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Family-School Partnerships: Promoting Family Participation in K–3 Teacher Professional Development

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Sixty-three teachers in a K–3 mathematics specialist certificate program conducted family projects in order to improve their skills in partnering with families around mathematics. Past studies have indicated that family involvement in children’s education has many positive influences on academic achievement; however, parents’ discomfort with math, and teachers’ discomfort with working with parents, may be obstacles. The purpose of the present study was to examine 2 years of teachers’ mathematical family projects and describe the types of projects chosen, the risks and benefits of these projects, and the quality of the parent–child interaction. It was found that the teachers implemented a variety of projects that promoted parent participation in mathematics. Teachers were also able to utilize a cycle of inquiry to examine the progress of their project. The results showed that teachers were able to create a strong connection between the math classroom and the home environment of the child, as shown, for example, by findings related to the themes of *home–school connections* and *mathematics curriculum of the home*.

Key words: Family partnerships; Mathematics education; Teacher professional development

A growing national consensus indicates that U.S. competitiveness depends on dramatic improvements in the math and science education of K–12 students (e.g., National Commission on Mathematics and Science Teaching for the 21st Century, 2000; National Mathematics Advisory Panel, 2008; National Research Council of the National Academies Committee on Early Childhood Mathematics, 2009). Improving mathematics education for the youngest children (under age 8) may be particularly critical to later outcomes, particularly for low-SES children, who are most at risk for school failure (Ginsburg, Lee, & Boyd, 2008). The National Research Council Committee of the National Academies

Committee on Early Childhood Mathematics (2009) has recommended a coordinated national early childhood initiative, including (Recommendation 8) that “early childhood partnerships should be formed between family and community programs so that they are equipped to work together in promoting children’s mathematics” (p. 4).

The importance of parental involvement in mathematics education has long been recognized (e.g. National Council of Teachers of Mathematics, 1989; National Association for the Education of Young Children, 2002; U.S. Department of Education, 1994), and studies suggest that parent–child interaction in the area of math affects children’s math learning and knowledge (e.g., Blevins-Knabe & Musun-Miller, 1996; Ramani & Siegler, 2008). Peressini (1998), drawing on Epstein’s (1994) typology of parental involvement, describes how mathematical thinking is embedded within everyday occurrences in and out of school.

It is essential that parents and community members be involved in mathematics education so that they understand, support, and contribute to the teaching of school mathematics. . . . All parents who have an interest in our students’ mathematical development [should] have a role in which they can meaningfully participate. (p. 4)

Indeed, a strong body of research from the field of early childhood development offers theoretical and empirical guidance for applying this framework to K–3 math education. According to ecological systems theory (Bronfenbrenner, 1977, 1992), children’s development is most optimal when effective connections among major systems (home and school) are established. The ecological orientation views children’s learning as a result of the child/family system interacting in reciprocal fashion with the school/schooling system (Rimm-Kaufman & Pianta, 2000). Families influence children’s development in many ways; in the case of mathematics, parents support learning through everyday activities and routines at home, interests and values that they model, games and puzzles they play with children, communications with teachers, support for homework and supplementary math activities, and involvement in learning activities in the community (Weiss, Caspe, & Lopez, 2006). With strong support, K–12 parents can become intellectual

resources and genuine partners with teachers and researchers by leading math workshops for other parents (Civil & Bernier, 2006). Parents can be both “authors” and “agents” in their children’s schools and move into a position of parental engagement that steps well beyond the limited views of involvement that many educators envision for them (Calabrese Barton, Drake, Perez, St. Louis, & George, 2004).

However, the early childhood literature suggests these kinds of opportunities may only rarely be fully utilized, or realized, because many parents of young children place more emphasis and importance on supporting their children’s literacy development (e.g., by reading books) than mathematics (e.g., teaching counting; Barbarin et al., 2008; Cannon & Ginsburg, 2008). Even when parents see themselves as critical players in their children’s learning, they may have little understanding of the new reform-oriented mathematics curricula, as Remillard and Jackson (2006) found with a sample of African American elementary school parents in a low-income neighborhood.

