“We *Do* Care,” Say Parents

Forms of inquiry and related findings describe investigative efforts to acquire an understanding of how and why parents and children work together in mathematics the way they do.

By Regina M. Mistretta

Parents can positively impact children’s learning of mathematics. For example, when parents pose thought-provoking questions or help break a problem into smaller, more manageable pieces, they positively influence the organization of their child’s thinking (Walker, Shenker, and Hoover-Dempsey 2010). Additionally, when parents readjust their assistance to reflect their child’s increasing abilities, they scaffold the child’s thinking to higher levels (Friedel et al. 2007; Jeynes 2007; Hyde et al. 2006).

To productively engage families in the learning process, teachers must support such interpersonal relationships (Walker, Shenker, and Hoover-Dempsey 2010). Barton and her colleagues (2004) encouraged teachers to first develop an understanding of how and why parents and children work together the way they do. I describe the investigative work of a group of teacher candidates as they sought to attain such understanding. Forms of inquiry, related findings, and implications for teacher practice bring the parents’ voices to conversations about how to cultivate parent-child collaborations in mathematics.

Interacting with families

Eighteen preservice teachers (two males and sixteen females, all Caucasian), who were enrolled in a university career-change master’s degree program, interacted with thirty fourth-grade families (one

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For participating in the parental engagement program, families received incentives in the form of home instructional materials as well as travel and tuition stipends.

child and one parent) as part of the required fieldwork of their mathematics methods course. These practical experiences were possible through grant funding that recruited the families, on the basis of economic and academic need, from four inner-city nonpublic schools in the New York City metropolitan area. Nonpublic schools were chosen so that awarded funding could be used, in part, for tuition stipends. The families' ethnic backgrounds included nine Hispanic, ten African American, one Asian, and ten Caucasian families. Sixteen male and fourteen female fourth-grade students joined twenty-eight mothers and two fathers.

These families participated in a parental engagement program titled *In Collaboration*. Each preservice teacher worked with one or two families at four monthly two-hour family sessions held on campus. The goal of each family session was to spark communication among parents and children as they collaborated on fourth-grade curriculum-based tasks involving the use of classroom manipulatives (e.g., tangrams, pattern blocks, attribute pieces, polyhedral models) to represent mathematical concepts. Reflecting current classroom conversations about multiple solutions and multiple methods of solution was an additional goal for each session.

Such a crafted learning environment for the In Collaboration program stemmed from investigations concerning how best to support parents. For example, Sheldon and Epstein (2001) found the most productive efforts concerning parents to be those focused on building understanding of the changes in mathematics teaching, especially the use of manipulatives (Mistretta 2004; Orman 1993; Dauber and Epstein 1993; Epstein 1986). Researchers also found parents to be much more knowledgeable about their children's learning of mathematics at the close of a series of activities where both parents and children engaged in mathematics tasks together (Tregaskis 1991; Hendrickson et al. 2004; Lachance 2007; Fagan 2008).

In addition to providing opportunities for parents to learn about classroom mathematical learning, these sessions also furnished a venue for the preservice teachers to investigate families' collaborative efforts while engaging in mathematical tasks. The preservice teachers used multiple forms of inquiry—including a survey, interviews, and observational field notes—to investigate their assigned families' collaborative efforts. Following are descriptions concerning their findings about how and why parents and children work together the way they do in mathematics, as well as the implications of their findings on instructional practices.

Parent survey and interview

The parent survey (see the **online appendix**), adapted from the work of Sheldon and Epstein (2007), was administered at the beginning of the first family session. It consisted of twenty-seven statements requiring five-point Likert scale responses, and it revealed baseline parental perspectives on (a) ways parents should assist with their child's learning of mathematics and (b) ways teachers should support parents with their child's learning of mathematics. The parent interview was conducted at the beginning of the first family session, as well, to further inquire about (a) how parents primarily assist their child in mathematics, and why; (b) the challenges and related reasons, if any, parents face while assisting their child in mathematics; and (c) how parents desire teachers to support them with their child's learning of mathematics.

For the most part, these forms of inquiry revealed that parents view their role in assisting their child in mathematics as passive and traditional. For example, of all the forms of parental assistance indicated on the parent survey, those statements with the highest average mean ratings involved providing quiet settings and checking that homework was complete and correct. Unfortunately, verbal communication was viewed as less important. Survey statements receiving the lowest average mean ratings were for actions that involved posing in-depth questions and discussing solution methods.

Communication is a key element in mathematical learning that allows children to gather, organize, and clarify thoughts in a manner that contributes significantly to conceptual understanding (Flores and Brittain 2003), so the preservice teachers addressed this need. To facilitate better communication, they offered parents supportive questions (see **fig. 1**) to pose to their child while working together (NCTM 2000). The majority of preservice teachers noted that during interviews, parents often expressed frustration that their prior learning environment differed from that of their child: "Mathematics today is taught differently than in my time. I want to help; however, I don't want to confuse my child, either."

FIGURE 1

Communication is key to students' mathematical learning, so the preservice teachers offered parents supportive questions to pose to their child while working together.

