Math Curriculum in the Early Childhood Context

Carol E. Copple, Ph.D.
National Association for the Education of Young Children

As we turn our attention to math curriculum and an array of exciting experiments in curriculum development, we should pause a moment to consider the context—actually, the enormously varied contexts—within which children five and under spend their days.

Variation in child care settings

Education and care settings for children through age 5 are highly diverse. Of all children under 5 in the United States, almost a quarter are at home with a parent. Others are cared for by a relative (23%), family child care provider (16%), or nanny/babysitter (6%). Finally, about a third of under-5 children—and nearly half of all 3- and 4-year-olds—are in some kind of center-based program (Capizzano, Adams & Sonenstein, 2000)

Dramatic differences exist in the training and skills of those who care for young children, even if only those caring for children in group settings are considered. In the early childhood workforce, teacher/caregiver backgrounds range from a bachelors degree or beyond (31%) to a high school diploma or less (24%) (Whitebook, Howes, & Phillips, 1998). This variegated picture of the contexts in which young children in America spend their time must be taken into account by curriculum developers and others seeking to shape young children’s mathematical experiences. Such innovators should be asking themselves, for instance:

- Is this curriculum or resource accessible for caregivers or teachers with relatively little background in child development, early childhood education, and math? Can they understand and make effective use of it? If not, what experiences and resources will they need in order to do so? and

- What can be done to bring aspects of this curriculum into the home and other informal settings? How can the value of mathematics in general—and this curriculum approach in specific—be communicated to parents and other lay persons? Are there some simple things families can do with their children to enhance the impact of the curriculum?
Common features of the early childhood context

In the majority of programs, even across the quite varied landscape of early childhood care and education, certain practices are likely to be found. Although varying from program to program and teacher to teacher, these practices are far more typical in settings for children up through age five than they are in classrooms for elementary and higher grades. Each of the following practices—and the overall context they create for children—is relevant in developing effective curriculum design and implementation.

- Throughout much of the day children are free to move about the room and go to any of the learning centers or activity areas—blocks, dramatic play, and so on. As they do so, children manipulate a wide variety of things, including materials in mass (e.g., sand, rice, water); discrete objects that may be sorted, classified, arranged in patterns, and counted; and materials/activities in which shapes are salient (puzzles, tangrams, and the like). Teachers generally provide opportunities for children to “mess about” with materials and processes—allowing time to explore and experiment—especially when things are first introduced.

  However, teachers need more knowledge of the kinds of materials and experiences that would be most valuable for children for mathematical learning.

- As children pursue their own interests and investigations in art, construction, dramatic play, sand and water play, and other activities, many teachers (with varying levels of skill) look for opportunities to help them extend and elaborate their pursuits. Early childhood teachers tend to talk and interact with children individually and in small and large groups, typically conversing with them rather than “lecturing.” They ask open-ended questions and make comments in order to get children to notice, think, and express their ideas.

  However, because many teachers are not proficient in following up on initial questions or remarks, their questions often make little impact on children’s thinking and construction of knowledge. Sustained interactions relating to math ideas are scarce indeed.

- Most early childhood teachers do not divide the day by subject or discipline (math, science, language and literacy, and so forth). Rather, they plan an integrated curriculum, often organizing classroom activity around a theme, unit, or project in the course of which children will use and learn in all or most of the learning domains.

  However, integrated curriculum has risks as well as strengths. The math that comes up in a given project or unit—for example, children ringing up groceries on a cash register—may be so far from where the children are in their math understanding that they get almost nothing mathematical from the experience. Many teachers say that “math is everywhere” in their classroom and curriculum, yet little of it registers with children because teachers lack developmental knowledge of children’s math learning.
Children are continually interacting with one another; as they engage in cooperative play they communicate, negotiate, debate, and work together to achieve joint purposes. However, when the learning environment and activities have not been designed to spark mathematical conversations and investigations, children may not talk a great deal about number, space, patterns, and other math-related topics.

Teachers or caregivers have closer contact with families, and parents tend to feel more at home with them, than is the case with teachers in higher grades. However, the vast potential afforded by this rapport and daily communication is too rarely put to use by involving parents in promoting children’s learning and development at home, or even sharing with them much about what the child is learning and doing in the program, in mathematics, for instance. As for promoting children’s enthusiastic engagement with math, parents are almost never used as a resource.

In sum, there are a number of ways in which early childhood programs are well suited to children’s math learning. Children are not sitting passively; they are actively involved with materials, and they are talking with one another and with teachers. All this is good, but clearly it is not to ensure enough children’s acquisition of mathematical knowledge and concepts. Much of the potential offered by the early childhood context with respect to math learning is not being fully realized.

What do early childhood teachers need from us?

Staff working in early childhood settings need extensive training, sometimes even in the rudiments of safety and caring for children, not to mention the fostering of children’s learning. As we work to improve the quality of math curriculum and instruction in the early years, we need to remember that this is the reality: there are hundreds of thousands of virtually untrained early childhood workers, along with hosts of teachers with basic early childhood training but little if any preparation relating to math teaching and learning.

For the least trained personnel, it will be well to focus on a few core messages. In the reading area, by analogy, a simple but powerful message is “Read to children everyday.” What are comparable messages or practices for math?

Another fruitful direction of exploration is developing or identifying materials—from simple toys and games to software—that take children into interesting mathematical avenues without sophisticated teachers on the spot. As for published curricula, they certainly have a role to play. When knowledgeable experts develop and extensively field test a curriculum, they are providing a resource that few teachers could develop on their own. Yet without a degree of professional development for teachers, most curricula will fall far short of achieving their goals. We need to think a lot more about this problem.
Practically all teachers need to know more about math—the nature of the beast—and how to work with children in math. They need to know much more about what math young children are interested in and capable of doing; many vastly underestimate the range of young children’s interests and the extent of their capabilities.

For our part, we should not underestimate early childhood teachers. When they have this awareness and knowledge about math and the rich potentials for early math learning, a great many will think of wonderful ways to “mathematize” their classroom and curriculum.
References
