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Education Director.

The Importance of Early Childhood Mathematics



A recent report released by the National Research Council highlights the need for increased emphasis on math in early education programs. The NRC report describes most established pre-kindergarten programs as a “loosely sewn-together patchwork of programs and services” where “attention is almost entirely on reading and literacy, without recognizing the importance of math...”

(Mathematics Learning in Early Childhood: Paths Toward Excellence and Equity, 2009).

This growing body of research further indicates that a high quality kindergarten math program has effects up through fifth grade and can help overcome systematic inequities in educational outcomes and later career opportunities. A research study from the University of Missouri revealed that students who knew the number line and some basic facts at the beginning of first grade showed faster growth over the next five years. “In order to improve basic instruction we need to know what to teach,” said David C. Geary, Curators’ Professor of Psychological Science. A good pre-school teacher (or a good pre-school program) integrates math into child-initiated activities with questions about the number of rocks in a pile, the relative size of two objects, or the proper order of events in a familiar routine.

Emphasis on Problem Solving in Early Childhood

Research strongly supports the consistent use of manipulatives to build students’ thinking skills, create positive attitudes toward math, and assist transfer of learning to problem-solving situations. As children use manipulatives to explore problems, they discover and understand the basic patterns underlying the essential concepts of mathematics.

Research-based techniques associate math concepts to real-world situations. Stories from children’s literature are engaging and very effective at introducing new math concepts. The teacher encourages children to make up their own word problems related to basic facts, a technique which assists in understanding the structure of word problems and the language of mathematics.

Systematic instruction on steps and strategies heightens awareness of commonly used tools in problem solving. Lessons that incorporate strategies such as act it out, use a model, draw a picture, and make a table help students find different ways to solve a problem.

Mathematics that Makes Sense and is Enjoyable

A major goal of mathematics instruction is to help children believe in themselves and feel confident about learning math. This develops as children are able to reason and justify their thinking and learn that mathematics is not simply memorizing rules and procedures. They see that mathematics makes sense and is enjoyable (NCTM, 2000).



Product Focus: *Moving with Math*® Connections A Literacy-Based Math Program in English and Spanish

Assessment to Screen and Differentiate Instruction

A successful math curriculum begins, continues, and ends with assessment. That is why *Connections* includes a full complement of classroom-proven assessment tools to assist the teacher in identifying student needs and planning intervention goals. Teachers can easily evaluate student math proficiency, identify at-risk students for targeted intervention, monitor student progress on a periodic basis, and evaluate the effectiveness of the program. These assessment tools include:

1. *Screening, Benchmark, and Post-Test*
2. *One-on-One Tests with Manipulatives (optional)*
3. *Oral Reviews*
4. *Chapter Tests and Reviews*
5. *Informal Assessments: Questioning, Journal Prompts, Think Alouds*

Optional Web-Based Assessment



Moving with Math® *Connections* has the option of web-based assessment for kindergarten through grade 2. Web-based assessment provides teachers with immediate reports to easily differentiate instruction, monitor progress, and provide accountability to all stakeholders. The kindergarten is administered off-line, then teachers enter results online to receive immediate assessment reports. A web-based Pre-Test, Benchmark Test, and Post-Test are available for students in Grade 1 and Grade 2 to take online.

All test questions are correlated to the Common Core State Standards.



Moving with Math® *Connections* provides a standards-based curriculum designed to prepare young learners for lifelong success in math. To accomplish this goal, *Connections* emphasizes the hands-on discovery and understanding of essential math concepts and the acquisition of math literacy needed by young learners to succeed in their math education.

Theoretical Basis

Connections utilizes an activity-based approach that mirrors children’s natural learning style. Conceptual learning begins with a real-world experience, a children’s story, and manipulative exploration. Students gradually move from using concrete manipulatives to representing concepts with drawings and pictures, and then to a higher level of abstraction by using words and numerals.



