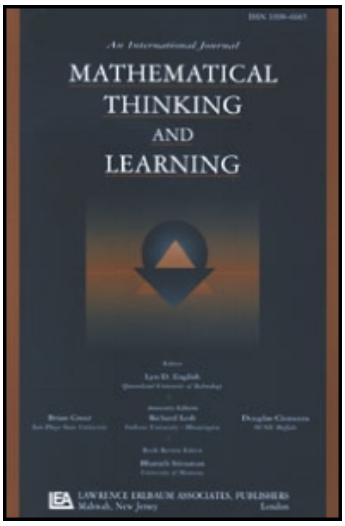

Mathematical Thinking and Learning
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t775653685

Old Math, New Math: Parents' Experiences with Standards-Based Reform

Janine T. Remillard [a]; Kara Jackson [a]
[a] Graduate School of Education, University of Pennsylvania.

Online Publication Date: 01 June 2006

To cite this Article Remillard, Janine T. and Jackson, Kara(2006)'Old Math, New Math: Parents' Experiences with Standards-Based Reform',Mathematical Thinking and Learning,8:3,231 — 259
To link to this Article: DOI: 10.1207/s15327833mtl0803_3
URL: http://dx.doi.org/10.1207/s15327833mtl0803_3

MATHEMATICAL THINKING AND LEARNING, *8*(3), 231–259

Old Math, New Math: Parents' Experiences with Standards-Based Reform

Janine T. Remillard and Kara Jackson
Graduate School of Education
University of Pennsylvania

We focus on how African American parents in a low-income neighborhood experience, interpret, and respond to current reform efforts as implemented in their children's school. As part of a larger project on parent–child numeracy connections in an elementary school, we interviewed 10 parents and held 2 focus group meetings, during which parents shared their experiences with mathematics as students themselves and as parents of children using a Standards-based curriculum. Even though parents saw themselves as critical players in their children's learning, we found that the implementation of reform-oriented curriculum tended to disempower parents with respect to school mathematics. Parents had little understanding of the reform-based approaches, and thus limited access to the discourse of reform. Our findings call for examination of the effect that reforms have on parents, particularly when the current educational climate calls for increased parent participation and involvement.

> If an 8 year old can do it, I know I can do it. I was like—wait a minute, he's the kid and I'm the parent, and he knows and I don't know. … He had got upset one day and said, "Mom, you're going to make me get a bad grade. That's not right. That's not right. That's wrong."
>
> —Shanice, mother of three

At the time of this study, Shanice was a 42-year old mother of three sons, ages 20, 16, and 8. Similar to the other parents that we worked with, Shanice was struggling to help her third-grade son with the reform-oriented mathematics assigned for

Correspondence should be sent to Janine T. Remillard or Kara Jackson, Graduate School of Education, University of Pennsylvania, 3700 Walnut Street, Philadelphia, PA 19104. E-mails: janiner@gse.upenn.edu, karajack@dolphin.upenn.edu

homework. The uncertainty and confusion voiced by Shanice was not unique to her. In fact, we argue in this article that the implementation of reform-oriented mathematics instruction has, in some cases, worked to disempower parents as players in their children's education. As mathematics educators who embrace current visions for reform, we find it important to consider the ways that the changes include/exclude and affect parents, particularly when the current educational climate calls for increased parent participation and involvement. Furthermore, there is serious need to conceptualize, as well as enact, practices that value what parents bring to reforms in terms of their own mathematical understandings and histories and to provide opportunities to support the work of parents with regard to reform-oriented mathematics.

PARENTS AND REFORM IN MATHEMATICS EDUCATION

Within the United States and elsewhere, national and local governing agencies have called for increased "parent involvement" in education (Epstein, 1996; Epstein & Dauber, 1991; Henderson & Berla, 1994; Hoover-Dempsey & Sandler, 1997; Mattingly, Prislin, McKenzie, Rodriquez, & Kayzar, 2002; Milne, Myers, Rosenthal, & Ginsburg, 1986; Vincent, 2001; Vincent & Tomlinson, 1997). Although what counts as "parent involvement" varies across studies (Lewis & Forman, 2002; Mattingly, Prislin, McKenzie, Rodriquez, & Kayzar, 2002), policymakers regularly cite evidence that children whose parents are involved in their education tend to perform at higher levels on standardized tests when compared to children with less involved parents (Henderson & Berla, 1994; Jeynes, 2005; Sheldon, 2003). Researchers at the Center on School, Family, and Community Partnerships have found evidence that explicit partnerships between schools, family, and communities are beneficial for parents, teachers, and schools in general. For example, teachers who involve parents tended to stereotype parents of low-income and low-educational levels less and tended to show increased student achievement on standardized tests in subjects where parents were included (Epstein, 1996, 2001; Sheldon, 2003). Beyond arguing that parent involvement impacts student achievement, representation in schools, to many, is a basic right of parents too frequently ignored in schools serving students of color and low-income populations (Calabrese Barton, Drake, Perez, St. Louis, & George, 2004; Delgado-Gaitan, 1991, 1993; Fine, 1993; Peressini, 1998).

These calls to redefine and increase parent involvement in schools present a particularly difficult challenge to mathematics educators already immersed in curricular and pedagogical reform. The reforms, prompted by the National Council of Teachers of Mathematics (NCTM) Curriculum Standards (NCTM, 1989, 2000) and furthered by a flurry of curriculum development projects, promote a view of mathematics unfamiliar to most parents in the United States. Indeed, these efforts

to decrease emphasis on the learning of rote skills and increase emphasis on conceptual understanding, problem solving, and mathematical thinking have required schools, teachers, students, as well as parents, to orient themselves to new goals for mathematics learning and approaches to teaching it. As illustrated by Shanice at the start of this article, parents often find themselves feeling less useful to their children with respect to school mathematics.

The first decade of the current reform efforts placed primary emphasis on teacher development, curriculum development, and accomplishing systemic change within schools (Civil & Bernier, this issue; Martin, this issue). Parents were, by and large, invisible in such efforts in districts and schools around the country, except when described as barriers to reform (Peressini, 1998). Through an analysis of both curricular and school reform documents at national and local levels, Peressini demonstrated that parents are repeatedly "portrayed as stumbling blocks for reform in mathematics education" (p. 567) in the National Research Council's 1989 report and are virtually ignored in the NCTM Standards documents of the 1990s. Parents were framed in a corpus of policy documents as being mathematically incompetent to support their children's learning or as uninterested in doing so.

There have been few efforts to support parents as learners and to study their perceptions, experiences, and expectations in relation to their children's reform-oriented mathematics education (Civil, 2001; Civil & Bernier, 2004; Civil, Guevara, & Allexsaht-Snider, 2002; Lubienski, 2004; Martin, 2003a). Thus, we are left with questions about what it would mean to frame parents as partners in mathematics education reform, rather than detractors of it. In this article, we report on findings from our work with a group of African American parents living in a low-income neighborhood whose children attend the same elementary school. We examine how parents experience, interpret, and respond to current reform efforts as implemented in their children's school. We assume that understanding parents' experiences with mathematics and reform is the first step in conceptualizing ways to include and support parents as partners in their children's mathematics education.