The discomfort of parents of young children with mathematics appears to be mirrored by teachers’ discomfort with working with parents around mathematics. According to Peressini (1998), major issues include clarifying the possible roles of parents in math education, and finding effective strategies for individual teachers to use in working with their own particular sets of families and children around their district’s math curriculum. (This latter issue obviously includes complex issues of professional development, support, and time.) Although parent involvement is widely considered a key element of school improvement, teacher education institutions minimally address this component, according to a nationwide study of K–12 teacher preparation programs (Hiatt-Michael, 2004). This is a missed opportunity, because teacher education courses that deal systematically with parent involvement issues and practices successfully prepare teachers to engage in a diverse range of involvement practices (e.g., home visits, newsletters, family nights), not simply conducting parent–teacher conferences (Katz & Bauch, 1999). Only in personnel preparation programs serving professionals who work with preschool children and/or children with special needs are *family-centered beliefs, skills, systems, and work practices* systematically addressed (Giallourakis, Pretti-Frontczak, & Cook, 2005).

This study reports on two years of findings from an NSF-funded Math Science Partnership intended to improve K–12 mathematics education throughout an entire state. The question we ask is: How do early elementary public school teachers participating in a program of graduate

math education coursework connect with families and invite parents to become partners with teachers in math education? The research method is qualitative. For the analysis, we used the three components delineated by Stake (1995) for analyzing qualitative data in a case study. First, we compiled a complex description of the case being studied, including the theoretical model and specific components of the professional development process. Second, we used thematic analysis to look for patterns in the data. Third, the interpretations and assumptions of the researchers were explored through naturalistic generalization. This occurs as we step back and make generalizations from the case and speculate about how we may use these findings to improve future professional development.

A Case of Parents as Partners in Primary Mathematics Education

The Sample

The data for this study come from teachers’ family project reports from one course, Improvement of Instruction in Elementary Mathematics: Helping Young Children Become Mathematical Thinkers. The course is part of a set of courses and experiences that seeks to increase K–3 teachers’ capacities to be *intentional, planful, observant, and reflective practitioners*.

The participants comprised two cohorts in the Primarily Math Specialist Program for K–3 teachers at the University of Nebraska—Lincoln, spring 2010 and 2011. Cohort 1 ($n = 32$ females) consisted mostly of teachers who taught in the state’s capital city, while the remainder taught in rural areas across the state. Cohort 2 ($n = 27$ females, 1 male) all taught in the state’s largest city or a surrounding suburb. The groups were similar in terms of teaching experience (2 to 30 years of teaching).

The Context

The context for the study is the Primarily Math component of an NSF-funded Math–Science Partnership, NebraskaMATH. The overall goal is to improve achievement in mathematics for all students and narrow achievement gaps in at-risk populations. Primarily Math addresses the mathematics education of young children, as they transition from kindergarten through grade 3, and seeks to better understand what mathematical attitudes, knowledge, and habits of mind K–3 teachers need to possess to best help young children acquire strong mathematical foundations. Teacher professional development is the core process of NebraskaMATH, and an underlying assumption is that ongoing learning

and reflection is a key part of the work of teaching (Cochran-Smith & Lytle, 2009; Smith & Heaton, 2013). Teachers need to learn how to be continual learners in, of, and from practice (Lampert, 2010; Schön, 1987). The goal of the NebraskaMATH faculty is to engage teachers in continually reflecting on their past teaching, asking themselves questions to problematize their current practices, and collecting and analyzing data to inform future teaching practices (Smith & Heaton, 2013), particularly posing questions and then investigating them critically and collaboratively (Cochran-Smith & Lytle, 2009, p. 121). Certainly, it is possible to see inquiry as a one-time process, with a clear beginning and end. In fact, there are guidebooks to aid in such a process (e.g., Mills, 2010). While this is certainly a worthwhile endeavor, in our project we are striving to model and help teachers acquire a view of inquiry that is integral to the way teachers engage in the work of teaching and involves “inquiry as stance,” which is defined as involving “a continual process of making current arrangements problematic; questioning the ways knowledge and practice are constructed, evaluated, and used; and assuming that part of the work of practitioners individually and collectively is to participate in educational and social change” (Cochran-Smith & Lytle, 2009, p. 121).

The process of doing something in practice, gathering data on what happens, and revising the next version of practice is what Schön (1983) refers to as *reflective practice*. In early childhood education, this cyclical vision of inquiry and reflection, based on pedagogical documentation, is referred to as the *cycle of inquiry* (Gandini & Goldhaber, 2001; Edwards et al., 2007; Edwards, Gandini, & Forman, 2012).