- What problem are you working on?
- What do the directions say?
- What words or directions don't you understand?
- Where do you think you should begin?
- What do you already know that can help you work through the problem?
- What have you done so far?
- Do you have similar problems to look at?
- Can you draw a picture or make a diagram?
- Can you explain what the teacher asked you to do?
- Can you tell me where you are stuck?

The preservice teachers came to realize, through interviewing, that parents desire to help. Moreover, the need for teachers to build parents' familiarity with current mathematics methodology surfaced as a way to lessen parental frustrations caused by differing learning environments. The preservice teachers' realization of this was encouraging to note because, according to Konzal (2001), teachers often misinterpret parents' low levels of involvement as lack of commitment rather than lack of understanding concerning curriculum and methodology.

Parents also expressed their desire for information about current curriculum content, as well as methods of teaching and ways of assisting their child's learning of mathematics at home. These interactions with parents clearly provided the preservice teachers with opportunities to witness parents' desire to serve as active participants who meaningfully contribute to their child's academic learning, not passive recipients of information and teachers' agendas.

Observations and family interviews

Field notes taken at each of the four family sessions focused on the preservice teachers' observations of parents' positive and negative behaviors toward their child. For example, they took note of whether parents were receptive to and encouraging of their child's mathematical thinking or were resistant to and impatient with it. They observed whether parents primarily explained their answers and solution methods to their child or listened to and explored ideas with their child.

The questions that parents posed also determined whether they were asking their child short-answer questions requiring a yes/no or number response, or questions requiring detailed explanations that probed their child's mathematical thinking. At the beginning of the second, third, and fourth family sessions, the teachers also conducted family interviews, which served to investigate aspects of the assigned home tasks that went well and those that were challenging, according to parent and child alike.

Both observations and family interviews brought to the surface the changing behaviors and positive feedback from parents and children. For example, the majority of preservice teachers noted that verbal communication stemmed more and more from the child instead of the parent as the family sessions progressed. Students offered explanations, whereas parents listened and used supportive questions from the preservice teachers to guide the children.

FIGURE 2

This task involves comparing and contrasting four examples to determine one that is different from the others.

Which one does not belong?

$\begin{array}{r} 29 \\ \underline{+14} \end{array}$	$\begin{array}{r} 9 \\ \underline{+\ 4} \end{array}$
$\begin{array}{r} 7 \\ \underline{+\ 4} \end{array}$	$\begin{array}{r} 18 \\ \underline{-\ 9} \end{array}$

FIGURE 3

Examples that generate multiple responses can be modified for topics and grade levels and used in everyday classroom routines.

(a) Which one does not belong?

$\frac{50}{100}$	$\frac{5}{10}$
.05	$\frac{1}{2}$

(b) Which one does not belong?

dog	cat
run	fish

(c) Which one does not belong?

$-5 + -2$	8×-2
$-5 + (-7)$	$-9 \div 3$

(d) Which one does not belong?

$\frac{2r+6}{5}=-4$	$10=\frac{x}{3}+\frac{x}{7}$
$.5x - .3x = 8$	$x^2 + x = 12$

FIGURE 4

Assigned as homework, tasks with multiple solutions cultivate collaboration and communication among family members.

(a) Which one does not belong?

$\begin{array}{r} 3 \\ \underline{\times\ 3} \end{array}$	$\begin{array}{r} 9 \\ \underline{\times\ 9} \end{array}$
$\begin{array}{r} 1 \\ \underline{\times\ 2} \end{array}$	7×7

(b)

Which One Does Not Belong?	Why?
1 x2	It doesn't because it doesn't have two factors that are the same.
1x2	The product is the only prime number.
7x7	It is not aligned vertically.
1x2	The product is the only even number.
7x7	It does not have the answer sign.
1x2	It is the only one that has an even factor.

The majority of preservice teachers reported that parents specified two particular tasks, Which One Does Not Belong? and Today's Date (Fuys and Welchman-Tischler 1979), as causing "less stress" and greater confidence in their ability to assist their child. The tasks involved multiple correct answers or methods of solution; in turn, parents admitted feeling their "creative side challenged" and their "contributions valued."

Parents expressed that they were listening more to their child's explanations, and the children expressed gratitude: "This is great! Now she actually listens to me instead of telling me what to do and sometimes yelling." I share these tasks not as unique ideas but as examples of how the preservice teachers sparked conversations enabling parents to confidently contribute solutions and prompting children to positively accept their ideas.

Sample tasks

Current curriculum materials, such as Everyday Mathematics (University of Chicago School Mathematics Project 2006), address these tasks and represent interventions that support the emotional quality of parent-child interactions known to positively influence children's openness to parents' socialization efforts (Pomerantz, Moorman, and Litwack 2007).

The task Which One Does Not Belong? involves comparing and contrasting four examples to determine one that is different from the others. For example, when shown four computation examples (see **fig. 2**), the families responded with answers such as these:

- 29 + 14 because it is the only example where you need to regroup
- 7 + 4 because it is the only one without a 9
- 18 – 9 because it is the only subtraction example
- 18 – 9 because it is the only one without a 4
- 18 – 9 because the answer is a composite number and the other answers are prime numbers

Related curriculum skills include sorting and classifying as well as algebraic reasoning involving patterns and relationships. Additionally, communication about reasons for multiple solutions and methods of solution are possible—all skills related to the Process strands of Communication and Reasoning and Proof (NCTM 2000).