Young learners move back and forth between these modes of thinking as they progress through the three developmental stages of learning described by Piaget: concrete, representational, and the abstract or symbolic level.

Gradual Release Instruction

All instructional materials in the *Connections* curriculum support a gradual release lesson structure that directs the exploration of each math concept first with manipulatives and hands-on activities. Responsibility for learning shifts from the teacher to the student.

Read to Me

More than 200 story-based activities are described in the



Connections Read to Me

bibliographies. Children’s stories provide students with original problems to be solved, ways to practice mental math, and opportunities to develop problem-solving skills. Engaging illustrations help frame the problem and excite a child’s interest in finding a solution.

Building Math Vocabulary

Mathematics is “conceptually driven,” because students must understand the meaning of terms and symbols underlying concepts rather than by reference to contextual clues like those encountered in reading. That is why *Connections* explicitly calls out new vocabulary words in each lesson. The language of mathematics is taught explicitly to establish a solid connection between the concept and the mathematical terms describing it. *Connections* encourages the development of a practical, precise, and conceptually accurate math vocabulary.



Research Reveals Importance of Early Childhood Education

Addressing Research-Based Strategies

The National Council of Teachers of Mathematics (NCTM) and the National Association for the Education of Young Children (NAEYC) have collaborated in preparing a set of recommendations to support high-quality, challenging, and accessible mathematics for 3- to 6-year-old children. The joint statement acknowledged the importance of early childhood learning in the first six years of life and the significantly lower levels of achievement of children who live in poverty and are members of linguistic and ethnic minority groups. They also emphasized the importance of connecting the curriculum for children aged 3 to 6 with what is done with students over 6.

The ten recommendations for achieving high quality mathematics education are:

1. Making sense of the real world

Develop the essential ideas of sorting, classifying, and finding patterns.

2. Building on experience level

Structure lessons around the Concrete, Representational, Abstract (CRA) model of cognitive development.

3. Teaching based on development

Integrate language development related

to big ideas.

4. Strengthening reasoning and problem solving

Use manipulatives to help children discover and develop understanding of essential math concepts.

5. Sequencing mathematical ideas

Scaffold math concepts within a logical structure where each new concept is built upon previously learned concepts.

6. Developing key ideas in depth

Key ideas are developed using the CRA method, and significant practice time develops long-term retention.

7. Integrating math in other activities

Activities in learning centers connect math to other curricula areas such as art, science, music, drama, reading and the real world.

8. Exploring and discovering

Manipulative activities and games are designed for children to explore, discover, and communicate concepts.

9. Providing a range of activities

Lessons with tactile, visual, and auditory activities reach out to students with different learning styles.

10. Providing continuous assessment

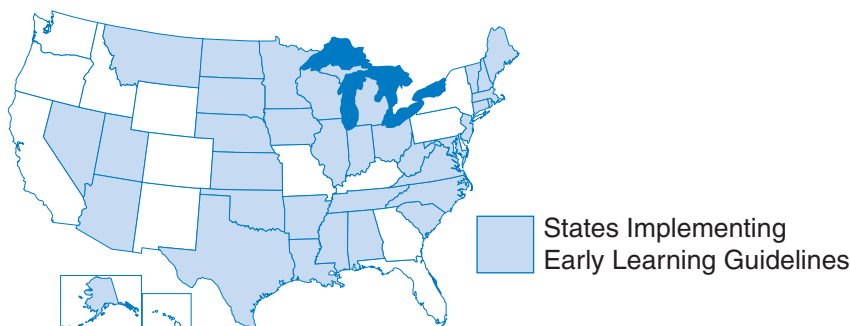
A variety of assessment tools screen, assess, monitor, reassess, and measure growth.

The complete study is available at www.naeyc.org/positionstatements/mathematics



Implementation of Early Learning Guidelines Growing Nationwide

During the last ten years, all states have made significant progress in developing Early Learning Guidelines (ELGs) for preschool children. Thirty-six states are implementing ELGs and the remaining states are in the process of revising or developing them.