Course Instructions

Teachers participating in NebraskaMATH’s Primarily Math program were required to participate in professional development courses that concentrated on their own mathematical content knowledge as well as on pedagogical knowledge for teaching. Teachers were required to take four courses in their 1st year in the program (two math courses in the summer, and two pedagogy courses the following year during fall and spring semesters). In the fall course, teachers conducted a child study and another major assignment in which they planned, implemented, and analyzed two back-to-back mathematics lessons in their own classrooms. In the spring course, they focused on promoting productive math talk in their classrooms, understanding and supporting the individual needs of diverse learners, and communicating with families. Part of the spring course included a family project based on teachers’ own math

curriculum and aimed at promoting family participation in their schools. Because the teachers came from different grade levels (K–3), as well as from school districts that implemented different mathematics curricula (e.g., Math Expressions, Investigations, Saxon, Trail Blazers), neither the fall nor the spring pedagogy courses included a focus on methods of teaching specific mathematical concepts but instead addressed general pedagogical techniques that could be adapted to teachers’ own classrooms and teaching/learning challenges.

The course instructors projected the family project assignment to strengthen two competencies in teachers: (1) designing and implementing strategies for joining with parents as partners in helping young children become mathematical thinkers; and (2) using processes of reflection and ongoing inquiry in this work. This study will emphasize findings related to the first competency, with briefer comments related to the second.

As a first step in preparing to conduct a family project, teachers were introduced to the importance of family–school partnerships at a professional day at the beginning of the semester. They had the opportunity to examine useful resources and brainstorm in small groups (Stenmark, Thompson, Cossey, & Hill, 1986). Next, they were asked to complete on their own a professional writing assignment in which they reflected on the types of family involvement, both math- and non-math-related, they had experienced in the past. They considered both positive and negative outcomes that they had seen after encouraging parental involvement and hypothesized why these outcomes may have occurred.

As a next step, in formulating plans for their family projects, teachers were instructed to consider the specific benefits they believed their project would provide to one or more of their families, with respect to families becoming empowered to promote their children’s math learning. Teachers were also asked to examine the possible risks they might face when planning such a project. In their final reports, teachers were asked to describe their projects in detail. They were not asked to specifically address whether the risks about which they worried had been realized, or whether the benefits they expected had been achieved; therefore, we cannot provide findings on those issues. However, through follow-up quantitative and qualitative data, we will suggest how the family project assignment may have had lasting influences on teaching practices.

To promote reflective practice, teachers conducted their projects in two stages (“trials”) and collected feedback from colleagues, parents, or students to obtain evidence of how their project was perceived. Based on feedback,

they revised, adjusted, or elaborated their projects as they moved from Trial 1 to Trial 2. For instance, teachers who felt that their first efforts to work with families were successful could try the same tactics again, perhaps with minor revisions, but if they were not successful, they could make major revisions and try again. Alternatively, teachers could use their two trials to first solicit feedback on their plan from a focus group of other adults, and then carry out their plan (now improved). In a third scenario, they could use their two trials to conduct a pair of interconnected experiences; for example, to extend a school-based event (Trial 1) with a home-based follow-up activity (Trial 2). However implemented, this cycle of inquiry invited teachers to reflect deeply on their work, take risks, and implement family partnership strategies that they could sustain in future years.

The same procedures were followed for both cohorts, except that on the professional day in Year 2, the course instructors introduced the findings and key concepts from a literature review (Pomerantz, Moorman, & Litwack, 2007). This review concludes that four qualities of parent–child interaction lead to effective parent involvement and student success. These components include: (1) *process- (rather than person-) focused involvement*; (2) *autonomy-supporting involvement*; (3) *involvement that encourages positive rather than negative affect*; and (4) *involvement that encourages positive beliefs about the child's potential*. In their plans for their family projects (included in their final reports), Cohort 2 teachers were asked to describe how they would focus on the “quality” of family involvement (see [Appendix A](#), item 5).

The course instructor and one of the course's teaching assistants were responsible for grading the teachers' family projects. (See assignment instructions in Appendix A.) The assignment instructions designated how points would be awarded: on the basis of how thoroughly teachers described the type of family project created, the risks and benefits associated with the project, the mathematical content of the project, the process of collecting evidence on how the project was received by the families, the revision process completed by the teacher, and, for Cohort 2, the quality of family involvement evidenced. Teachers in both cohorts were evaluated as doing a very good to excellent job overall on their family project papers (they received grades ranging from 26 to 30 out of a possible 30 points).