After a teacher determines four examples that generate multiple responses, he or she can integrate this motivational task into daily classroom routines for various grade levels, topics, and subject areas (see **fig. 3**). When assigned as homework (see **fig. 4**), the same task can cultivate collaboration among family members.

The Today's Date task (see **fig. 5**) involves representing the numeral of a date in multiple ways. In addition to building conceptual understanding of number, this task provides opportunities to communicate about several correct solutions and is applicable to any day of the year in classrooms of all grade levels. A teacher may also choose to require solutions that introduce, develop, or review a particular topic.

Inquiry into parent-child collaborations

Research informs us that teachers can influence the success or failure of efforts that seek to change the ways parents participate in their child's education (Civil and Bernier 2006). The practical experiences of interacting with families that are discussed in this article allowed the parents' voices to inform the preservice teachers' future practices for cultivating parent-child collaborations in mathematics. For example, the preservice teachers recognized the need to support parents with prompting and probing questions that would improve parent-child communication. They realized that parents need information concerning both content and methods of teaching to help build familiarity with current mathematics curriculum. Preservice teachers witnessed the positive impact of tasks involving multiple solutions and multiple methods of solution on the emotional quality of parent-child interactions.

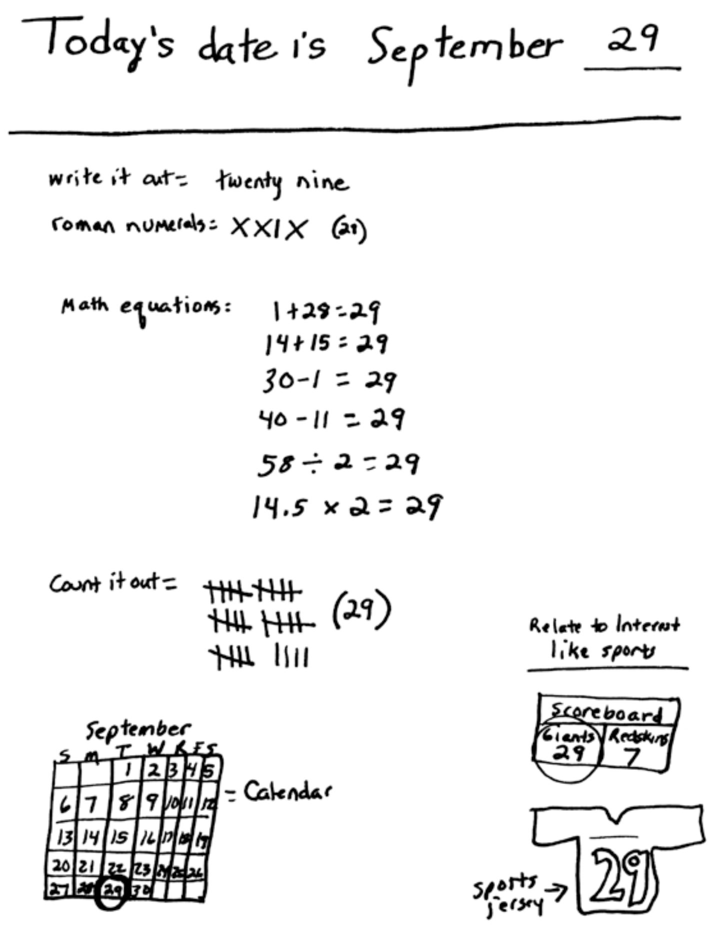
The opportunities the preservice teachers had to learn about parent-child collaborations were made possible through incentives not usually available or appropriate for all school settings. I therefore recommend adapting parts of the shared forms of inquiry to suit specific needs and school settings. For example, distributing the parent survey shared or those posted on the website of the National Network of Partnership Schools, Johns Hopkins University (www.csos.jhu.edu/p2000/survey.htm) can shed light on areas warranting teachers' inclusion at parent-teacher meetings.

Hosting family math nights and observing parent-child collaborations in a manner similar to that of the preservice teachers can afford teachers opportunities to tailor interventions and guide parents' efforts. Additionally, teachers' design of or actual use of the collaborative mathematics tasks and supportive parental questions, such as those found useful to the preservice teachers, can help teachers spark productive parent-child conversations at home about mathematical ideas.

"Mathematics today is taught differently than in my time. I want to help; however, I don't want to confuse my child, either."

FIGURE 5

Teachers can tailor tasks so that solutions present, develop, or review a particular topic, especially with a task like this, which can apply to any day of the year in any classroom.



The benefits of interacting with families were clear for the preservice teachers described in this article. I continue to integrate practical experiences working with families into my current mathematics methods course. A colleague has also adapted her graduate science methods course and is finding similar results. The ways we craft inquiry into parent-child collaborations will vary depending on our individual settings. What is essential, though, to all is that we begin the inquiry.

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Once teachers inform themselves of which practices are going on in the home and why, the development of appropriate supportive collaborations can commence.

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