THE SIGNIFICANCE OF PARENTS LIVING IN A LOW-INCOME NEIGHBORHOOD

Our research focuses on the experiences of a group of African American parents living in a low-income neighborhood in a large city in the United States. We do not claim that our findings are exclusive to this group of parents. Indeed, it is likely that parents of a variety of income levels experience similar challenges navigating mathematics reform. However, there is ample evidence that parents who are often characterized as "disadvantaged" when compared to other populations experience more challenges in relation to their children's schooling than "advantaged" par-

ents. For example, the work of Lareau (2000, 2003) indicated that parents living in low-income neighborhoods do not always have access to the same resources as their middle-class counterparts. Furthermore, these parents are less likely to be available during school hours due to employment obligations. In addition, low-income adults tend to have low levels of formal education (e.g., Kirsch, Jungeblut, Jenkins, & Kolstad, 1993) and may feel uncomfortable entering schools due to unsuccessful formal schooling experiences (Chavkin, 1989; Chavkin & Williams, 1989; Epstein & Dauber, 1991; Lawson, 2003; Lightfoot, 2004; Valencia & Solórzano, 1997). Thus, it is important to understand what resources and experiences low-income parents do bring to the mathematics education of their children.

Furthermore, students of color and from low socioeconomic backgrounds tend to achieve at lower levels in mathematics as compared to their White, middle-class counterparts (Ladson-Billings, 1997; Lee, 2002; Tate, 1997). Given the significance of parent involvement, understanding how low-income parents are engaged in their children's education and the barriers they face can be a step toward decreasing this achievement gap.

PARENTS AND REFORM-ORIENTED MATHEMATICS

Although parents are now on the radar screen of policymakers in mathematics education, there have been few substantial efforts to include parents in the reforms or to give parents a recognized "arena" in which to make their concerns public (Peressini, 1998, p. 576). According to Peressini (1998), "calls for parental and community involvement have been at an abstract level and not closely examined" (p. 557). He questioned the ways in which teachers and parents have been positioned with respect to these reforms, claiming that, in many ways, parents have been denied access to the discourse of the reforms. He contrasted the rights available to those who have access to the discourse (teachers, administrators) to the rights of those who do not (parents) in the following way (Peressini, 1998):

> On the one hand, mathematics teachers who are knowledgeable of and understand the changes in mathematics content, pedagogy, and assessment are privileged to take part in various activities central to mathematics education and the reform thereof. … In other words, mathematics teachers and educators who know the true discourse of mathematics education reform have the right to exercise power in the ongoing reform … Parents, on the other hand, … are not privileged to participate in many of the same activities mathematics teachers perform … . Furthermore, parents, because of their incomplete knowledge of this true discourse, are unable to engage in various activities that are part of mathematics education (e.g., assisting their children with mathematics homework). (pp. 574–575)

In particular, parents who are unfamiliar with the mathematical content that their children are learning (especially as their children get older) and with the rationales behind the reforms are probably less inclined to be able to substantially support their children's mathematical learning other than in the form of "monitoring" their homework and "encouraging their children's mathematical development" (Peressini, 1998, p. 575). Furthermore, without such access to the discourse, "it is unclear how parents can productively participate in deciding on particular components of mathematics education reform" (Peressini, 1998, p. 575).

One result of largely ignoring parents in mathematics education reform is that parents tend to be seen by their children's teachers as obstacles or barriers to their children's learning (Peressini, 1996, 1998). Peressini's (1996) study of parental involvement in reform-oriented mathematics in three high schools showed that parents were only minimally involved in the reforms. He found that there were few opportunities for parents to learn about the reforms and that when parents initiated communication with the mathematics department about the reforms, "they [were] most often perceived as a hindrance" (Peressini, 1996, p. 21). This tendency was more marked when parents were of low-income status and of color. His comparison showed that parents at the two schools that had higher numbers of low-income students and students of color had "virtually no voice in the mathematics education of their children and seem[ed] to be recognized and heard much less than the parents at [the school with students of higher-income and fewer students of color]" (Peressini, 1996, p. 23).

The largest attempt to systematically include parents in the discourse of the reforms has been the work of Marta Civil and her colleagues at the University of Arizona. Civil's project has included both Project MAPPS (Math and Parent Partnerships in the Southwest) as well as Project BRIDGE (Linking home and school: A bridge to the many faces of mathematics). Although MAPPS works to develop parent leadership in mathematics reform across districts, BRIDGE is home and classroom based, designed to facilitate connections between home and school mathematics (Civil, 2001; Civil & Andrade, 2002; Civil & Bernier, 2004, this issue; Civil et al., 2002; Civil, Quintos, & Bernier, 2003). Throughout all of this work, Civil and her colleagues took the stance that parents be seen as "intellectual resources" (Civil & Bernier, 2004). That is, they explicitly frame parents as coming to the mathematics education of their children as parents, teachers, and learners, and they intentionally work to understand the different perspectives that parents have to offer. Civil's work and theoretical stance reflects what Peressini (1996) argued for: "Rather than blindly calling for increases in parental involvement, it is essential that we first make efforts to understand the various aspects and perspectives of parental involvement in mathematics education" (p. 25).

In addition to Peressini's and Civil's work, several studies have examined parents' beliefs related to reform-oriented mathematics instruction. Graue and Smith (1996) conducted interviews with predominantly White, middle-class parents of

sixth-grade children who were in a mathematics classroom using a Standards-based curriculum. They focused particularly on the parents' interpretations of the assessment practices associated with the curriculum, which were designed to emphasize mathematical reasoning. Thus, students were expected to explain their answers and were awarded points on the quality as well as the correctness of their explanations. Graue and Smith found that most parents felt that the assessments did not differentiate enough among the students in the classroom. They argued that the parents' disappointment with the reform-oriented assessment practices were situated in the context of their own schooling and in relation to an "authoritative discourse" that assessment practices have historically represented in schooling. Parents expected that assessments would objectively sort students according to mathematical ability. Based on their findings, Graue and Smith argued that one needs to understand parents' interpretations of reform within the sociohistorical contexts in which the reform takes place. They suggested that "how parents react to any reform rests as much with the social positioning of participants as with the substance of the reform itself" (p. 416).

Lubienski's (2004) study of parents' and students' choices between a high school traditional mathematics course sequence and a Standards-based course sequence also highlights the role of parents' own experiences in responding to reform practices. Her participants were primarily White, but they reflected socioeconomic diversity. Although very few parents chose the Standards-based course sequence, those who did tended to be of higher socioeconomic-status background. Lubienski found that parents who chose the traditional sequence tended to cite concerns with college preparation, whereas those who chose the reform-oriented curriculum "placed a higher priority on student understanding and enjoyment of mathematics" (p. 338). Throughout, Lubienski found that "parents' beliefs about appropriate secondary mathematics instruction were rooted in their own school experiences, as well as that of their older children" (p. 358). Her findings call for more examinations of parents' (and students') beliefs about mathematics in relation to reform and challenge mathematics educators to think seriously about parents' and students' genuine objections to reform-oriented mathematics.