During the process of implementing their projects, all teachers had the opportunity to discuss their projects with their peers during a professional day held midsemester. These small-group discussions within a community of peers (Cochran-Smith & Lytle, 2009) provided a forum

for teachers to describe their progress so far as well as their plans for the next phase, and get feedback and suggestions. As we (the authors of this article) observed the interaction, we saw many teachers giving close attention and support to their Primarily Math peers and letting them know that problems they may have been experiencing were not out of the ordinary and could be overcome. Practitioners' learning in communities is a central dimension of the concept of inquiry as stance (Cochran-Smith & Lytle, 2009, p. 140).

Sources of Data

The sources of data for this article include the final family project reports teachers prepared. These final project reports include teachers' written responses to the assignment instructions (see Appendix A), as well as any supplementary materials teachers wanted to submit, including sample letters to parents, photographs from school-based events, sample newsletters or web-based communications to parents, photographs of math bags or other materials that teachers created, examples of games and activities offered to children and families, and examples of questionnaires and interview questions used in ongoing assessment (see Appendices B through D for examples).

Procedures and Findings

Analysis of Project Formats and Strategies

We conducted inventories to identify the types of family projects the teachers undertook, that is, what general formats or strategies they used. (Note: Teachers were asked to connect their family projects to the math content they were teaching, but we did not find that their comments about content fell into distinct themes we could describe; therefore, the math content of the projects is not analyzed for this study.) Cohort 1 teachers produced projects that were easily classified into the setting where the project took place, home or school. The 19 *home-based formats* included *games/activities* sent home to all the families at once. These activities were often not hard for the teacher to organize and often included things such as sending home a board game or worksheet with game instructions (see [Appendix B](#) for an example). They also included *math bags or backpacks* taken home by different children in turn (see [Appendix C](#) for an example). This activity required a substantial amount of organization on the teacher's part to make sure the proper materials were included in the backpacks and that each child had a designated time to take the bag home. Other home-based options included *parent–child*

homework assignments, web or Internet-based activities, and parent newsletters spotlighting classroom moments through photos and math anecdotes (see [Appendix D](#) for an example). Note that projects could include more than one of these activities or resources. The 13 *school-based formats* included *parent education sessions* (e.g., a curriculum night for parents, or parents visiting to observe instruction during a math lesson); *family math nights* (e.g., families came to the school after the end of the school day or in the evening to participate in math-related activities); *math and muffin mornings/math days* (e.g., parents of the students came to participate in math-related activities that took place during the school day); *child–parent–teacher conferences*; and activities for a districtwide kindergarten orientation event. (See Table 1 for further description of all categories.)

Cohort 2, in contrast, produced family projects that were not so easily classified by setting. While 13 teachers produced home-based projects, and 6 teachers produced school-based projects, 9 teachers produced projects that included a school-based component followed up by a home-based component. The types of strategies involved were similar to those Cohort 1 used, but Cohort 2 often combined them in ways that crossed over the original categories, for example, combining a family night with student-led conferences.

In both groups, teachers' projects often involved imaginative and carefully planned motivational, communication, and evaluation strategies. For instance, one teacher invited parents and students to a high school basketball game, where she was coaching. Parents and students were asked to work together in order to keep score of the game using a number of different addition strategies. Furthermore, as mentioned above, teachers in both groups were asked to draw upon their own particular math curriculum in designing their projects, and all teachers did so. For example, one teacher went online to acquire the Harcourt Math Family Involvement packets that were available as part of her math series. On the basis of formative assessment results, she chose two units that she thought would be particularly beneficial for students as the basis for parent–child home activities. Another teacher created, along with her students, a newsletter describing to parents the method they were using to solve double-digit addition; she then invited the parents and children to a math night where they continued to practice the method using the Promethean board (see Table 1 for additional examples).

Risks Taken by the Teacher

The course syllabus asked teachers, while planning their family projects, to think about the risks that they felt

would be part of planning and implementing their project and to discuss these risks in the final project reports. The analytic procedure involved three phases.

Phase 1: Initial coding. Following the submission of Cohort 1 final project reports, the members of a coding team, composed of the authors of this study and an additional graduate student, worked independently to locate relevant segments of text from the project reports that described the teachers' specific perceptions of risks. Strauss and Corbin (1990) describe this process as "fracturing the data," which allows one to identify categories, their properties, and their dimensional locations. These segments of text were then categorized using researcher-generated codes that captured their meaning, based on the language of the participants. Twenty-three initial codes were generated.

