



ADVANCING RESEARCH, IMPROVING EDUCATION

SOUTHEAST COMPREHENSIVE CENTER

Report of the Task Group on Conceptual Knowledge and Skills

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July 28, 2009

Constructing Foundations for Success:

Implications of the
National Mathematics Advisory Panel Report



Outcomes - Participants will...

- Understand the recommendations of the National Mathematics Panel Report (NMPR) that pertain to curriculum and content.
- Connect the key NMPR curriculum and content recommendations to current work and state initiatives.
- Develop strategies that will lead to coordinated, leveraged actions that address the curriculum and content recommendations of the NMPR.

Overview of Curriculum Task Group

- National Mathematics Panel asked to make recommendations on “the critical skills and skill progressions for students to acquire competence in algebra and readiness for higher-level mathematics.”
- Panel established a Task Group on Conceptual Knowledge and Skills (CKS) composed of seven nationally recognized educators.

Overview of CKS Task Group

- CKS Group formulated three major questions focused on:
 - 1) the major topics of school algebra
 - 2) the essential mathematical concepts and skills that lead to success in Algebra, and
 - 3) the impact of the sequence of topics prior to algebra course work

CKS Task Group: Methodology and Evidence Base

- Reviewed research literature focused on three key questions
- Review yielded some peer-reviewed and published studies that met standards of methodological quality
- Small number of such studies

CKS Task Group: Methodology and Evidence Base (Continued)

- Supplemented the literature review with:
 - reports by national organizations and government agencies
 - analyses and comparisons of state curriculum frameworks and school textbooks
- Recommendations on matters of definition and mathematical content were guided by professional judgment.

Data Review and Analysis

- Review of national, state, school, or district data, if applicable
- Multiple data sources [textbooks, Trends in Mathematics and Science Study (TIMSS), National Assessment of Educational Progress (NAEP) data, teacher survey, state standards, international curricula, etc.]

CKS Task Force Findings

- Individually read handout on recommendations and findings, then:
- List the 3 that need immediate attention
- List the 2 that most surprised you
- Make 1 recommendation to address an item from your first list

CKS Task Force Findings

- As a team, share and compare lists.
- Compile a team 3-2-1 list. Pick a spokesperson to share with whole group.

Benchmarks for Critical Foundations

- Research Brief -- Benchmarks for Critical Foundations of Algebra
- Whole numbers (2), Fractions (6), Geometry (3)
- Evenly assign to team members
- For your assigned benchmark(s), give an example, illustration, or description of what those fluencies or proficiencies look like.
- Post to appropriate station and discuss with those with same task.
- Whole group carousel and discussion.

Benchmarks for Critical Foundations

- 1) Solve:

$$\sum_{n=1}^4 2n - 1$$

Benchmarks for Critical Foundations

- **2) Solve:**

- **$X = 1 + 3 + 5 + 7$**

Examining Content

- Solve individually:
 - Estimate how far a bicycle with 24-inch wheels (diameter) would travel if the wheels made 20 revolutions.

Examining Content (Continued)

- Compare your estimate with others at your table.
- What were the keys to finding the solution/estimate?
- Discuss with others at your table and be prepared to share with the whole group.

Examining Content (Continued)

- Handout on multiplication of mixed numbers
 - In pairs, answer/solve the given questions.
 - Share with team members
- Read additional handout on multiplication of mixed numbers.
 - Share thoughts with team members
 - Whole group discussion

Examining Content (Continued)

- In state teams, discuss:
- How do your state standards address the type of depth and understanding students should attain regarding multiplication of mixed numbers?
- What implications are there for state department of education staff outside of the division/unit responsible for content standards?

Examining Content (Continued)

- 1) If you left high school with a conceptual understanding of π being the relationship of the circumference to the diameter (as opposed to simply being a quantity of approximately 3.14), please stand.

Examining Content (Continued)

- 2) If you graduated from college with a conceptual understanding of π being the relationship of the circumference to the diameter (as opposed to simply being a quantity of approximately 3.14), please stand.

Examining Content (Continued)

- 3) After college, if you learned a conceptual understanding of π being the relationship of the circumference to the diameter through some type of professional development opportunity, please stand.

Examining Content (Continued)

- Attaining a conceptual understanding of π :
- K-12 education
- College
- Professional Development system

Reflecting on Algebra Content

- What mathematics knowledge do you want your students to walk away with upon high school graduation?
- How does the state department of education ensure that this happens?

Instructions State Team Work

- After break, convene state teams.
- Participants will complete and discuss the State Team Planning Tool: Section B—Curricular Content.



References

National Mathematics Advisory Panel (2008). *Report of the task group on conceptual knowledge and skills*. Retrieved April 20, 2009, from <http://www.ed.gov/about/bdscomm/list/mathpanel/reports.html>