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## Storytelling: Building a Mathematics Curriculum from the Culture of the Child

Susan Butterworth and  
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Susan Butterworth, [sbutterworth@mediaone.net](mailto:sbutterworth@mediaone.net), and Ana Maria Lo Cicero work at Seaside Nursery School and Marblehead Children's Center, Marblehead, MA 01945. An administrator and freelance writer, Butterworth enjoys observing teachers, parents, and children, and one of her main goals is to facilitate communication among those groups. Lo Cicero works with children and teachers to develop classroom activities that support

their mathematical and personal development. She enjoys integrating art and children's cultural experiences into classroom mathematics activities. The authors thank the teachers, especially Andrea Parker, Pam Mentuck, and Erin Bushway; the children; and the parents with whom they work. The project about which this article is written was funded by Rosanne Phe-lan; a videotape titled *Creative Mathematics* is available by calling the authors at (781) 631-1954 or sending e-mail to [mhcc@tiac.net](mailto:mhcc@tiac.net).

Edited by Douglas Clements, [clements@buffalo.edu](mailto:clements@buffalo.edu), and Julie Sarama, [jsarama@buffalo.edu](mailto:jsarama@buffalo.edu), State University of New York at Buffalo, Buffalo, NY 14260. This section addresses the early childhood teacher's need to support young children's emerging mathematics understandings and skills in a context that conforms with current knowledge about the way that children in prekindergarten and kindergarten learn mathematics. Readers are encouraged to send manuscripts for this section to "Early Childhood Corner," NCTM, 1906 Association Drive, Reston, VA 20191-9988.

As teachers of young children, we perceive a tension between the demands of parents and elementary schools—that young children be academically prepared to enter increasingly challenging kindergarten programs—and our philosophy of early childhood education—that four- and five-year-old children should experience creative nurturing in a setting that encourages free expression of childhood through spontaneous play. In the early childhood education community, we have embraced the Reggio Emilia approach, the idea that a successful curriculum grows from the children's own interests and that effective projects encompass multiple disciplines and may develop and change over an extended period. We believe that the

school experience will be most meaningful to the child if the culture that each child brings from home is connected with the activities in the school setting. How, then, can we encourage mathematical thinking in our prekindergarten classrooms and still be consistent with Emilia's concept of curriculum?

Although we have not yet completely resolved this tension, we have tried a project approach that uses the children's own stories as sources for teaching and learning mathematics while developing language and cultural awareness. Working with four- and five-year-olds in a preschool setting, we begin by asking a child to tell a story. We use these stories to present mathematical concepts. Using real-life situations from the children's family experiences, their "historic culture," we present addition, subtraction, multiplication, and division when appropriate. Our goal is to help preschoolers gain an intuitive understanding of these concepts rather than to teach them arithmetic facts.

### Culture and Mathematics Curriculum

We built our project from theoretical and practical foundations. Our basic philosophy is described in detail in *The Hundred Languages of Children: The Reggio Emilia Approach* (Edwards, Gandini, and Forman 1998). The practical background was provided by a series of projects conducted and reported by Ana Maria Lo Cicero over the last several years. Lo Cicero's work includes Children's Math Worlds, a conceptually challenging mathematics curriculum that seeks to integrate children's cultural experiences into classroom mathematics. This curriculum was developed in an urban Latino setting with Karen Fuson and others at Northwest-





the table and count. At first, some of the children were confused and counted some chairs twice. One of the teachers suggested touching the chairs to make the counting more concrete and help solve the problem. This guidance cleared up the confusion, and the children quickly counted eight chairs. The children who were watching showed the number 8 by holding up eight fingers.