Phase 2: Theme generation. The second phase of analysis for final project reports was the generation of themes. The two authors of this study grouped the 23 initial codes into meaningful themes based on common experiences and words of participants. In an inductive process, single codes were clustered together by making connections between interrelated groups of codes and overarching meanings. No codes were discarded in this clustering. Four content themes emerged from the analysis and reduction of the initial 23 codes.

Phase 3: Theme validation and disconfirmation. The final phase of analysis of the final project reports was theme validation/disconfirmation. This involved an integrative process, with the two researchers reviewing the four content themes identified during phase 2, generating the overarching core themes by relating content themes to one another based on meaning, and validating those relationships by searching for confirmation and disconfirmation (Strauss & Corbin, 1990). The research team did this by returning to the final project reports and identifying examples that confirmed and disconfirmed the four content themes. A review of the textual material showed that not all of the content themes were evident in all participants' final project reports.

To be retained as an overarching theme, the researcher team required that the themes be both centrally related to one another and mentioned by more than 25% of all participants. The criterion of 25% was an arbitrary cutoff suggested by the Office of Qualitative and Mixed Methods Research at our university; it serves the purpose of suggesting credibility and generalizability of the findings, that is, that the findings are not a matter of categories idiosyncratic to a few individuals. The "centrally related" criterion likewise served to protect

Table 1*Numbers of Teachers in Cohorts 1 and 2 Who Created Different Types of Family Projects*

Type of project	Cohort 1 total	Cohort 2 total	Example of project
Math games/ activities	9	11	<p>Math Activities were sent home with one teacher's students to complete with their parents.</p> <p>Trial 1: Families completed a "solid figure hunt" where families had to search for different types of 3D figures around their home.</p> <p>Trial 2: Based on the response of parents who noted that they enjoyed having a mixture of activities to complete with their children, this teacher followed up by sending home additional math games and activities that focused on the math curriculum of the classroom.</p>
Math bags/ backpacks	7	8	<p>Similar to above, but involving more preparation, providing the bearer of the materials with a special and enjoyable role. One teacher used math bags to help families become more aware of how math skills may be included in everyday situations.</p> <p>Trial 1: Each bag provided an explanation of a math concept plus a book that was related to a specific math activity to be done by parent and child.</p> <p>Trial 2: Based on evidence that families wanted more access to bags, this teacher created additional math bags so students would have more frequent turns to take a math bag home.</p>
Homework	3	3	<p>One teacher wanted to help parents understand what their children were doing in math class.</p> <p>Trial 1: This teacher sent home parent-child math homework that included different problem sets.</p> <p>Trial 2: This teacher next sent home a math-related game with students to complete with their parents. The teacher then sent out a survey to determine which approach families liked the most and then planned to send that type of assignment/activity home the rest of the year. This teacher found out that families enjoyed the problem sets more than the math-related game.</p>
Web/Internet	1	0	<p>One teacher wanted to communicate virtually with parents about what was happening in her math classroom.</p> <p>Trial 1: This teacher created a blog called "Math Moments" that parents could check to see what their children were learning mathematically.</p> <p>Trial 2: After determining through a paper survey that not all parents had taken the time to view the blog, this teacher decided to send e-mails to all parents each time she posted a new Math Moment. The note included a direct link to the blog. She hoped this would encourage parents to view the classroom blog.</p>
Parent newsletter	3	1	<p>One teacher sent out "snapshot newsletters" that highlighted a specific topic students were learning in the math classroom and suggested a home activity.</p> <p>Trial 1: This teacher sent home a newsletter explaining a concept (telling time to the hour) and including a suggested activity on telling time for parent and child to do together.</p> <p>Trial 2: By gathering feedback from parents, this teacher found out that her first activity (creating a timeline) did not interest some of her students. Therefore, as a follow-up, she prepared an additional newsletter and bags covering another topic that she thought might be of more interest (counting money).</p>
Parent education	5	2	<p>One teacher wanted to inform and educate parents on the math concepts she was teaching in her classroom.</p> <p>Trial 1: The teacher invited parents to attend a math class on a specific day and see how their children learned a "hard math concept."</p> <p>Trial 2: As a follow-up, this teacher sent home a math assignment for parents and children to work on together.</p>

(Continued on next page)

