

# Encouraging Family Involvement in Math during the Early Years

*Involving families in mathematical learning is essential to young children and it is essential for early childhood educators to create opportunities for parents to become involved.*

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A significant amount of research has been published that supports family involvement in children's early learning (Epstein, 1995; Jeynes, 2012; LaRocque, Kleiman, & Darling, 2011). In the United States, the importance of parent involvement is so well accepted that it was written into education law, including an entire section in the No Child Left Behind Act or NCLB (2002). Although there are many examples of family involvement in literacy during the early years, parents are generally not as involved in their children's mathematical learning (Cannon & Ginsburg, 2008). Many barriers to family involvement exist, including:

- lack of mathematical knowledge (Kliman, 2006; Kliman, Jaumot-Pascaul, & Martin, 2013; Muir, 2012)
- negative feelings and anxiety about mathematics (Gunderson, Ramirez, Levine, & Beilock, 2012; Maloney, Ramirez, Gunderson, Levine, & Beilock, 2015; Vukovic, Roberts, & Wright, 2013)
- a focus on literacy over mathematics (Cannon & Ginsburg, 2008; Skwarchuk, 2009).

However, involving families in mathematical learning is essential to young children. Studies have demonstrated children whose parents are involved in their mathematical education benefit in engagement, achievement and attitude (Berkowitz, Schaeffer, Maloney, Peterson, Gregor, Levine & Beilock, 2015; Missall, Hojnoski, Caskie, & Repasky, 2015; Sheldon & Epstein, 2005; Sonnenschein, Metzger, & Thompson, 2016). Parents who help children become involved in meaningful activities can help create positive experiences (ESSO

Family Math, 2011; Kliman, 2006). Thus, it is essential for early childhood educators to create opportunities for parents to become involved in their children's mathematical learning.

The purpose of this article is to provide research-based ideas on how to encourage family involvement in mathematics with young children. Examples of ways that early childhood teachers can increase opportunities for at-school and at-home family engagement in their children's mathematical learning are described. The article also includes a resource list with websites and books that teachers can share with parents.

*(Authors' note: The term parent is used throughout this article to refer to the primary caregiver responsible for a child's upbringing at home, which may include grandparents or other guardians. The term family is used to refer to the person or group of people who are in a child's home life.)*

## Opportunities for Family Involvement in Math At-School

There are two primary settings that can support family involvement in mathematics during the early years: the classroom and the home. Table 1 provides a summary of the research that supports at-school and at-home mathematics, along with specific strategies early childhood educators can use.

## Family Math Nights

One key way that early childhood educators can encourage families to become involved with mathematics

**Table 1: Strategies that Encourage Family Involvement At-School and At-Home**

Activity	Strategy
<b>At-School Mathematics</b>	
Math Buddies	<ul style="list-style-type: none"> <li>Request parent volunteers to help small groups play math games during class time (Peters, 1998)</li> <li>Ask parents to share hobbies with students that incorporate mathematics</li> </ul>
Family Math Nights	<ul style="list-style-type: none"> <li>Integrated inquiry-based projects (Sullivan &amp; Hatton, 2011)</li> <li>Invite families to use math to create a dish and bring it to a potluck dinner (Kyle, McIntyre, &amp; Moore, 2001)</li> </ul>
<b>At-Home Mathematics</b>	
Math Literature	<ul style="list-style-type: none"> <li>Send home non-fiction books about math and storybooks with math-related problems</li> <li>Distribute a list of books related to math that can be checked out from the local library</li> </ul>
Math Kits	<ul style="list-style-type: none"> <li>Create math kits with clear, concise instructions and all materials necessary to complete activities related to number sense, patterns, shapes, seriation, classification, measurement, and graphing (Seo &amp; Bruk, 2003)</li> </ul>
Math Backpacks	<ul style="list-style-type: none"> <li>Develop self-contained, mobile learning centers that integrate math and science allowing families to explore specific themes and content through active, hands-on experiments (Kokoski &amp; Patton, 1997)</li> </ul>
Math Newsletter	<ul style="list-style-type: none"> <li>Send home a newsletter to explain ways that parents are already incorporating mathematics in the early childhood classroom</li> </ul>

at school is through Family Math Nights. At Family Math Nights, children and their parents come together to investigate mathematical concepts through active, hands-on explorations. Some Family Math Nights are only for the child and their parents, while others have activities for the entire family, including older and younger siblings.

Some Family Math Nights have a variety of centers or stations that include several mathematical concepts. Others focus on one activity or math concept. The format of Family Math Nights might differ depending on the teacher, grade level, or school. However, the objective of every Family Math Night is the same: to support mathematical learning.

Supporting mathematical learning can be accomplished in three different ways:

1. helping families gain a better understanding of math curriculum
2. fostering positive attitudes about math
3. linking what the children are learning in the classroom to the home (Lopez & Donovan, 2009; Taylor-Cox, 2005).

