

Engage families in meaningful mathematics



Although adult family members often desire that the children learn the excitement and value of routine household math, they may appreciate teacher support and collaboration.

foundations and nurture positive emotional growth in mathematics (Kavkler et al. 2000).

Effective teachers-family collaborations must be grounded in a positive school-family relationship and should begin early, which can lead to powerful implications for years to come. Young children benefit from observing their families and teachers in the context of a close, caring relationship and knowing that both are working together in the educational process (Greenman 2001). Studies suggest that children whose families are involved in their education demonstrate higher academic achievement, more positive attitudes toward school, and better homework habits than those of less-involved families (Epstein 1985; Henderson 1987; Jeynes 2005).

Can positive strategies limit?

Teachers often engage in various approaches to establish and maintain positive relationships with families and to support and encourage family involvement in education. Common strategies include providing information to families (e.g., newsletters), extending work begun in the classroom into homework assignments, and providing opportunities for families to participate in school-sponsored activities with their child (e.g., school carnivals).

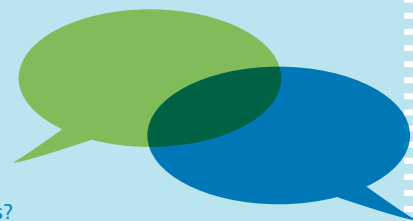
Although such strategies are critical in establishing and maintaining relationships with families, they may also be limiting. Families are frequently positioned as recipients of information and facilitators of teachers' goals for children, rather than as participants who make meaningful contributions to their child's education. The real challenge, then, lies in finding ways to involve families as partners in their child's education. Family members' influence on children's education must be recognized, and children's educational experiences should be consistent with their families' values and goals for learning. This kind of relationship requires that teachers move toward embracing the goal of family empowerment.

Young children enter school with natural curiosity and understanding of many mathematical concepts (Clements 2001). *Principles and Standards for School Mathematics* (NCTM 2000) highlights the necessity for caregivers to support and encourage this natural mathematical curiosity. Together, teachers and families can build on children's conceptual

Meaningful teacher-family conversations

To gather information, a teacher might ask adult family members questions such as these:

1. What mathematical skills and knowledge do you want your child to possess?
2. What concerns do you have about your child's mathematics education and experiences?
3. How do you think your child will best learn about mathematics?
4. In what kinds of mathematical experiences would you like your child to participate?



What is empowerment?

Empowered families feel influential in the school-family partnership and believe that their efforts have an impact (Greenman 2001). Empowerment provides families with opportunities to genuinely share the “power” in the educational process, meaning that the teacher is not the only decision maker regarding classroom practice; parents’ suggestions are frequently implemented as well. Shared power requires that teachers see families as meaningful contributors to children’s education—contributors whose knowledge, opinions, and concerns are critical components of the educational process. Teachers who view families as competent and who demonstrate empathy and trust in the family’s role (Swick 1994) will support family empowerment as well as seek, collect, and value evidence of the unique knowledge that families possess about their child.

Can teachers empower families?

A meaningful curriculum for young children builds both on curricular standards and in response to families’ educational values and priorities (Bredenkamp and Copple 1997). Engaging in conversations with family members is an important method for teachers to learn about the family’s goals and priorities for children’s mathematical learning. Such conversations allow teachers to better understand families’ viewpoints in relation to mathematical education. Teachers can then integrate these perspectives into their classroom practice. When family members see evidence of their input in the mathematics curriculum, they feel valued. This method of collaboration sets the stage for a meaningful and effective partnership between the teacher and families.

The work of one pre-K teacher illustrates what can emerge from collaboration with families. As the academic year began, families from diverse backgrounds and ethnicities responded to questions from the teacher. Many family members expressed the desire for their children to understand the importance of mathematics in daily life and learn about mathematics in ways that foster interest and excitement rather than hesitation and insecurity. After considering these priorities, the teacher planned a series of family-oriented cooking activities in the classroom. The teacher

and families worked together to emphasize the mathematical nature of cooking and also to highlight families’ unique backgrounds and cultures. Throughout the year, family members visited the classroom and engaged the children in cooking recipes that their families enjoy at home. For example, one mother baked scones; a father shared his special recipe for macaroni and cheese; and a grandmother visited to prepare sushi in front of the class.

Before each visit, the teacher prepared picture-cue recipe charts (see samples appended to the online version of this article at www.nctm.org/tcm), highlighting concepts of counting and measurement, a copy of which was sent home after each family member’s visit. She included suggestions for follow-up home-based activities comparing different amounts of common ingredients in recipes.