Type of project	Cohort 1 total	Cohort 2 total	Example of project
Family math nights	4	8	One teacher wanted to get parents more involved in practicing math skills with their children to reinforce their learning. Trial 1: Parents were invited to attend a family math night with their children to participate in fun math-related games and activities. Trial 2: For stage 2, the teacher sent home weekly problem-solving homework for parents and children to work on.
Math and muffins/math days	2	4	Similar to Family Math Nights, but taking place during the school day. One teacher wanted parents to engage in math-related games with their children as an enjoyable way of promoting mathematical learning at home. Trial 1: A “Math and Munchies” hour was created. Parents were invited to attend with their children and participate in math-related games and activities. Trial 2: For stage 2, the teacher periodically sent home math games for students to engage in with their parents, instead of doing the normal homework assignments.
Child–parent–teacher conferences	1	1	One teacher wanted to use conference time to show parents how much their children were learning about math and help the parents understand what the children were learning. Trial 1: This teacher held child–parent–teacher conferences, where children and their parents played several math games that children had already played in the classroom. The children were the “teachers” for their parents. Trial 2: The teacher followed up this project by sending a newsletter to parents to provide more information about the concepts that were covered during the conference.
Kindergarten orientation	1	0	Through a kindergarten orientation format, one teacher provides parents with information on how to integrate math into their children’s everyday lives. Trial 1: The teacher created a plan to make placemats to give to each family. The placemats would attractively display some math vocabulary and activities. Before making the placemats, the teacher talked to peers at her school about what to do at the orientation and what to include on the placemats. Trial 2: After getting feedback from peers, the teacher made adjustments to her original plan for what to include on the placemats and what to discuss at the orientation with the families.

Note. Teachers may be counted in more than one category because their first and second trials may have included different strategies. For instance, see the example for Math and Muffins/Math Days.

the breadth of the themes generated. Applying this criterion required the coding team members to concur in their subjective judgments that categories were connected conceptually, whether in the actual words teachers used or the examples they gave. For example, one subtheme (“language and diversity issues”) occurred fairly infrequently and was combined with the theme of “resources and logistics” because it was usually described in practical terms (e.g., how to translate documents to be sent home or how to conduct a parent-teacher conference with non-English-speaking parents—problems that were resolved by involving school district translators). Our teachers did not discuss language and diversity issues as cultural barriers (e.g., trying to talk to people who have a different worldview or different values about education)—issues that would require something beyond simple, practical solutions. The consolidated themes include: (1) *resource, logistics, and communication issues*; (2) *stepping outside the familiar*; and (3) *history of failure*.

The following year, after the Cohort 2 final project reports were collected, the two authors of this study independently evaluated the 28 new reports, in order to determine whether the expected risks of Cohort 2 could be classified using the same three themes used for Cohort 1. Similar risks were identified by both cohorts, but there were instances where the definitions of the overarching themes needed to be expanded in order to fully emphasize the risks Cohort 2 perceived. For instance, it was decided that the *resource, logistics, and communication* theme needed to include issues of *parental strain*. The *history of failure* theme needed to be expanded to include not only past experiences of failure but also expectations of failure.

Resources, logistics, communication, and parental strain. Risks related to this theme included a series of practical issues teachers experienced. These issues included energy, effort, and time expended by the

teacher; problems obtaining necessary physical resources or materials; difficulty in communicating with parents about the project or the math curriculum (perhaps requiring extra meeting times or the help of a translator); and strain on the parents' time and energy (see Table 2). One teacher worried, "Will it be worth the effort?" but another optimistically predicted, "Asking parents to do one more thing will be challenging, but I know the risk is worth it, and students/families will gain so much from just a mere 5–10 minute math game played on the weekend." In general, many teachers provided information about one or two practical obstacles that concerned them, but without dwelling on any obstacle at length.

Stepping outside the familiar. The risks related to this theme involved going beyond the teacher's past practices and routines and instead trying new strategies or approaches. Examples of these changes reported by teachers included incorporating photos and classroom stories into newsletters, inviting parents to come into the classroom and observe math instruction, collaborating with teacher colleagues in carrying out a family math night, and using children as "teachers of parents" in games, activities, or conferences.

Experiences/expectations of failure. Risks that were identified related to this theme included past experiences of failure and expectations of future failure. For instance, one teacher addressed both concerns when she wrote, "Family participation at our school is limited, so we are not certain if the turnout at the event will be very high." Teachers also expressed concern about whether parents would see the value of the project. Teachers described and/or anticipated many sorts of failures: unresponsive parents, strained children, and wasted effort.