In his work with African American parents, Martin (2003a, 2003b, this issue) found that parents seemed to be less concerned with whether their children were experiencing traditional or Standards-based mathematics instruction and more concerned with whether they were receiving what Martin called "opportunity mathematics." He defined *opportunity mathematics* as "the kind of mathematics that will help their children penetrate closed structures, improve their conditions in life, and overcome the barriers that they will likely encounter as a result of their African American status" (Martin, 2003a, p. 8). Martin argued that, rather than paint a picture of parents as either receptive or resistant to reform-oriented mathematics, it is critical to examine their beliefs and experiences with mathe-

matics in relation to the socioeconomic contexts in which they live. He called for more studies that

> directly examine African American parents' beliefs about constraints and opportunities associated with mathematics learning, whether learning school mathematics is sufficient to penetrate opportunity structures outside the school context, and whether some kinds of school mathematics are more helpful and preferred, than others. (Martin, 2003a, p. 12)

In our research, we have sought to understand how a group of African American parents' conceptions of mathematics intersect with the implementation of mathematics education reform.

METHOD

The data analyzed for this article come from a project, Parent–Child Numeracy Connections (PCNC), begun in the fall of 2003, that examines parent–child interactions around mathematics learning in an urban, public elementary school. The aims of the larger project are to (a) understand how parents act as mathematical resources for their children, (b) consider how they might be supported in doing so, and (c) make their practices more apparent in schools. To study parent–child interactions, we undertook a number of activities over 1 academic year. These activities included (a) focus group meetings for parents to discuss their children's mathematics education, (b) Family Math Nights, (c) home interviews with parents, and (d) several parent math courses.[1] The data for this article come primarily from interviews with 10 parents, although our analyses are informed by all of our other interactions with the parents. (In this article, as in the project in general, we use the term *parent* to refer to a child's primary caretaker).

Research Context

The participants in the study were parents of children involved in an Educational Scholarship Program (ESP). For almost 2 decades, this program has provided full college scholarships to minority students from low-income communities who successfully complete high school. In 2000, the program began working with the fam-

[1]These courses meet on Saturdays over a 6-week period. The primary goal of each course was to develop participants' mathematical understandings of a particular topic (measurement, decimals and percents, algebra). Each session also provided opportunities for parents to ask specific questions about their children's mathematics homework and mathematical situations faced in their daily lives.

ilies of 50 kindergartners enrolled at Maple Elementary School. All names of parents and of the educational scholarship organization and school are pseudonyms.

At the beginning of this study (2003–2004 academic year), 39 students, all African Americans, were in the ESP in this cohort at Maple Elementary, with 33 in third grade and 6 in second grade. Fifty-five percent of the ESP parents had completed high school, and 3 parents had bachelor's degrees. Located in a large school district serving over 260 schools, Maple Elementary School was one of 60 schools identified as low performing by the state. The school is located in a low-income, predominantly African American neighborhood and, at the beginning of the study, served 670 prekindergarten–Grade 6 students. Maple Elementary planned to adopt the Standards-based curriculum *Everyday Mathematics* (*EM*; University of Chicago School Mathematics Project, 2001) in the fall of 2002. Due to complications in receiving the materials, however, teachers began using the curriculum consistently in January of 2003. The school district officially mandated that all elementary schools use *EM* in September 2003.

EM is one of several elementary-level curricula funded by the National Science Foundation (NSF) and designed to be aligned with the NCTM Standards. The curriculum was designed to develop fluency with numbers, conceptual understanding, and an understanding of the applications of mathematics in daily life. As a result, it de-emphasizes reliance on many conventional approaches to mathematics instruction, including the teaching of a single computational procedure. Instead, it relies on a number of nontraditional instructional approaches, including teaching a variety of alternative computational algorithms. *EM* emphasizes that students should develop command of computational facts. It does not, however, provide many drill-based worksheets, but rather incorporates the use of games to help build fluidity with basic facts.

Furthermore, *EM* takes a "distributed practice" approach to the learning of mathematics (University of Chicago School Mathematics Project, 2001), or what is commonly known as a "spiral" approach. Rather than being required to master a particular concept or topic before continuing to another, students are exposed to mathematical concepts at spaced intervals over time. As the year progresses, a child's understanding is expected to move from "introductory" to "developing" to "secure" with respect to each topic. A secure understanding of any skill is not anticipated until students have worked with the topic three or four times.

Throughout the grades, *EM* also makes use of several unique conventions designed to promote understanding of the underlying principles of mathematical concepts. Two such conventions are "Frames-and-Arrows" and "Number Grid" problems. "Frames-and-Arrows" represent functions and build algebraic reasoning (see Figure 1). The frame represents the input, and the arrow represents the operation to perform on the input. Frames-and-Arrows problems require students to evaluate the change that happens from one frame to the next, at times to fill in the frames and, at other times, to fill in the "rule," or what the arrow represents.

For example, in Figure 1, the student is given "the rule" via the arrow, indicating the operation to perform on each frame. In this case, the student is expected to fill in the two empty frames by adding 5 to each subsequent frame. Thus, the student would add 3 + 5, and fill in 8 in the second frame, and then add another 5 to 8 to place 13 in the third frame.

Number grid problems are based on the 100s board, made up of the numbers 1 to 100 displayed in rows of 10 (beginning with row 1–10, followed by 11–20, etc.) and designed to promote number sense. Although 100s boards are not unique to *EM*, the "grid problems" are. Such problems give students pieces of the number grid, and they are asked to fill in missing boxes (see example in Figure 2).

Participants

Table 1 shows the variation among the 10 mothers that we interviewed. They were all African American women living in a low-income neighborhood, yet they showed distinct variation across the following demographic variables: age, level of education, current employment, age when first child was born, and whether they were living in a two-parent household. Variables such as age, employment status, and household description are not fixed, but represent the status of the interviewees

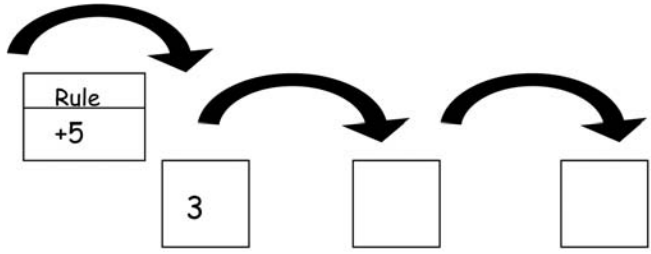

FIGURE 1 Example of a Frames-and-Arrows problem. The frames are represented by squares (as shown here), circles, triangles, as well as a number of other shapes. From *Everyday mathematics* (2nd ed.) by University of Chicago School Mathematics Project. Copyright 2001 by The McGraw-Hill Companies. Reprinted with permission.

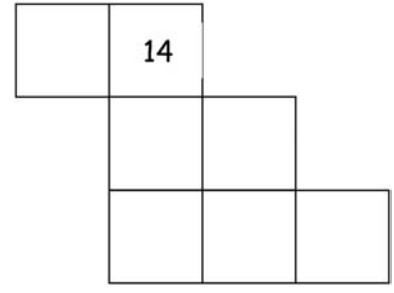

FIGURE 2 Example of a Number Grid problem. From *Everyday mathematics* (2nd ed.) by University of Chicago School Mathematics Project. Copyright 2001 by The McGraw-Hill Companies. Reprinted with permission.