The classroom cooking experiences resulted in many conversations with and among children and their families. In class, students began writing their own recipes for the dishes they “cooked” at the sand table and home living center. When asked to reflect on their families’ experiences at the end of the year, students remembered the adults’ cooking presentations as particularly enjoyable and meaningful for their entire family.

Educate yourself about your families

Children and families participate in activities in their everyday lives that provide rich opportunities for mathematical learning. NCTM (2000) recommends taking advantage of naturally occurring activities to enhance children’s development of mathematical knowledge and skills. Teachers can support this process by learning about the daily routines and activities of families, such as getting ready for school, mealtimes, bedtime, grocery shopping, and relaxation or entertainment activities. Teachers can help

families understand opportunities for exploring mathematical concepts present in these routines. For example, family members can make comparisons, identify patterns, describe the sequencing of events, and sort and classify objects within these natural activities. Conversations about their daily lives can help them make explicit connections to math. Moreover, offering specific suggestions and ideas that coincide with events in a family's life demonstrates respect for traditions and priorities.

One preschool teacher introduced a "shape sheet" designed for grocery store trips. Children use the sheet to identify and count the shapes they see while shopping. The teacher believes that prepared examples help busy families implement activities. By sending home several copies of this sheet (with instructions for the parents), this teacher facilitated a way for families to easily incorporate a mathematics investigation of a daily routine into their hectic lives.

Educate families about math content

Teachers must find ways to support families' understanding of the concepts being explored in the classroom, using methods that encourage discussion and are not interpreted as condescending. Approachable teachers who demonstrate a willingness to answer questions help other adults feel on equal footing.



Identifying and sorting shapes in the grocery store is a way to introduce math concepts to preschool-aged children.

Some family members will feel more confident helping students with math when they receive some teacher support. For example, when sending home an activity sheet, teachers could provide a supplemental written description of the activity. This information could also be delivered in ways that go beyond a newsletter or homework sheet, such as on a Web site or through a homework hotline on which telephone callers hear a prerecorded message. Designed for the person helping the child with the activity, the message could briefly and clearly describe the purpose of the activity and the steps that the child must take while completing it.

Teachers might also explain how an at-home activity connects to school tasks. For example, in one activity, students counted the number of specific items in the household, such as televisions, radios, and hairdryers. The teacher information for parents included an explanation of children's development in counting, key observations, and questions to support the activity. With such accompanying information, activities become avenues to support parents' understanding of early childhood mathematical content and development.

Educate families about how youngsters develop understanding

Remillard and Jackson (2006) found that although parents value school mathematics, they associate it with computational skills and seatwork rather than with real-world connections. Families often value procedural knowledge but do not recognize the importance of conceptual development. Many parents who happily report that their child can say their numbers (procedural knowledge) fail to recognize that this skill does not provide evidence of the child's understanding that groups of objects correlate with each number (conceptual knowledge). Families may need support to understand how children develop such number sense. Experiences such as having children count the number of forks at the dinner table, for instance, can help them connect numbers with their meaning and develop understanding of number beyond the procedural knowledge generated by reciting numbers.

Establish ongoing communication

Family math nights, math items in newsletters, and backpacks filled with math activities to

engage students at home are a few examples of ways to build and sustain communication with families. Co-sponsoring a math night at school can provide families a valuable opportunity to join in mathematical play and to model questioning strategies. By using information gathered from parent conferences, teachers can encourage parents to bring games and activities that are particularly meaningful to them.

One teacher's math night included a station led by a mother who quilted as a hobby. Seeing samples of her work gave students the opportunity to create their own patterned quilts on construction paper. Another parent, who enjoyed cooking, brought items from her kitchen for children to sort and categorize by shape, color, and use. A family who had recently emigrated from Russia brought nesting dolls for students to explore. A father who loved playing a memory game with his child brought the game to share. These activities allowed family members to discover and share learning opportunities they use with their child at home, to develop mathematical thinking, and to see themselves and others as mathematicians. Such opportunities can foster close, reciprocal relationships with the families of the children's classmates, as well.

Conclusion

When teachers commit to developing empowering relationships with families, children reap the benefits. In the context of a true partnership, teachers and families work together to ensure that mathematical experiences are meaningful and relevant, with strong connections between home and school. Family values and experiences, capitalized on by the teacher in the classroom, breathe life into mathematics. Teachers' continued collaborations with families empower children to explore and build mathematical understanding of the world.