Helping families to gain a better understanding of math curriculum is the first way that Family Math Nights support mathematical learning. Family Math Nights can be engaging while helping parents understand the math curriculum. Sullivan and Hatton (2011) described inquiry-based lessons that integrated math and science and offered opportunities for families to learn about topics in-depth.

**Early childhood educators must create opportunities for parents to be involved.**

One example was an activity that challenged children and their families to build a tower out of sticks and marshmallows that would be able to hold a plate of cookies. Families used a variety of mathematical concepts, including geometry, measurement, and balance, in order to be successful in this challenge. Each family worked together to come up with a possible solution and created a model to test their solution. Teachers and trained volunteers acted as facilitators during the

inquiry, asking questions and making suggestions. A whole-group summary at the end of the night related the investigation to the standards the children were learning in the classroom. This helped parents understand more about the mathematical curriculum in a hands-on, active way.

Family Math Nights can also go a long way in fostering positive attitudes about mathematics (Lopez & Donovan, 2009). As early childhood teachers model, facilitate, and guide families through appropriate mathematical activities, parents become more comfortable with engaging their children in math. There is even some evidence that this comfort level can lead to decreases in math anxiety (Furner & Berman, 2003). When their math anxiety decreases and comfort level increases, parents are likely to have and to display positive attitudes about math. These positive attitudes are the precursors to positive learning dispositions or habits of thoughts and actions (Da Ros-Voseles & Fowler-Haughey, 2007). As parents engage their children in solving challenging mathematical problems at Family Math Nights, they demonstrate and encourage positive dispositions such as curiosity, flexibility, resourcefulness, and persistence. These attitudes and, eventually, dispositions are another positive contribution of Family Math Nights.

**Family Math  
Nights support  
mathematical  
learning.**



Photo by Elisabeth Nichols

*The use of manipulatives helps young children to understand mathematical concepts.*

Additionally, Family Math Nights can help parents link what the children are learning in the classroom to learning in the home. Early childhood educators have the unique opportunity to model appropriate math-related activities and behaviors. They can help parents understand math as a way to solve real-world problems.

An example of a Family Math Night that linked school and home involved cooking (Kyle, McIntyre, & Moore, 2001). Each family brought

a potluck dish that the children had been involved in making. Primary-aged children and their parents engaged in reading fractions, developing part-to-whole relationships, and measuring during the cooking process. Once at school, children helped to sort the dishes into categories, including appetizers, main dishes, side dishes, and desserts.

Afterward, families were given a book containing all the recipes of the dishes prepared by the families. They were also given multistep

problems to solve at home using the recipes from the book. For example, when given a list of the amount butter required for each recipe, families had to figure out how many combinations of desserts they could make with 1 ½ cups of butter. In this way, families engaged in math at home (when cooking), at school (by sorting), and at home again (solving problems from the recipe book).

### Math Buddies

Another way that early childhood educators can provide opportunities for parents to become involved in math activities is to invite them to become “Math Buddies” and volunteer to help students with math during the school day. Peters (1998) described two studies that involved parents of children ages five and seven coming to the classroom to play math games with small groups of children. By using math materials in a setting with a teacher as the guide, parents became more confident about effectively engaging children in math. The small group that parents facilitated did not necessarily include their own child, as the study was not intended to provide parent education. However, parents reported that the facilitated game sessions gave them ideas of ways to help their children at home.

Activities used with Math Buddies can go beyond math games. Math Buddies can share their hobbies that incorporate mathematics with the students. For example, a Math Buddy who sews can help students design and create their own quilts out of paper or scraps of materials. When planning the quilt, children can identify characteristics of shapes, including the number of sides and corners. They will learn about fractions and measurement as they cut

**Table 2: Commonly Found or Recycled Materials to Promote Mathematical Concepts**

Mathematical Concept	Objects
Number Sense (one to one correspondence, counting, addition, subtraction, etc.)	rocks, coins, buttons, milk lids, shells, beads, sticks, cotton balls, flowers, decorative gems, poker chips
Patterns	soda/water bottle lids, small pieces of yarn, colored paper strips, nuts & bolts, beans and seeds, artificial flowers, socks, plastic animals
Sorting	old keys, cookie cutters, pom pom balls, leaves, rocks, leaves, barrettes, marker lids, sequins, craft jewels
Measuring	paper clips, pipe cleaners, yarn, pencils, drinking straws, coffee stirrers, unsharpened pencils, plastic worms, craft sticks

the paper or material. Students will explore geometric transformations, including rotations, reflections, and translations, as they turn, flip, and slide the pieces of the quilt. Other hobbies, such as carpentry, cooking, and gardening, can allow Math Buddies to share ways that mathematics is integrated into everyday activities.

**Use commonly found or recycled materials as manipulatives.**

### Opportunities for Family Involvement in Math At-Home

Opportunities for involvement at home is important, as family involvement in home-based activities has been shown to predict greater academic achievement than other

types of involvement (Halgunseth, Peterson, Stark, & Moodie, 2009; Harris & Goodall, 2008). Kokoski and Downing-Leffler (1995) described three advantages to establishing connections between home and school during the early years. First, a significant part of young children’s education is due to the influence of family and the home environment. Second, academic activities done at home promoted academic achievement at school. Finally, the child’s self-esteem is affected by positive academic interactions at home. It is essential that early childhood educators go beyond providing opportunities for parents to become involved just at school. They must also promote family involvement in mathematics at home.

