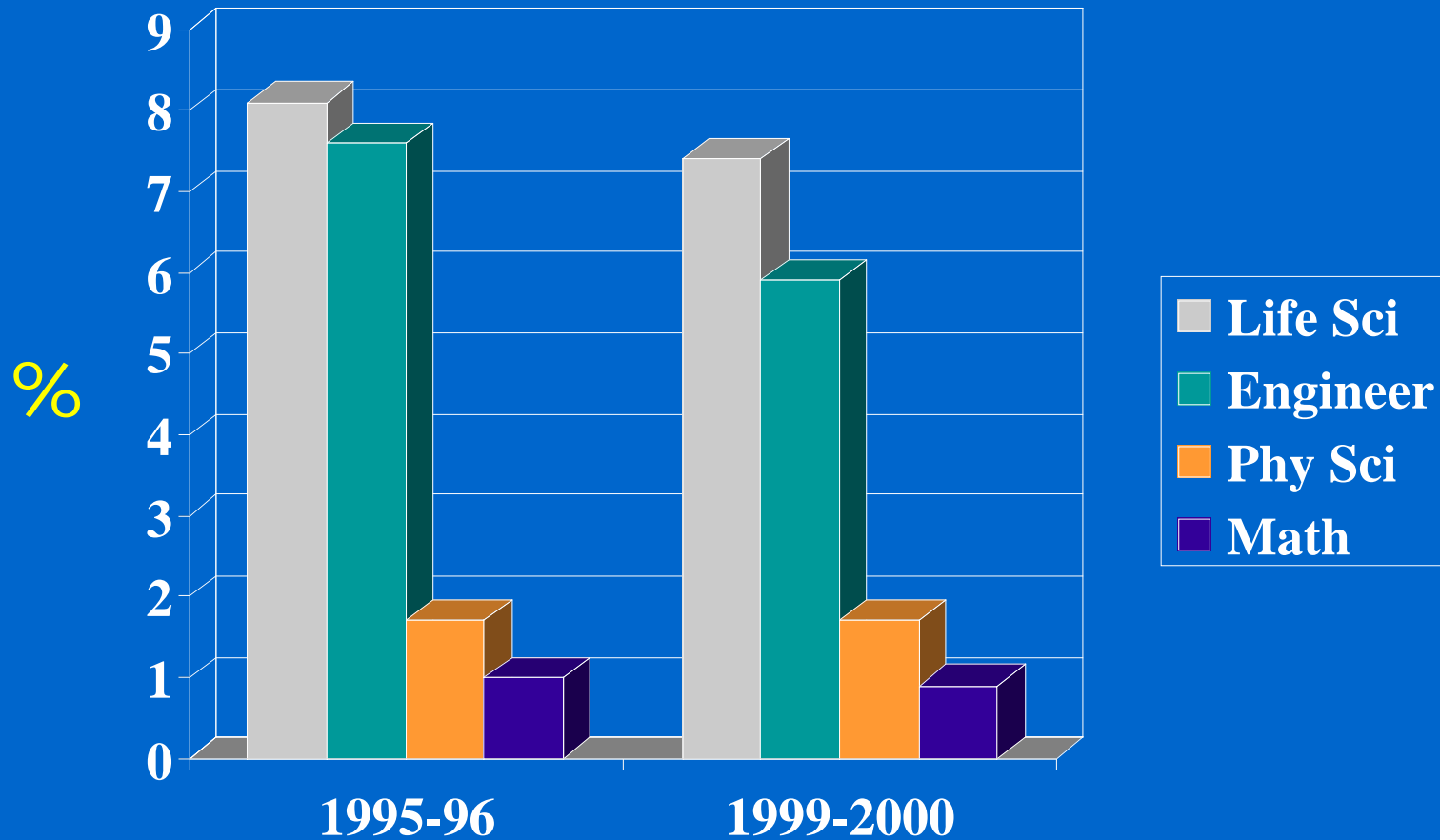
Proficient Below Basic Below Basic Af Am



TIMSS Math 1995



Declared Major 4-year colleges





Tracking and Grouping





Assessment for Instruction





Structured Peer Feedback



The Math Wars

| Constructivist Approaches | Skills-based Approaches |
|---|--|
| Knowledge is constructed | Knowledge is imparted |
| Children should develop their own understanding | Children should master standard facts & concepts |
| Authentic problems | Skill-relevant problems |
| Intrinsically motivated | Extrinsically motivated |



