

Mathematics in Early Childhood Learning

A Position of the National Council of Teachers of Mathematics

Question

What is important in early childhood mathematics education programs?

NCTM Position

Young learners' future understanding of mathematics requires an early foundation based on a high-quality, challenging, and accessible mathematics education. Young children in every setting should experience mathematics through effective, research-based curricula and teaching practices. Such practices in turn require that teachers have the support of policies, organizational structures, and resources that enable them to succeed in this challenging and important work.

A growing body of research supports the implementation of curricular resources and program standards for mathematics for early childhood learners (Richardson, 2000; NAEYC & NAECS/SDE, 2003; Clements, Sarama, & DiBiase, 2004; NAEYC, 2009; National Research Council, 2009). The National Association for the Education of Young Children (NAEYC) and the National Association of Early Childhood Specialists in State Departments of Education (NAECS/SDE) recommend the implementation of “curriculum that is thoughtfully planned, challenging, engaging, developmentally appropriate, culturally and linguistically responsive, comprehensive, and likely to promote positive outcomes for all young children” (2003). This research underscores the need to expand the implementation of pre-kindergarten programs to all communities to provide greater access to early mathematics instruction for early childhood learners. In mathematics, curricular and program standards should be flexible guidelines based on the following criteria: available research and expert practice, the big ideas of mathematics for children, and a range of expectations for outcomes that are developmentally appropriate (Clements, Sarama, & DiBiase, 2004). The big ideas in mathematics must include mathematical experiences that incorporate mathematics content in areas such as number and operations, geometry, algebraic reasoning, and measurement. Mathematics curricula and teaching practices should rest on a solid understanding of both mathematics and the development of young children. Understanding should be monitored by observation and other informal evaluations to ensure that instructional decisions are based on each child's mathematical needs.

Research on children's learning in the first six years of life demonstrates the importance of early experiences in mathematics. An engaging and encouraging climate for children's early encounters with mathematics develops their confidence in their ability to understand and use mathematics. These positive experiences help children to develop dispositions such as curiosity, imagination, flexibility, inventiveness, and persistence, which contribute to their future success in and out of school (Clements & Conference Working Group, 2004).

Early childhood educators should actively introduce mathematical concepts, methods, and language through a variety of appropriate experiences and research-based teaching strategies. Teachers should guide children in seeing connections of ideas within mathematics as well as with other subjects, developing their mathematical knowledge throughout the day and across the

curriculum. They must encourage children to communicate, explaining their thinking as they interact with important mathematics in deep and sustained ways.

Teacher education programs must include attention to the mathematics component of early childhood programs, and continuing professional development opportunities should support high-quality mathematics education. Effective professional programs weave together mathematics content, pedagogy, and knowledge of child development and family relationships (Ball & Cohen, 1999). The development of institutional policies that promote teachers' mathematical learning, teamwork, and planning can provide necessary resources to overcome classroom, community, institutional, and system-wide barriers to young children's mathematical proficiency.

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