Early childhood educators generally have little control over children’s home environments. However, there are ways that teachers can add to the home environment that encourage involvement in math.

### Sending Home Materials

One way is to provide families with resources that encourage mathematical thinking. Not all families have access to mathematical materials. Cai (2003) found that only about 30% of parents studied bought math-related books for their children. Teachers can send home non-fiction books about math, storybooks with math-related questions, or lists of books that families can check out from the library.

Teachers can also send home math materials such as connecting cubes, pattern blocks, attribute blocks, and counters for families to use. It is necessary to note that math materials from the teacher supply catalog should be used with caution. Some parents might not know what to do with certain materials. The use of unfamiliar or expensive math materials might discourage parents from being involved in their child's math at home (Keyser, 2006).

Teachers should provide families with opportunities to use store bought materials during open house, conferences, or Family Math Nights so the parents become comfortable with math materials. Using commonly found or recycled materials as manipulatives may also help parents feel comfortable and give them ideas for other accessible items that can be used for math at home. *Table 2* includes ideas of commonly found or recycled materials that can be used to promote mathematical concepts.

### Creating Homework Kits

Homework is another way that families can be involved in their children's mathematical learning. In a cross-national study on parental roles in mathematics, about 55% of U.S. parents reported regularly checking their children's homework (Cai, 2003). When math homework

involves a passive activity, such as a worksheet, parents have little incentive to become actively involved in their children's mathematical learning (Kohn, 2007). Teachers at an early childhood center in Wisconsin took a unique approach to homework by developing math homework kits (Seo & Bruk, 2003). Parents had been requesting worksheets to help their children with basic skills in mathematics. The teachers, understanding this did not align with developmentally appropriate practices, instead created activities that supported children's learning of math concepts including number sense, patterns, shapes, seriation, classification, measurement, and graphing. The kits included clear, concise instructions and all materials necessary to complete the activities. In addition to increasing opportunities for children to participate in high-quality activities, the teachers wanted the children to help their parents become familiar with the math content that they were learning at school. They reasoned this would help parents better promote mathematical learning in other contexts at home. In fact, parents began to talk more to teachers about their children's mathematical learning. The math kits provided a home-school connection that not only increased the children's mathematical knowledge but also bolstered math understanding of their families.

### Providing Take-Home Bags or Backpacks

Take-home bags or backpacks can also foster mathematical learning at home. Kokoski and Patton (1997) described a backpack system that integrated math and science into meaningful activities. These self-contained, mobile learning centers offered families the opportunity to

explore specific themes and content through active, hands-on experiments. The experiments were open-ended and required families to work together to investigate scientific concepts using meaningful math.

In one activity, *Rainbow Stew*, the children used measurement and sequencing to create a substance out of cornstarch and sugar that encouraged exploration of color mixing. In addition to using math as a tool in the context of science, the backpacks helped children and their parents realize that they could do math at home in meaningful ways.

**Build partnerships  
with families.**

The activities in take-home bags do not have to be expensive. A teacher-created set of paper tangrams can substitute for a commercially purchased set. Items found in nature, such as sticks and rocks, can be used as counters. With some creativity, early childhood educators can put together a set of rotating take-home bags to send home with the children in their class.

### Identifying Indirect Mathematical Experiences

Finally, early childhood educators can help families understand how they are already engaging their children in mathematics at home. Family involvement with math need not occur through direct experiences that are meant just for math. Math can occur in the context of



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*Parents are essential to supporting a young child's learning.*

everyday activities (ESSO Family Math, 2011). For example, when they play card games, children build number recognition skills. They practice classification as they sort the silverware when helping empty the dishwasher. When they follow a nighttime routine of taking a bath, brushing their teeth, reading a story, and going to sleep, children demonstrate an understanding of sequence and order. There is a strong relationship between the frequency that families engage in these indirect mathematical activities and children's mathematical proficiency (LeFevre, Skwarchuk Smith-Chant, Fast, Kamawar & Bisanz, 2009). It is essential that early childhood educators help parents realize that math goes beyond just numbers and counting.

Experiences at home should include a wide range of mathematical concepts and skills. Sending home newsletters and talking to parents about these experiences can help them to understand they are already engaging their children in mathematics.

## Conclusion

Early childhood educators have the responsibility to provide opportunities for families to be involved in their children's mathematical learning at school and at home. Although there are some challenges, the benefits, including increased achievement and positive attitudes about math, are too great for teachers to ignore. There are many opportunities to engage families in

promoting mathematical learning at both school and at home. The ideas given in this article are just a few examples of how to accomplish this. It's important to remember that just as each child is unique, so are each of the families, therefore each family's involvement may be different. It is essential for early childhood educators to build partnerships with families so each child in their care has the greatest opportunities for success.

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