TABLE 1
Demographic Variables of Parents

Pseudonym; Date of Interview	*Age*	*Age of Children*	*Level of Education*	*Current Employment*	*Household Status*
Alma[a]; 09/02/04	49	~30, 29, 24, 21, 12	Did not complete high school	None	Single mother
Anna; 01/12/04	26	9 , 7	High school diploma	None	Single mother
Betty[a]; 06/28/04	~50	5 children in their 20s and 30s	Certificate from clerical school	Full time	Single mother
Beverly; 01/01/04	48	9	BS in mathematics	Part-time; receiving unemployment benefits	Single mother; contact with father
Cassandra; 02/19/04	~30	13, 9, 8	High school diploma	Full time	Fiancée living in home; Limited contact with father
Jackie; 04/27/04	~40	25, 23, 14, 9	Certified as medical assistant	None	Two parents living in home
Lucille; 12/31/03	~50	31, 15, 8, 6	Did not complete high school	Part-time	Two parents living in home
Shanice; 01/08/04	42	20, 16, 8	AA in nursing	Full time	Two parents living in home
Sienna; 12/06/03	26	8	BA in psychology; pursing AA in early childhood ed.	Full time	Single mother; contact with father
Tanya; 09/02/04	Early 30s	12, 9	High school diploma	Full time	Single mother

[a]Grandmother.

at the time of the interview. The interviewees included 8 mothers and 2 grandmothers (Betty and Alma) of ESP children. Betty was the primary caretaker of her granddaughter, Aisha, during the school year. Alma, the mother of Tanya and grandmother of Latrice (an ESP student), also had a 12-year-old son at Maple Elementary School. She played a significant role monitoring her son's and her two granddaughters' progress in school.

Researchers' Identities

PCNC is led by the two authors. Janine Remillard, a mathematics educator and teacher educator who has taught elementary school mathematics, is the principal investigator. Kara Jackson, a doctoral candidate in mathematics education and education, culture, and society who has taught elementary and high school mathematics, is a research assistant for the project. We are both White women with middle-class lifestyles. Our research team also included three additional women, one White and two of color. Within this article, any use of "we" refers to the two authors, as we have engaged in the analysis of the data collected.

We, and the other members of the research team, differ in significant ways from the participants in PCNC, particularly with regard to racial identification, social class, and formal education backgrounds. Because it was essential to build trust with the participants from the start of PCNC, the team focused specifically on this aspect during the first 6 months of the project. We collected very little formal data during this time and instead focused on developing understandings of the participants' concerns and experiences with their own and their children's mathematics education. One of us (KJ) has organized and taught in the mathematics component of ESP's summer program since the summer of 2003 and has taught mathematics in ESP's after-school program since September 2003. This contact has allowed for many informal opportunities to get to know parents, grandparents, teachers, and children.

Data Collection and Analysis

The team began the project by holding two focus group sessions to explore parents' experiences with and concerns about reform-oriented mathematics. They were closely observed and documented with field notes. The focus group sessions raised many questions for us, particularly around the ways that parents viewed mathematics, their own mathematical experiences as well as those of their children, and how they made sense of the reform-oriented mathematics instruction at Maple Elementary. After parents participated in the focus groups, they were invited to be interviewed so that we could explore such questions in greater depth. Thus far, as noted previously, we have interviewed 8 mothers and 2 grandmothers. Eight of the 10 interviews took place in the interviewees' homes, allowing us to observe practices

and artifacts related to the parents' descriptions. Although a few fathers attended focus group sessions, none volunteered to be interviewed. The interviews were semistructured. We asked questions about the parents' and children's practices related to mathematics at home and in school as well as their mathematical aspirations for their children. Interviews lasted between 45 min and 2 hr; they lasted 75 min on average. They were audiotaped and later transcribed.

Analysis of the data for this project has been iterative and systematic (Hammersley & Atkinson, 1995). We first engaged in an open-coding process and read through the interviews to identify the salient cross-cutting themes and patterns in the parents' perspectives and practices. Through this first process, we generated codes that we then used to index the interviews using the software QSR NVivo. Through organizing the data by indexed segments, we refined and developed themes across the parents' experiences and explored relationships among them (Emerson, Fretz, & Shaw, 1995). We use the themes to structure the presentation of our findings. Throughout our analysis, we triangulated the data with the focus group responses and field notes taken on informal interactions. We continued to look for discrepant cases as well as cases that confirmed the general trends in our findings.

PARENTS' EXPERIENCES WITH MATHEMATICS EDUCATION REFORM

As a starting point for considering how parents might be included as partners in the mathematics education of their children, we examined how they framed their roles in their children's schooling. We looked at parents' experiences with mathematics as students and in their daily lives, their responses to the new curriculum, and the interactions between these two.

Connections and Disconnections Between School Mathematics and Everyday Mathematics

The parents that we interviewed tended to have a broad view of mathematics as it applied to their daily lives and, at the same time, a narrow view of school math. (Unless otherwise noted, all quotes come from the parent interviews, dates of which are provided in Table 1.) When speaking of their own experiences with school mathematics, 7 of the 10 parents focused almost solely on computational skills. Lucille, a mother of four in her early 50s, recalled learning each operation in order: "Basically you learn your adding, you learn your subtraction, you learn your multiplication and then you learned your division." Cassandra, a 30-year-old mother of three, described her school math experience similarly: "You did the addition, subtraction, multiplication, division and then maybe switch to a little alge-

bra and that was it … that was the whole math book." Alma, a mother of five, described her school math experience as follows: "[it included] arithmetic … the basics of adding, subtracting, multiplying … and a little light-weight fractions, but I am 49, so that's been a long time."

Beverly, a mother of one in her late 40s who had a bachelor's degree in mathematics, was the only mother who described her mathematics experiences as consisting of more than computational procedures. "There's only one answer," she explained, "but there's different ways you can get the answer. I like that." She recalled taking high-level mathematics courses, such as probability and statistics and differential equations, and enjoyed learning math.

As is typical of many adults living in the United States, with the exception of Beverly, the mothers we spoke with had negative experiences with mathematics and associated school mathematics with fear and confusion. Betty, grandmother of one of the ESP students and mother of five, recalled how difficult math was for her in school:

> I had a hard time with math. I never seemed to be able to grasp it because, like you had to do it this way, this way, follow the rules. If you got your answer and it was right, [they'd] make sure you did it like they said do it; [otherwise] they held it against you.

Similarly, Cassandra, Sienna, Betty, Alma, Tanya, and Shanice all spoke of being fearful of mathematics. They recalled feeling lost and being scared of it. Anna, a 26-year-old mother of two, described similar experiences, until her parents arranged for her to be tutored.

Some mothers were explicit about the disconnect that they experienced between school mathematics and the mathematics they used in their daily lives. "It took me a while to catch on," Cassandra explained, referring to her experience as a math student. "And now it's like [I'm] not using it in my everyday life, it's totally forgotten. Now I'm scared of it." Sienna, a 26-year-old mother of one, also described how she used math everyday, but she lacked confidence when doing computation without a calculator:

> If I add it up in my head or add it up on paper, I have to do it twice, and then I will still get a calculator because I feel like I must have done something wrong … especially because it's bills. I still want to get the calculator to add it up. And I feel more confident using that calculator than I do with doing my own stuff.