Conceptual Understanding



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-
-

Decimal Fractions

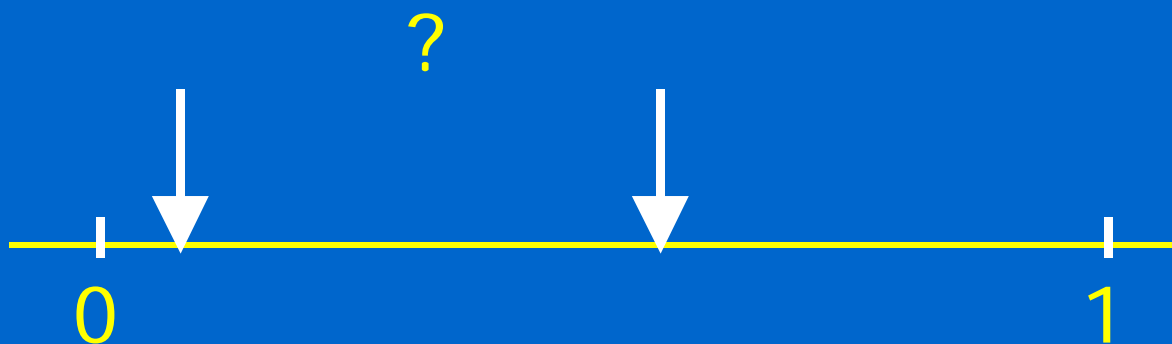
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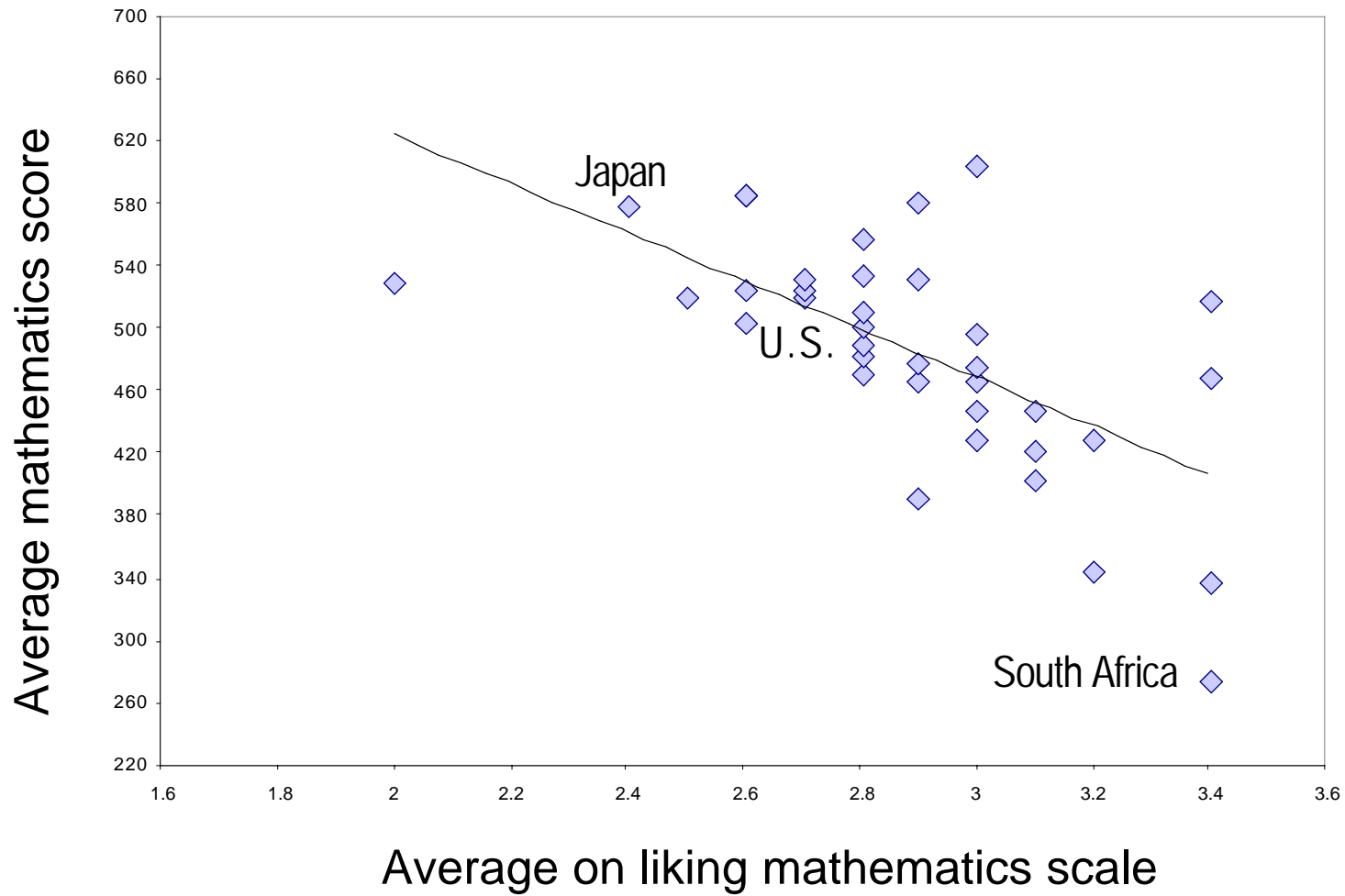
Decimal Fractions

