

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

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# arly Childhood Corner



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

s 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 fourand 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.

Susan Butterworth and Ana Maria Lo Cicero



Susan Butterworth, 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 Phelan; a videotape titled Creative Mathematics is available by calling the authors at (781) 631-1954 or sending e-mail to mhcc@tiac.net.

Edited by Douglas Clements, clements@buffalo.edu, and Julie Sarama, 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.

# 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-

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ture about his/her story. You may include your photos or cutouts from newspapers or magazines. We will be using all of this material to develop our math lessons.

ern University. With Kristen Hudson, Lo Cicero has also been involved in using art as a pathway to mathematical thinking. These background experiences are described in more detail in the sources listed in the bibliography. In each of these approaches and projects, curriculum is created by listening to the child, telling and retelling stories, and documenting this process. The Hundred Languages of Children summarizes our goal:

As we discuss and share reflections, we create culture. We consider what has happened and search for its interpretation; we negotiate to construct a collective understanding. (Edwards, Gandini, and Forman 1998, p. 133)

We seek to create a common culture of the children as a group by working from the stories that each child brings from the culture of his or her home. To make this culture visible in our centers, we have adopted the Reggio Emilia practice of documenting the children's evolving experiences with photographs, drawings, videotapes, and audiotapes. By so doing, we hope to increase the children's interest and confidence; to promote an exchange of ideas among the parents, teachers, and children; and to encourage reflective thinking.

### **The Market Project**

We began the market project with a letter to the families of the students in our transitional kindergarten class:

Family participation is an important element of our "math stories" curriculum. We ask parents to take their children along when they go to the supermarket. Take photographs if you can (optional). Later, talk about the experience with your child. Ask your child to tell you about the shopping experience so you can write down your child's story and send it in to class. Also, please ask your child to draw a pic-

Brian's family responded with an imaginative mural that included photographs of Brian at the supermarket, pictures of food and cooking utensils, and Brian's story written down by his mother.

Brian held his mural up for the group to see and began his story: "We went shopping at Crosby's. I bought butter and five apples, four red ones and one yellow one. Then I went home and ate the apples." We did not ask specifically for the stories to include quantity. One of the advantages of using the market as a subject is that quantity and money are natural elements of the shopping experience.

The teacher then asked the children whether they had any questions for Brian, or whether someone would like to retell his story. The children were asked to comment on Brian's story both to encourage clarification, an exchange of ideas, and reflective thinking and to enhance the meaning and importance of the story. By displaying the children's work and taking photographs as they told their stories, we hoped to acknowledge the importance of each child and his or her culture and to promote shared discussion with parents, children, and teachers about the learning process.

Next the teacher suggested dramatic play, using the classroom space to enact the story concretely. She asked the children to look around the classroom for items that they could use to act out Brian's story. The children responded with "fruit" and "money." One table became the "market," with a basket of fruit to sell and a child acting the part of the shop-keeper. Another table became the dinner table.

We asked some of the children to count the chairs around the table. They began to walk around

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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,



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

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having a yard sale," Pat said in an excited stage whisper. "They're bargaining for the best price for a toy shovel." No guidance was necessary. We stood back and watched while the children developed their own mathematics curriculum, drawing on one of the signs of spring on Saturday mornings in the popular culture of our suburban town, going to yard sales.

The market project is meant to be long term, with each lesson building on the common culture that we have created together by documenting the stories told by children, collected by parents, and interpreted into mathematics curriculum by the teachers. By exploring this theme over time, we hope to see an increase in students' comprehension of progressively more complex mathematics concepts, as well as an increased awareness of language, vocabulary, and culture.

## Conclusion: Collective Experiences

This teaching approach begins with a child's story or drawing to formulate a curriculum that strengthens students' ability to think creatively about word problems and mathematics operations while developing language; cultural awareness; and an exchange among parents, teachers, and children. The children's own stories connect home with school and invite parental involvement. The elements of telling and retelling the story and asking questions help develop language and encourage reflective thinking and an exchange of ideas in the school community while affirming the importance of each child's home culture. Lo Cicero and others (1999) summarize the concept:

Teachers can choose the stories that they think are fruitful to expand mathematically. Stories can be told at other times of the day and returned to and told again (perhaps by another child to emphasize listening and remembering) during mathematics class . . . . Mathematical aspects can be expanded. Nonmathematical aspects can be discussed in other subject areas. Children feel very excited and affirmed whenever their story is mentioned in class. (p. 60)

Documenting the project by displaying the children's drawings and stories and taping, videotaping, and photographing the discussions are additional components of the process. These components give the stories importance; encourage further thinking and clarification; and make the experience available to parents, children, and teachers who were not present. The atmosphere of learning; the excitement of the children; and the exchanges among teachers, children, and families are rewarding in themselves. The resulting curriculum is conceptually challenging and arises from

the collective experience of home and classroom

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NCTM members will receive a free copy of the booklet with their March 2001 News Bulletin. The booklet is written for the teacher and contains a variety of lessons and activities related to the theme, Mathematics at the Fair.

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