On the other hand, when speaking of mathematics in their daily lives, all parents that we interviewed referenced a wide variety of activities and practices that they viewed as mathematical, including cooking (both measuring processes and trans-

ferring ingredients into containers of different volumes), monetary transactions in stores, bills, banking, sorting and classifying objects, measuring lengths of objects, scheduling, and playing "spatial math" games. In other words, although these parents seemed to have a rather limited view of what counted as "school math," their understandings of what counted as mathematics within the context of their lives had breadth, complexity, and utility. Moreover, although many parents recalled negative experiences with school mathematics, they all presented themselves as competent with the mathematics necessary for their daily lives.

Cassandra, for example, described a wide array of mathematical practices that she engaged in on a regular basis, such as balancing her checkbook, opening up bank accounts, making large purchases that required a down payment, and being able to discern what advertisements mean by phrases such as "get $2000 cash back." Sienna explained how she used math regularly at home and in her job. "I think I use it every day," she began, "Even though I try and avoid it, I use it every day." She then offered examples of how she used mathematics on a daily basis. At work as a case manager, she was responsible for evaluating applications for an educational program to determine income level and give a rating depending on other criteria. She also described how she used mathematics when cooking or paying bills and in her studies toward an associates degree in early childhood education.

Betty also described using math on her job. "I use math every day," she explained, "'cause, part of my job is collecting a bunch of payments … So I have to … count them all up to make sure my balance sheet is right, what I put on the account." Shanice described, at length, the multiple ways that she used math in her job as a nurse, primarily for measuring medication. She also described ways that she used math when arranging furniture or mending clothes.

Despite the disconnections they felt between life and school mathematics, almost all of the parents that we interviewed worked hard to make connections between the two to support their children's learning. For example, they described using ordinary household tasks to teach or review math learned in school. All of the connections that they made, however, tended to reflect a view of mathematics as computational knowledge and were aimed at providing additional practice with school mathematics. In other words, they applied strategies and procedures learned in school to daily activities.

Often, these embedded instructional activities grew naturally. Other times, the computational work was inserted into the context less naturally. Shanice, for example, explained that she regularly made up counting or computation activities for her 8-year-old son with the calendar, with words in the dictionary, and with setting the table or washing dishes:

> These are like different games that we actually do. [There are] things around [the] house that you can do. You can do silverware. We go through silverware as far as washing dishes. How many forks do we need tonight? How

> many knives do we need tonight? How many do we need altogether? It's just different things—buttons, we use shoes, we use steps. We count different things.

Beverly described how she had her daughter sort Christmas tree ornaments into different groups before putting them on the tree: "It was a good tool to put things in equal parts. Because like if you have 3 people now I had 3 bags, how am I gonna divide these 30 balls into 3 bags." Sienna described having her daughter total her monthly bills once she had paid them all.

Anna insisted that her two daughters, ages 7 and 9, keep a record of the money they had in their banks and of any money that they spent:

> [They] know that every time they get money from my dad or a dollar from my mom, I tell them to write in their book. They have a little money book. "Alright how much did grandma give you that day? How much did papa give you that day? Now add it up together." They know how to add it. Then after that, I say, "You took the quarter out. How much do you have left?"

Some parents sought to make connections between school and everyday activities because they enhanced their children's learning of school mathematics. For example, Jackie, a mother of four, explained how she used everyday contexts to help her daughter understand concepts that were confusing to her:

> When she gets home and she gets stumped [on math homework], I'll try to base it around our everyday living. So it'll help her to understand much better, so when she sits down and tries to use her mind to think it through, "Oh I don't know how to do this." And then I'll have to pull out something from our everyday living.

Old Math Versus New Math

The parents' views of mathematics as computational knowledge, as either isolated from or embedded in real-world contexts, affected what they saw in the *EM* curriculum. Every parent we spoke with was strikingly aware of the new curriculum and how it differed from the mathematics instruction they had experienced. Many of them used the term *new math* to refer to the unfamiliar approaches and conventions used in *EM*. It is worth noting that none of the parents saw connections between the mathematics represented in *EM* and the mathematics of their everyday lives.

The conventions used in *EM* were unfamiliar to the parents in two ways. First, many of the conventions themselves were unique to the curriculum (or the particular genre of reform-oriented curricula). Thus, they represented a foreign language to parents that they struggled to interpret. In our conversations, many parents re-

ferred to worksheets containing "diagrams with the circle and the plus sign and you had to fill in the numbers" (Lucille, focus group, 10/08/03) and boxes arranged in a grid pattern.[2] Parents expressed frustration over not understanding what to put in the diagrams and boxes. As Lucille put it, "It's like a whole new language that we need to know. It's a whole new fashion that feels like you're doing things in a roundabout way" (Focus group, 11/19/03).

Second, in addition to representing an unfamiliar language, these conventions placed primary emphasis on underlying meanings and relationships. As adults whose mathematics instruction focused on rules and procedures, parents had limited experience to draw on to understand or appreciate the assignments their children brought home. In other words, knowing that arrangements of boxes on a page represented a portion of the number grid did not necessarily help them guide their children in determining what number should be placed two boxes below 14 (see example in Figure 2). In fact, several parents described resorting to guessing as they helped their children with homework.

Most of the parents that we spoke with found the new approach to math instruction more confusing than what they experienced as students. Seven of the parents that we interviewed and several others at the focus group sessions indicated that the "old" math was simple and straightforward, whereas the "new" math was complicated. There was general agreement among these parents that the added complication was unnecessary. As Cassandra put it at a focus group interview, "They've made it complicated." To this, another parent responded, "It's making simpler things harder." Shanice agreed and added, "That's just it. The way we were taught it it's easier to grasp on to. It's so hard for the kids to catch on to" (Focus group, 11/19/03).

Parents also noted a number of features of the new curriculum that they were able to make sense of, even though they did not always agree with them or understand their purpose. In describing these features, they highlighted the ways the curriculum seemed radically different from the mathematics instruction that they experienced. Several parents noted, for example, that the "new math" allowed for, or even encouraged, the use of multiple approaches to solving problems. Lucille equated the simplicity of the "old math" with learning one way to find an answer in computational problems. In contrast, she asserted, the "new math" offered students multiple ways of arriving at answers:

> Well, my experience was that math was a lot simpler [laughter] than it is now and the kids now need more ways to understand math because math has totally changed. … Now they added a lot more into it. The answer will come

[2]Lucille's description of the diagrams with circles and plus signs refers to Frames-and-Arrows and represent functional relationships (see Figure 1). The boxes refer to the Number Grid exercises that highlight the patterns in the number system (see Figure 2). Both are described in the Method section.

> up the same but they have to know all the little ins and outs of doing it … . So my thing is try to explain the new math to them even though the answer still is going to be 24 if it's 24. It's the new way of getting 24.

As is illustrated by Shanice's quote at the beginning of this article, several parents told us stories about disagreements that they had with their children over the correct approach to use when computing. In some cases, the child responded to a parent's instruction with, "My teacher doesn't do it that way." In other cases, parents reported teachers identifying students' strategies learned at home as wrong.