0.509



Checks on Constructivism

- Many routes to understanding
- Limits on working memory
- Inefficiency of discovery
- Role of work in learning





Curriculum



Constructivist Math – 3 States

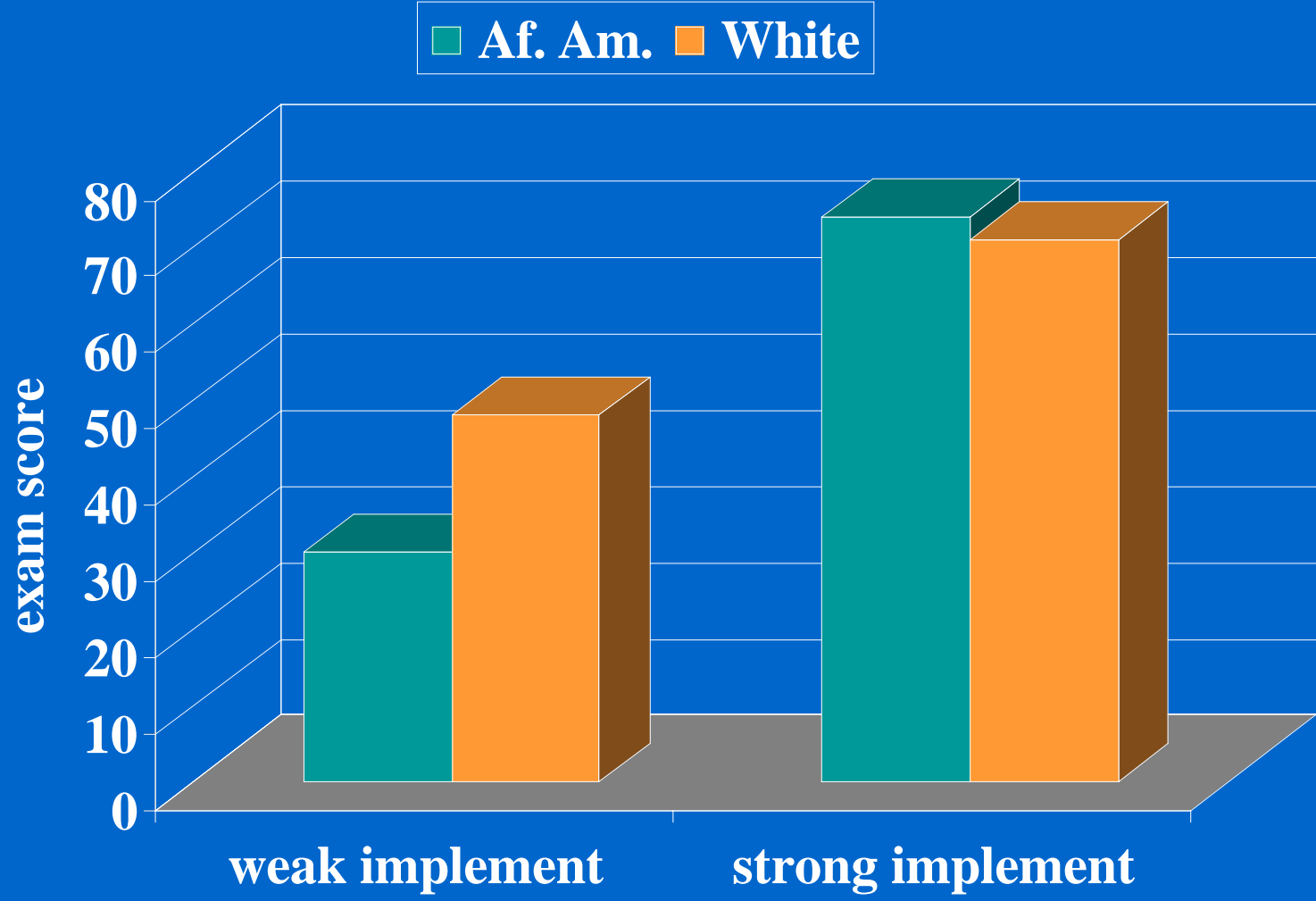
Constructivist Business-as-usual





Implementation



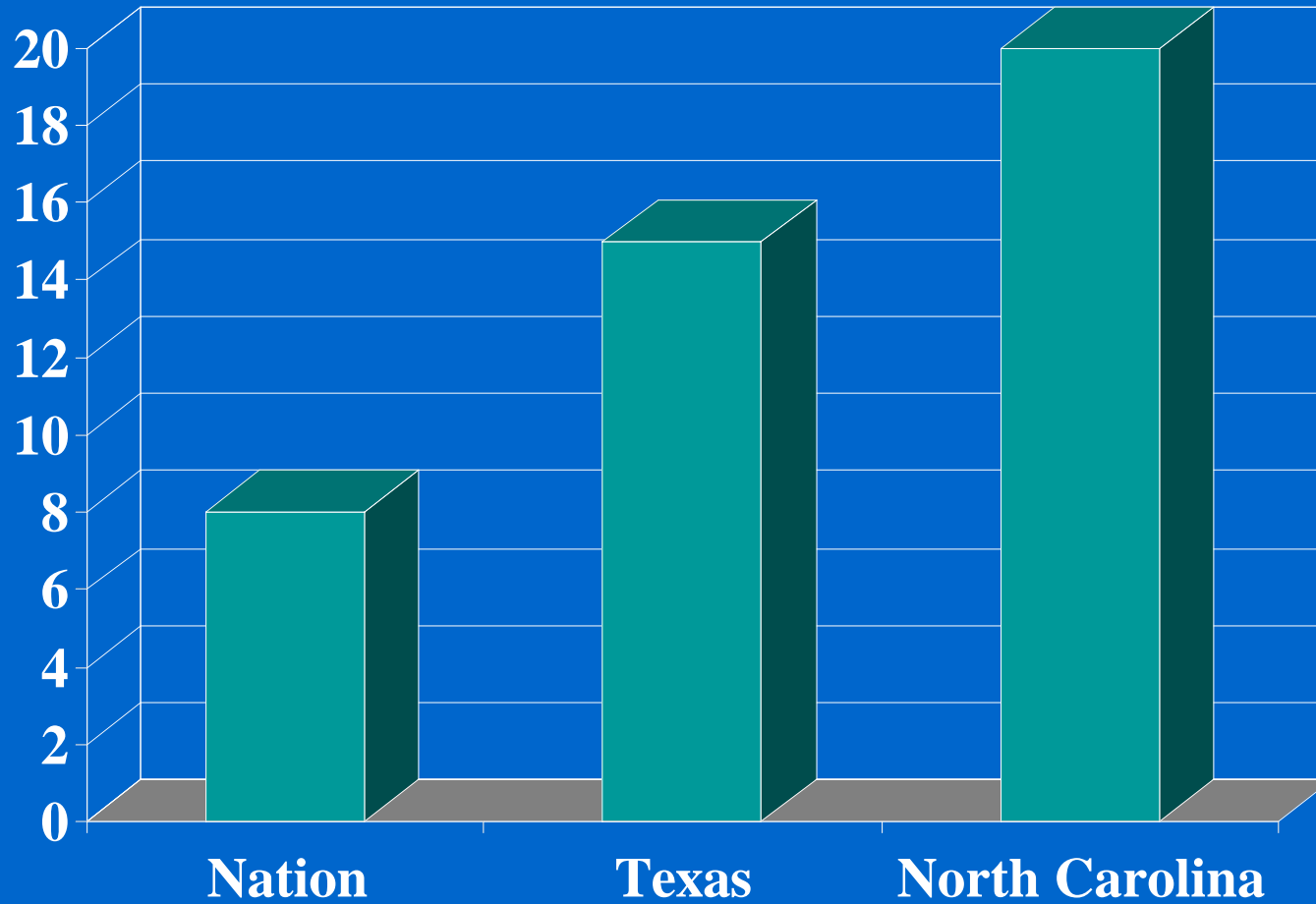




Alignment



NAEP



4th Grade Math Gains: 1992 to 2000

Elements of State Math Reforms

- State-wide standards
- Linked state-wide assessments
- Accountability for results



Putting It Together



| | |
|----------------------------|-------|
| Classroom-based assessment | + |
| Structured peer feedback | + |
| Tracking | - |
| Understanding | + |
| Direct instruction | + - ? |
| Discovery | + - ? |
| Authentic problems | + - ? |
| Work and practice | + |
| Curriculum | ? |
| Implementation | + |
| System alignment | + |