Benefits Expected by Teachers

In their final project reports, in addition to describing the risks they expected, teachers addressed their goals for their family project and described what "benefits" they believed would come from it.

Analytic procedure. Coding categories for benefits were established following a procedure parallel to that described above for risks. From the Cohort 1 final project reports, an initial list of 24 categories was generated, eventually reduced to 6: (1) *fostering home–school connections*; (2) *enriching math curriculum of the home*; (3) *increasing review/practice opportunities*; (4) *improving parent competence in supporting math homework*; (5) *fostering parent listening to children's thinking*; and (6) *increasing positive attitudes toward mathematics*.

The following year, using the Cohort 2 final project reports, the coders independently evaluated the new material to determine whether the benefits expected by the Cohort 2 teachers could be classified using the same six themes as for Cohort 1. Several new coding categories were noticed for the Cohort 2 data, and there were many instances in which the emphasis of the material seemed substantially different, for example, in anticipating ways in which parent or child competence might be increased. On the basis of careful review of the textual material (*Phase 3: Theme validation and disconfirmation*), the researchers decided to move to a slightly larger grain size in capturing the meaning of teachers' thoughts about benefits. The coders concluded that underlying the various comments was a simple and easily recognized differentiation based on the target of the benefit: (1) *students*; (2) *parents*; (3) *the home–school connection*; or (4) *the math curriculum of the home*. Each of these targets provided a benefits theme that met the criterion of being present in 25% or more of the teacher final project reports (see Table 2). Any individual teacher

Table 2

Numbers of Teachers in Cohorts 1 and 2 Reporting Three Themes of Risks Taken and Four Benefits Anticipated in Their Family Projects

Cohort	Risks			Benefits			
	Resource, logistics, & communication issues	Stepping outside the familiar	Experiences/expectations of failure	Students	Parents	Home–school connection	Curriculum of the home
1	10	15	7	10	13	9	14
2	13	14	17	10	20	12	14
Total	23	29	24	20	33	21	28

could write of benefits addressing more than one theme; for example, when a teacher stated, “I hoped to provide families with an enjoyable way to increase student learning and success in mathematics [and] at the same time having families be a partner in the active learning of the students, which will help them to learn and love math.” This statement falls into two categories: students as beneficiaries, and mathematics curriculum of the home.

Students as beneficiaries. A main goal of many teachers in both cohorts was to allow their students more practice time to strengthen their math skills in the hope that this would result in stronger math abilities. One teacher illustrated this when she reflected, “My family projects centered on family involvement and helping students become accurate and fluent with the basic math facts. The activities and games I sent home helped to reinforce student learning.” Other teachers mentioned such benefits to students as practicing math content of all kinds, taking personal responsibility, and promoting their communication abilities to explain their thinking. For example, one teacher’s goal of using the project to promote her students’ communication skills was also a goal of the curriculum and math assessments used in her school district. She explained this connection in her final project report:

I thought providing the parents with information on how to help their son/daughter at home with working through a problem and showing the process in which they came to their answer would not only be valuable to the student, but also it would benefit our school involvement plan. Our curriculum also has a math strand of communication and communication is included in our rubric for grading.

Parents as beneficiaries. Many teachers indicated that they wanted to have some way to make connections with the parents of their students. They reported that they wanted not only to show parents what their children were doing in the math classroom but also to demonstrate ways that they could help the children in learning math. As one teacher put it, “I wanted parents to experience math discussions at home to better understand what their child is thinking.” Teachers also expressed that they wanted to let their students have the feeling that their parents shared a strong interest in their math education, to “work on the school work as a family.” By focusing their projects on parents as the intended targets, teachers took actions to change parental attitudes or behaviors in ways that would in turn benefit students and their long-term math learning.

Home-school connection. Another main goal of teachers was to foster a strong home-school relationship between themselves and their students’ families. Teachers indicated that they wanted parents to feel trust and comfort in communicating with the school system and to incorporate those relationships into their own home. One teacher explained, “It felt right for me to do the [photo] snapshots [in newsletters] as a way to build communication and trust with the families.” Another wrote, “I also wanted to have parents visit the classroom in a relaxed atmosphere so that they would feel more comfortable coming to school, and hopefully getting them more involved in other school activities.”