Another feature of the new curriculum noted by half of the parents was the amount and level of reading embedded in the mathematics work. Lucille noted a generational change in word problems between the time her oldest and her youngest children were in school:

> [Reading and math are] getting to be almost the same because basically … now they've changed a lot of the math to … word problems, which before were just numbers … It just told you right there. Add the problems. Subtract the problems. … Now it's like you have to read it … reading math is basically like phonics so if they grasp the phonics and they understand the words when they're reading it, the comprehension part of it, you know it's basically turning out the same almost.

Similarly, Jackie and Betty also found that the demands on reading in the curriculum problematic when helping their children with math homework. These children had difficulties with reading, which confounded their efforts to work through the language-rich curriculum. Shanice also noted the reading demands in the curriculum, but she capitalized on them to assist her son, who struggled in reading. "I make reading part of it," she explained. "I do both."

The last difference that 6 parents consistently noted about the new curriculum was related to pacing. Most parents were familiar with instructional approaches that focused on mastery of skill, in which single skills are taught and followed by a substantial amount of repeated practice. The distributed practice approach taken in *EM*, in which many concepts are developed concurrently over an extended period of time, places minimal emphasis on repeated practice. Moreover, because the curriculum is organized in a spiral that moves through a series of different topics before repeating them, many parents viewed it as too fast-paced for their children. Most parents explicitly lamented the lack of repetition. Simultaneously, they noted that students were being exposed to more concepts than they had been exposed to in school. Jackie described the "downfall" of both the math and the reading curricula:

> [T]he new curriculum now, it's changed so much now. There's no repetition. And I think the school system is really going to see a downfall …,

> because there has to be repetition in order for them to really see an increase. And you know they're trying to put all this stuff on them, that's really crowding their mind. It's really cramping them, and we don't want them to cramp because then they can't expand. You know when they're cramped up. Repetition, repetition.

Other parents raised concerns about the pace at which the curriculum moved through different topics. They all believed that this approach made math more difficult for their children. As Cassandra explained, "They're so much more fast-paced with the kids, you know so it's kind of hard for the ones that don't catch on instantly."

Anna and Beverly were sharply critical of the spiral approach because it conflicted with their views of learning. Beverly articulated her concern this way:

> Like if they do something new, just don't show it to them 2 days and come back 3 weeks later and try to think that they retain that information. Do it for 2 or 3 weeks, make up different patterns, different symbols, different problems and let them do it and figure it out that way. Then after 6 weeks you have a review of the stuff you learned. Because if I was teaching [my daughter] Serahn how to drive, I couldn't do it in January and then one day in March and then in June she'll go take the test, and pass it. It don't work that way, not even with the math.

Anna also suggested that teachers should "stay with one thing" before "jumping to another."

Navigating the Terrain Between Old and New Math

All 10 parents that we interviewed found the "new math" challenging to navigate, as did the other parents that we interacted with through the larger project. As noted previously, they found stark differences between the ways they learned mathematics and the ways in which their children were learning mathematics. They found features of the new curriculum confusing or problematic and expressed considerable ambivalence or disagreement over it. However, most made substantial efforts to understand the curriculum better and gather resources that would help them support their children, with varying degrees of success. In their attempts to navigate the new math, they all confronted challenges that resulted from the way the new curriculum was implemented at the school and in the district and struggled to integrate these new ideas into what they knew about mathematics and how it is learned.

Implementation challenges. Our data collection took place during the second year that *EM* was being used at the school and the first year that teachers had all of

the materials when school opened in September. Thus, the classroom teachers were using an unfamiliar curriculum with limited preparation. As has been typical in schools across the United States (as well as other nations undergoing significant reform), teachers were uncertain about the purposes and intent of many of the assignments and were not prepared to explain or defend them to parents.

Many parents' struggles to support their children in math were confounded by an administrative decision to not allow students to take home an important resource—the student reference book. This hardbound book, along with a consumable journal of worksheets, comprised the student materials associated with the *EM* curriculum. Frequently, assignments from the journal indicated that students should consult their reference books for pertinent information. According to the parents that we interviewed, teachers did not send the reference books home for fear of losing them. Students were expected to complete nightly assignments on consumable pages taken from the workbook. The parents, however, found many of the assignments difficult to interpret or impossible to complete without the reference book.

Gaining access to resources. At one of our first focus group sessions, Lucille described the process she went through to convince her child's teacher to let her take one of the books home:

> When he wasn't bringing his math books home, I asked the teacher if he could bring it home and I would take responsibility for it because without that book we could not do those worksheets for homework. I needed the context. And my son, he could not remember how it was done in class. I said let me learn with you. After I talked to his teacher and said I'd be responsible for the book and he would bring it home. He improved thereafter. (Focus group, 10/08/03)

Lucille was the first parent to request from the teacher that the reference book be sent home. The teacher honored her request, possibly because she was known as a volunteer in the school and in her son's classroom. Many parents at the focus group session were surprised and relieved to hear about the existence of the reference book. Sienna later explained in an interview that learning about it "made me feel so much better." Other parents who had tried to get copies of the book themselves were surprised to hear that Lucille had procured one.

Learning about the new math. Several of the parents that we interviewed took a variety of steps to educate themselves about the math curriculum, including attending meetings held at the school, visiting their children's classrooms, talking to a teacher, or getting access to the resource book. Lucille, who had a first and third grader, was available during the day and spent a substantial amount of time as a volunteer in the school. She spent time in both of her children's classrooms, but

the majority was spent in her third grader's room, as he had some learning difficulties. Lucille questioned the new math curriculum, particularly its lack of a step-by-step approach, but at the same time, she wanted "to keep on top of all the changes in math." She spent time in the classroom "just observing how [the teacher was] teaching [the students]."

Shanice described how she felt "totally lost" with the "new math" but indicated that she wanted to understand it so that she could help her son: "It makes me want to go back to school and just learn the math and stuff because I'm totally lost when it comes to the math they're doing … . So, it's something that I'm willing to learn." Even though she worked the night shift as a nurse, Shanice often appeared in her son's classroom without having slept to learn more about the math he was learning.

Sienna, who worked full time and went to the community college at nights, was not available to come up to the classroom during the day to observe the math. She said her "biggest hurdle with [the] new math" was to find ways to learn about it so that she could do math the "right" way with her daughter Nikki. She was fearful of showing Nikki the incorrect way of solving a problem, knowing that the students were learning alternative approaches for computation. Once she discovered from Lucille that she could request a reference book, she used it to help her learn how her daughter was being taught. Subsequently, she became more comfortable encouraging Nikki to develop her own strategies to solve problems: "I told her, whatever works for you, you feel comfortable doing it then just do it. But as long as you get it done."

My way and the new way. As parents made efforts to understand the new approaches represented in the curriculum, they struggled to integrate these ideas into their own knowledge of math. This process was a theme in each of the interviews. Prior to participation in parent math courses, only 1 of the 10 parents—Sienna—came to value the reform ideas and approaches. The others were more skeptical and voiced their concerns and reservations. In practice, however, they struggled to help their children complete the assignments, drawing on a variety of resources, including the techniques they learned in school to do so.