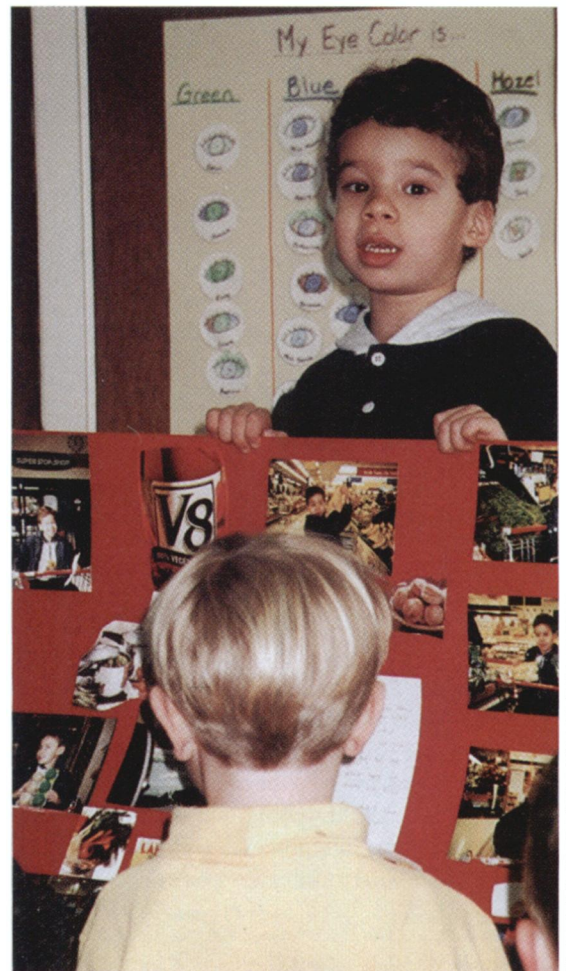
We continued enacting the story and presenting mathematical word problems. The teacher placed fruit in front of five of the chairs at the dinner table. She asked, "If we have five pieces of fruit on the table, how many pieces do we need to buy at the market to make sure that everyone at the table can have a piece of fruit?" Some of the children counted the empty chairs at the table to arrive at the answer, three.

We encouraged the children who were watching to work out the problem on their fingers. Some of the children held up four fingers on one hand and four fingers on the other hand to total eight, and some held up five fingers on one hand and three on the other. The teacher took the opportunity to discuss different combinations that will total eight:

I see that some children are showing four fingers on each hand, and some children are showing five fingers on this hand and three fingers on this hand, and some more children are showing three fingers here and five fingers on the other hand. These are all different possible ways to show the number 8.

At the market table, Christina asked Brian for three apples. How much money does she need? Brian asked her for three pennies. Christina gave Brian three of her pennies; she had three pennies left. The teacher asked the children how much money Christina had before she gave Brian the three pennies. By counting, using wooden chips to represent the pennies, or using their fingers, some of the children were able to answer the question correctly. Christina took the fruit back to the dinner table and, matching chairs and fruit, showed that she had purchased the necessary amount of fruit to finish setting the table. A mathematics lesson was in progress, naturally developing from Brian's story and the children's dramatic play.

Later we tried some more complicated questions. We asked the children a division question, again using concrete objects and the child's market story. If Brian asks Christina for all six pennies for the three pieces of fruit, then how much does the fruit cost? Only one of the five-year-olds was able to work this problem out, matching two of the wooden chips to each piece of fruit. Over time, we plan to ask more of these questions. For example, if we have four pennies, how many pieces of fruit can we buy? At this point in our lesson, however,



Photograph by Susan Butterworth; all rights reserved

the children's minds were beginning to turn to lunch!

The teacher's role in this curriculum is to look for opportunities to turn the children's stories into word problems. She or he must listen, understand the children's thinking, guide, intervene, and provide concrete examples as necessary to encourage mathematical thinking. The goal is to teach relationships, such as the relationship between food products and money, as well as the mathematical relationships of addition, subtraction, multiplication, and division, which young children can grasp when the concepts are presented concretely.

Mathematics stories can be used daily; they should grow from the children's lives. When we began the market project in the fall, we hoped that the teachers would begin to encourage mathematics stories as those arose spontaneously in the children's play and would continue the market theme throughout the year.

One of the teachers, Ms. Pat, called me over to a corner of the play yard one spring morning. She had a big grin on her face. A group of children was gathered around one of the picnic tables, which had a long row of sand toys displayed on it. "They're