To learn more, visit the National Child Care Information and Technical Assistance Center (NCCIC) website and search for your state's Early Learning Guidelines.



Moving with Math Addresses the Common Core State Standards

The Common Core State Standards promise to bring a greater degree of coherence and conceptual understanding to math instruction. For instruction to be effectively targeted, it must be driven by content standards that are relevant to the conceptual underpinnings and deeper structures of mathematics. This has been the long-term focus of the curriculum development efforts at Math Teachers Press, and we are pleased that the Common Core State Standards are attentive to this important aspect of math instruction. In addition, implementation of the Common Core State Standards promises to promote a greater degree of state-to-state consistency that has not existed before. We are excited by that prospect and by the opportunity we have to help teachers, students, and administrators make a successful transition to the new standards.

In preparation for this transition, Math Teachers Press is adding CCSS-aligned standards to the *Moving with Math* curriculum. CCSS correlations will also be included in a Transition Kit that is currently under development.

listeningpoint

“Providing young children with extensive, high-quality early mathematics instruction can serve as a sound foundation for later learning in mathematics and contribute to addressing long-term systemic inequities in educational outcomes.”

Cross, Woods, & Schweingruber, Committee on Early Childhood Mathematics; National Research Council (2009).

upcoming exhibits & workshops

Oct. 13–14, 2011—Toledo, OH
OCTM Conference Booth #200

Oct. 13–14, 2011—Jacksonville, FL
FCTM Conference Booth #142

Oct. 20–21, 2011—Atlantic City, NJ
NCTM Regional Booth #411
Workshop: Algebra Readiness in Middle School

Oct. 21, 2011—Fulton, MD
MCTM Conference

Oct. 27–28, 2011—St. Louis, MO
NCTM Regional Booth #306
Workshop: Data-Driven, Differentiated Instruction Provides Algebra Readiness in Middle School

Nov. 3–4, 2011—Albuquerque, NM
NCTM Regional Booth #601
Workshop: Assessment and Instruction on Multiplication and Fractions for RTI

Nov. 4–5, 2011—Palm Springs, CA
CMC-South
Workshop: Developing Math Concepts and Oral Language Strategies
Workshop: Making Sense of Fractions and Operations with Fractions

Nov. 10–11, 2011—State College, PA
PCTM Conference

Nov. 10–12, 2011—Louisville, KY
National Middle School Conference Booth #212

Dec. 2–3, 2011—Asilomar, CA
CMC-North

Jan. 21–24, 2012—Seattle, WA
National Title I Conf. Booth #303
Workshop: Algebra Readiness in Middle School

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For a complete list visit:
www.movingwithmath.com

a message to our valued customers...

Dear Friends,

Recent research has highlighted the importance of placing more emphasis on math in early childhood education and the importance of connecting the curriculum for children ages 3–6 with curriculum for students over 6. The research further indicates the mathematical understanding of early childhood math concepts differ for children living in poverty who are members of linguistic and ethnic minority groups. *Moving with Math Connections* for pre-kindergarten through grade 2 has been written to address these needs. We have carefully developed this program to implement research-based practices proven successful in classical early childhood studies. Children working with manipulatives in small groups develop understanding of essential math concepts and oral language skills. Children's stories connect math to the real world and make math fun.

Activities for learning centers and lightly scripted lesson plans make the teacher's job easier. Responsibility for learning is carefully transferred from the teacher to the student. Parent involvement is encouraged with family letters, activities, and games.

Screening assessments provided from pre-k through grade 2 quickly identify children with greatest needs. The



pre-kindergarten program is tested with manipulatives, and grades K–2 assessment may be paper-pencil or web-based. The tested objectives are correlated to state standards such as Texas and Virginia and the Common Core State Standards.

Please call 800-852-2435 to request a free sample. We look forward to hearing from you.

Caryl K. Pierson