Sienna's stance on the new curriculum evolved through observing her daughter and working with her. In her interview, she described her reaction to the array approach used in *EM* to introduce multiplication:

> How she's teaching them is just like the array that I was telling you she's doing, but instead of it being on a worksheet she's having the children do their own array. There's 3 times 6 and she has the 3 rows of 6 of Xs, then she'll add them up and 3 times 6 is 18. Then she'll do it backwards, 6 times 3 is 18. But, Ms. Reed introduced the division … you put 18 divided by 6 you get 3 and then vice versa and she understands that so much more. And we was talking about it Thursday, we was talking about math, and she said, "Ma, I was

> gonna take the [times tables] and memorize each one of them each day," now, these are her words, "but the way Ms. Reed is teaching me I like it better because I understand it more and I can see them."

Other parents were willing to learn as much as they could about the new approaches to learning math to help their children be successful in school. In this process, they called on friends and family members for assistance. Betty, for example, was uncomfortable with math in general and depended on her daughter (her granddaughter's aunt) for homework help. Cassandra indicated that her seventh-grade daughter had the responsibility of explaining the math assignments to her third-grade son and herself. Alma's sixth-grade son helped Tanya's daughters with their math homework.

Although they made concerted efforts to learn about the approaches central to the new curriculum, all of the parents that we interviewed found themselves teaching their children the approaches they learned in school. In some cases, they did so by choice. In other cases, they did so because they had no other options.

Shanice, for example, chose to teach her son both the new way and the old way for two reasons. She had more faith in the approaches that she learned in school to compute and wanted to give her son the option of using them. Moreover, she was not sure how long the new approach would endure. As a result, she wanted to be sure that her child learned what would be required in later years of school.

> I'm looking towards the future and preparing them. Because by the time he get up there [in high school] it could be a totally different thing. So I want him to be able to know the old method and the new method, so he'll know both of them, and this way he'll know which method to use when. … And he'll still come up with the same thing. So it's something that I'm willing to learn.

Beverly and Jackie also chose to supplement the math curriculum with instruction more familiar to them because they disagreed with some of its pedagogical approaches. As we mentioned earlier, Beverly disagreed with the spiraled organization of the curriculum because it did not offer the children enough time to learn the material before moving onto another topic. Jackie lamented the lack of repetition in the curriculum. Both parents gave their children additional at-home instruction that addressed these concerns. Beverly had her daughter complete worksheets that provided her additional practice on computational procedures. Jackie approached her child's teacher and received an old textbook that included the sort of repetitious worksheets she sought.

Anna and Betty found themselves using their own approaches when tutoring their children because they did not understand those used in the curriculum. Anna

resorted to "the old way" after sitting in on her daughter's class did not help her understand the "new way:"

> I remember like back in the day it was kind of easy, but [my daughter's class was] doing this, divide by this and you add this … and I'm like, "No way! I don't get it!" I know the old way, that's it. So I told [the teacher], "I'm sticking to the old way," and she was like, "Well … I think the new way is kind of easy."

Feeling that the teacher did not have time to explain the alternative algorithms for multiplication and division to her, Anna made little attempt the rest of the year to understand the new curriculum. In her interview, Betty described an instance in which she did not understand the marks her granddaughter was making on her paper when doing single-digit multiplication. She recalled telling her that the best way to do multiplication was by memory:

> She would try to do all these little sticks … and it would take her forever, you know, to get the multiplication. I'm like, hold up Aisha, multiplication is memory … . 3 times 5 will be 15 from now and forever.[3]

As shown previously, parents took a variety of stances toward the curriculum. It was evident that the parents' own experiences with mathematics influenced the stances that they adopted. All parents were consistent, however, in the importance that they placed on the role of their children's learning of mathematics.

Importance of Mathematics for Their Children

All 10 parents expressed a sense of urgency about their children's success with school mathematics. We heard it in informal conversations as well as interviews and focus group sessions. In an effort to understand their goals for their children, we asked parents why they felt mathematics was important for their children to learn. Their responses to this question included references to learning specific skills and developing confidence and independence that came with successful learning. All of the examples that parents provided were related to activities in daily life. In other words, even though the parents that we interviewed tended to see limited connections between school mathematics and their lives, they held on to the possibility of greater connections for their children.

[3]The marks made by Aisha, Betty's granddaughter, were most likely forming arrays. *EM* uses arrays to teach students about multiplication in third grade prior to developing factual knowledge of multiplication combinations.

The majority of the parents asserted that their children needed to learn mathematics to avoid being cheated in everyday activities that involved monetary transactions. Tanya's response to the question, "What do you think is so important about your children learning mathematics?" is representative of priorities voiced by 7 of the parents:

> You get cheated all of the time if you don't know how much change you're supposed to get … you don't know, you could lose a whole lot of money just not knowing how to count your own money and knowing how much something is, or what you're buying and you need to know, take focus of what is going on with your own money cause you can get cheated.

As a result, several parents insisted that their children know how to count money and calculate change at a young age. A number of parents told stories of children being "cheated" at the corner stores in their neighborhood.

Four of the parents—Sienna, Beverly, Cassandra, and Tanya—also indicated that they wanted their children to develop an understanding of or comfort with mathematics that would enable them to think and act independently. Beverly, for example, hoped that her daughter would develop the understanding and problem-solving skills needed to solve problems independently:

> Learning how, if I can't do it this way, what other ways can I do it. Instead of just "Oh, I can't do it." Other methods, if this didn't work then let's try this. Or if this don't work, let's try that. So she use her … brain cells … she's thinking about it.

As we described earlier, Sienna came to appreciate the value of developing understanding of mathematical concepts. She illustrated her view of deep understanding with the example given earlier in which Nikki demonstrated an understanding of multiplication using arrays. For Nikki, this was a successful learning experience and was counter to Sienna's experiences as a student of mathematics.

Whether they focused on learning skills or developing conceptual understanding, several parents made it clear that they saw successful experiences in math as important to fostering children's self esteem. When describing Nikki's successful experience with array multiplication, Sienna made a point to stress that she wanted her daughter to feel successful in mathematics to build her confidence in general.

Throughout our interviews and casual conversations, several parents spoke of independence when describing what they wanted from their children's mathematics learning or learning in general. Some noted that their children needed to learn to be independent at a young age given their social realities. Anna explained that her daughters were going to be "African American women out there in the world,"

and she did not want them depending on others for help. For this reason, it was important to her that

> They know how to do, buy stuff on they own; they know how to go to the store; they know how to shop; they know how much they have; they know what to add up to add up then after that they ask me or ask my mom or dad.

DISCUSSION

In this section, we consider what our conversations with parents suggest about the possibility for parents to be included as partners in their children's mathematics education. We are struck by the extent to which the parents that we interviewed framed such a role for themselves but were provided minimal support in enacting it. All 10 parents were heavily involved in their children's mathematics learning beyond homework assistance. Yet, they confronted a number of barriers related to mathematics education reforms that diminished their power and authority as players in this process. The consequence of these barriers—parents who are disempowered with respect to their children's mathematics education—is ironic, given that a primary goal of the reform movement is to empower students and teachers as knowers of mathematics. It is also problematic given the importance of parent engagement in educational processes (Epstein, 1996; Epstein & Dauber, 1991; Henderson & Berla, 1994; Hoover-Dempsey & Sandler, 1997; Jeynes, 2005; Mattingly et al., 2002).