REFERENCES

- Bredenkamp, Sue, and Carol Copple. *Developmentally Appropriate Practice in Early Childhood Programs*. Washington, DC: National Association for the Education of Young Children, 1997.
- Clements, Douglas. "Mathematics in the Preschool." *Teaching Children Mathematics* 7, no. 5 (January 2001): 270–75.
- Epstein, Joyce. "Home and School Connections in Schools of the Future: Implications of Research

- on Parent Involvement." *Peabody Journal of Education* 62 (Winter 1985): 18–41.
- Greenman, Jim. "Empowering Parents?" *Child Care Information Exchange* 138 (March/April 2001): 56–59.
- Henderson, Anne T. *The Evidence Continues to Grow: Parent Involvement Improves Student Achievement*. National Committee for Citizens in Education (NCCE) special report. Columbia, MD: Center for Law and Education, 1987.
- Jeynes, William. "A Meta-Analysis of the Relation of Parental Involvement to Urban Elementary School Student Academic Achievement." *Urban Education* 40, no. 3 (May 2005): 237–69.
- Kavkler, Marija, Simona Tancig, Lidija Magajna, and Carol Aubrey. "Getting It Right from the Start? The Influence of Early School Entry on Later Achievements in Mathematics." *European Early Childhood Education Research Journal* 8, no. 1 (2000): 75–93.
- National Council of Teachers of Mathematics (NCTM). *Principles and Standards for School Mathematics*. Reston, VA: NCTM, 2000.
- Remillard, Janine T., and Kara Jackson. "Old Math, New Math: Parents' Experiences with Standards-Based Reform." *Mathematical Thinking and Learning* 8, no. 3 (2006): 231–59.
- Swick, Kevin. "Family Involvement: An Empowerment Perspective." *Dimensions of Early Childhood* 22, no. 2 (Winter 1994): 10–13.

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A Web-exclusive, customizable student activity sheet and sample picture-cue recipe cards, as well as Math Night resources for families, are appended to the online version of this article at www.nctm.org/tcm.

Name: _____

Connecting shapes to everyday life

Use this page at the grocery store or shopping mall to help your child identify and keep a tally of common shapes. Have children add other shapes that they see.

SHAPE	COUNT
 <p>Circle</p>	
 <p>Triangle</p>	
 <p>Square</p>	

Parent's Name: _____

Child's Name: _____

Phone Number: _____

E-mail: _____

Homework for Parents

1. What is one thing your child enjoys doing outside of school?
2. What special family traditions, hobbies, or activities does your family enjoy?
3. What is one area of math that you would like your child to work on in school this year (such as recognizing amounts, saying numbers, identifying shapes, measuring, adding, subtracting, problem solving, reasoning, etc.)?
4. What questions or concerns do you have related to your child's mathematical education and experiences?
5. What is one thing your child can do well in math?
6. Do you have any special skills you can share with our class (such as cultural knowledge, model building, electrical knowledge, weaving, fishing or hunting, cooking, writing, etc.)?
7. Do you collect any special objects that you can share with students (such as shells, coins, stamps, photographs, postcards, etc.)?
8. Does any part of your work or job involve something related to our class or subject (such as electricians, doctors, store owners, beauticians, plumbers, carpenters, machinists, architects, etc.)?
9. Do you have an association with any special places we may visit as part of our classroom program (such as construction sites, museums, galleries, hospitals, industrial sites, etc.)?
10. Is there any other information you can share that will help me understand your child and best meet his or her needs? (Feel free to use the back or an additional sheet.)

Ways to help your child with math at home

Mathematics in the early years involves many important skills beyond recognizing and writing numbers. Foundational number sense involves comparing amounts and being able to count objects. It is also important that children can sort, classify, communicate what they see, solve problems, and recognize math in their daily lives. See the list of ideas below that can support your child's intellectual growth at home. Please let me know if you have any questions about these ideas.

- Have your child compare objects found at home (such as the plastic containers in the kitchen or books on a book shelf).
- Help your child identify patterns on clothing, with toys, and by using words.
- Have the student retell information and answer questions about the sequence of events such as a soccer game or a television show.
- Sort and classify household objects with your child, such as buttons, boxes, clothes, or toys.
- Refer to amounts of time on a regular basis, such as how long a television show is, the length of time a child can play outside, or the length of time until a meal.
- Have your child work on one-to-one correspondence by setting the dinner table. He or she should determine the number of each utensil that is needed.
- When you are grocery shopping, at the mall, or around the house, ask your child to find numbers or shapes.
- Have your student count items around the house or outside.

Helpful links for math night

<http://orion.math.iastate.edu:80/mathnight/>

<http://orion.math.iastate.edu/danwell/MathNight/oldhomepage.html>

<http://techteachers.com/mathweb/familymathnights.htm>

Family math games and activities

<http://www.mathgamesk-5.com/home.html>

http://sv.berkeley.edu/showcase/pages/fm_act.html

<http://www.mrsgoldsclass.com/MathGames.htm>

<http://illuminations.nctm.org/ActivitySearch.aspx>

<http://nlvm.usu.edu/>

Sample recipe cue cards