Home Math, School Math, Old Math, New Math

Parents came to the reforms with varied mathematical histories and degrees of success in school mathematics. Most parents, in fact, encountered difficulties with school mathematics. Despite their experiences, they all wanted their children to be successful in school mathematics, and they worked hard to ensure their success.

In contrast to the uncertainty and discomfort that they expressed about their own school math experiences, all 10 parents presented themselves as proficient handling everyday tasks in which mathematics played a central role, such as using a budget, balancing a checkbook, or cooking. In fact, all parents were articulate about the ways they used mathematics in their daily lives. Moreover, the aspirations they had for their children's math learning were rooted in demands of daily activity. In this sense, parents saw strong connections between school mathematics and daily life. Many, in fact, used everyday contexts and activities to help their children learn school mathematics.

Given the tendencies of parents to connect home and school mathematics, and because a primary goal of the Standards-based curricula such as *EM* is to highlight

and build on connections between everyday activities and school mathematics, it is significant that parents saw no relationship between the math that their children were learning in school and their daily lives. From their perspective, the "new math" was unrelated to anything they knew as mathematical, be it home or school based.

Our analysis revealed two reasons that parents did not see the connections that are readily apparent to most mathematics educators and teachers. First, like many adults schooled in the United States, they had firmly established conceptions of school mathematics that were grounded in computational proficiency. In fact, the mathematical connections they made to everyday tended to reflect applications of school math—computational facts and procedures—to real-life contexts. Second, the parents we spoke with were afforded limited opportunities to learn about the real-life connections forged by the *EM* curriculum. In other words, they were not provided access to conversations about the ideas behind the reforms in general or their specific implementation at Maple Elementary.

Access to Discourse of Reform

Peressini (1998) suggested that, by positioning parents outside of conversations about educational reform, schools deny access to the discourse of reform-oriented mathematics. For the parents that we studied, this discourse included reasons underlying the mathematics education reform movement in general, reasons behind the district and school curricular decisions, and explanations of particular elements of the curriculum. Parents had few opportunities to engage in conversations about any of these issues. Thus, they used their view of mathematics as computational procedures to evaluate the mathematics instruction their children were receiving. From parents' perspectives, their children were being taught math in a "confusing" way. Even if parents were inclined to appreciate alternative approaches to computation, many found the unfamiliar conventions and symbols used to communicate these ideas a formidable barrier. As a result, parents were skeptical that the school was providing their children the learning opportunities they needed to be successful in mathematics. It is worth noting that, prior to the parent math classes, only 1 of the 10 parents had developed an understanding of any of the computational approaches introduced in *EM*.

It is ironic, then, that many of the learning goals that they held for their children overlapped with those central to *EM*. Parents described wanting their children to develop confidence, independence, and the ability to use math in their daily lives. Several parents spoke of wanting their children to develop a deep understanding of math. These goals are fundamental to the *EM* curriculum. The parents differed with the curriculum, however, on how these goals should be pursued.

A critical outcome of being denied access to the discourse of mathematics education reform is illustrated by Shanice's frustration at the beginning of this article.

Like all of the parents that we interviewed, Shanice wanted her son to be successful in mathematics and to develop confidence and independence. Her confusion about the "new math," however, compromised her own independence and confidence as a parent committed to playing an active role in her child's schooling. As Peressini (1998) warned, without explicit inclusion into the discourse of the reforms, parents are left to monitor but not assist in homework.

Access and Social Class

Denial of access to the discourse of reform is not a phenomenon limited to parents in low-income communities (Peressini, 1998). It is likely that stereotypes associated with race and social class, however, allow practices that exclude parents to persist. Parents of color living in low-income areas are often characterized by teachers and administrators as uninvolved and/or uninterested in their children's education (Epstein & Dauber, 1991; Lawson, 2003; Peressini, 1996). Such characterizations may have informed the school's decision to not allow the *EM* reference book, which both explained the unfamiliar approaches and offered examples, to accompany the consumable workbook home. Thus, parents were not only denied access to reasons behind the new approaches to teaching and learning of mathematics, they were also denied access to resources that might have helped them understand aspects of the *EM* curriculum.

CONCLUSION

Our findings illustrate the ways that two concurrent trends in education create a complex and muddy terrain for parents and educational practitioners to navigate. Efforts to increase parent involvement seek to engage parents in their children's schooling in substantial ways. Reforms in mathematics education, however, promote a view of mathematics that is inaccessible to parents who have not had the opportunities to experience the learning of mathematics in a conceptually based way. Thus, parents are expected to support their children's learning of mathematics in ways that do not make sense to them. By limiting parents' access to the discourse of reform (Peresinni, 1998), schools represent the position that parents are not important educational players. Ironically, our findings revealed that these parents already saw themselves as critical players in their children's learning. They struggled to enact this role in a context that did not recognize them as such, however.

We assert that excluding parents from the discourse of educational reforms will likely lead to the failure of those reforms. In fact, we speculate that the exclusion of parents in initial reform processes has already slowed the progress of the current reforms in mathematics education. The importance of including parents in educational change was recently recognized by the NSF, the agency funding the curricu-

lum development projects such as *EM*. The most recent curriculum revisions are required to include a parent component.

Our findings give us a glimpse of what schools might do to recognize parents as partners in mathematics education. In particular, they need to be invited into the discourse of reform. That is, they need opportunities to learn about the ideas behind the reforms as well as particular approaches taken by reform-inspired curricula.

Over the last decade, reformers have allocated significant resources to professional development of teachers and school administrators in relation to the adoption of Standards-based curricula and new expectations for teaching and learning. These efforts have been based on the assumption that pedagogical reform cannot be sustained without substantial learning on the part of teachers and administrators (Ball, 1996; Nelson & Sassi, 2000). To this point, parents have not been included in most efforts to foster learning.

Although we promote the notion that parents should be seen as partners in their children's education, we also remain skeptical of this perspective. The term *partnership* generally refers to collaborations among equal players. In this instance, it is important to keep in mind that parents and school officials rarely occupy the same positions of power within the school context. In other words, we cannot ignore the power relations that exist between parents and teachers/administrators, particularly when the parents are of color and from low-income backgrounds. Within the context of their children's lives, however, parents have significant power and authority. Conceptualizing parents as partners means taking seriously their authority with respect to their children's learning and finding ways for parents to gain access to the discourse of reform. In other words, the more parents understand about the mathematical approaches their children are learning, the greater the potential there is for parents to participate in conversations around reform.

At the same time, conceptualizing parents as partners in mathematics education requires serious consideration of parents' genuinely felt rejection of the reforms. Like Peressini (1998) and Lubienski (2004), we contend that parents have the right to disagree with the reforms. Allowing for parents' voices to be heard in a public, official arena means that mathematics educators need to find ways to account for, respond to, and work with dissension.

ACKNOWLEDGEMENT

This research was funded in part by the National Science Foundation (Grant ESI–0333753) and the University of Pennsylvania Research Foundation. The views expressed in this article are the authors' and are not necessarily shared by the grantors. The authors acknowledge Lynda Ginsburg, Rhonda Elhosseiny, and Traci English-Clarke for their contributions to the ongoing research project.

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