Mathematics curriculum of the home. The goal for many teachers in creating these projects was to “give away” to parents some part of the math curriculum that they were using in their classrooms. Teachers wanted to show parents what their children were working on in their math class, and they wanted to get parents comfortable with the math curriculum and feel more confident in helping their children with their homework. One teacher illustrated this goal when she explained, “I wanted to create the opportunity for mathematical communication between myself and parents as well as the students and their parents. I also wanted to provide parents with ideas for incorporating math into daily activities.” Another teacher in Cohort 2 wanted to help parents better understand and utilize the math curriculum being used at school. She wrote:

The third grade has been learning about the concepts of multiplication, division, and how they are related. The family math project that I am going to do is to help students with the fluency of learning their facts. I hope to help parents understand the need and importance of their child learning their multiplication facts. I would also like parents to have several different ways to help their child.

This teacher, like many others, saw multiple ways in which both parents and children would benefit from their project, and they hoped that these benefits would be widespread, include more than just their own students, and extend to other family members by affecting the entire curriculum of the home.

Quality of Participation

From the discussion of project benefits, it is clear that teachers were drawn by their projects into thinking in detail about the experiential process of parental participation in the mathematical education of their

children. With Cohort 1, the course instructors did not ask teachers to reflect upon the interaction taking place between parents and children, although many teachers did so. However, between Years 1 and 2, as described in the Course Instructions section above, the instructors discovered a valuable resource in the literature on parent–school partnerships (Pomerantz, Moorman, & Litwack, 2007). To determine which of the four dimensions of quality involvement teachers incorporated into their family projects, the coding team used the four dimensions as theme categories and coded instances found in the final project reports. The numbers of teachers in Cohorts 1 versus 2 using each theme are presented in Table 3; in general, Cohort 2 used the themes more frequently, especially for involvement supporting autonomy and positive beliefs about the child’s potential. All four themes met the criterion of 25% of the total sample.

Process-focused involvement. This theme involves parents concentrating on the process of their child’s learning, rather than on their child’s ability or achievement. For example, teachers reported that they provided parents with suggested questions they could ask to prompt mathematical thinking and show the process by which they came to an answer on their homework. One teacher in particular offered a list of sample questions that parents could ask their child to better understand whether or not their child was able to explain the mathematical process of the math activity she sent home. Some of her sample questions included: “How did you get that answer?” “How did the grid help you add the decimals?” “What information does the grid give you that can help you add the decimals?” “What strategy are you using to solve this problem?” “Why did you choose that strategy?” “How is this strategy going to help you solve the problem?” “Could you solve this problem a different way?”

Other teachers found ways to assist parents in encouraging their children to try hard and do their best. For instance, one teacher commented that her project was based on “what a child can do” rather than “where

they want the child to be in the future.” She concluded, “Celebrate and rejoice in what the child is doing in mathematics in the here and now, and work on growing mathematically together.” In general, many teachers designed projects that drew parents into the world of their children’s mathematical thinking.

Autonomy-supporting involvement. This theme involves parents helping to build their children’s independence and self-regulation in carrying out their mathematical learning and education. For example, many teachers constructed goals involving children taking ownership in their own work. One teacher explained, “Children had to have some ownership with their extended learning at home,” and another teacher said, “The purpose of the homework is as much about learning to take responsibility for completing and returning the assignment as it is about doing the actual work.” Other teachers wanted their students to emerge as leaders or teachers in interacting with others. One teacher wrote, “I encouraged children to explain and show their parents how we use the tools that we had been using in our classroom,” and another designed a way for students to take a leadership role at parent–teacher–student conferences. As she described, “Students were seen as leaders at the meeting. They were the experts and were in charge of giving their parents a ‘tour’ of the math curriculum.” All of these examples suggest how teachers sought to strengthen enduring dispositions in their students—dispositions that would presumably generalize to mathematical learning across time and place.

Positive affect. Parental involvement that encourages positive affect toward mathematics involves parents expressing enjoyment, excitement, a sense of success, and/or pleasure in and affection toward their child while participating in the project. Many teachers went out of their way to create experiences and interactions characterized by all kinds of positive feelings, as opposed to negative elements such as criticism, reprimand, weariness, boredom, or complaint. One teacher explained,

Table 3
Number of Teachers in Cohorts 1 and 2 Mentioning Four Dimensions of Quality Parent–Child Interaction

Cohort	Process-focused	Autonomy-supporting	Positive affect	Positive beliefs
1	14	6	12	4
2	17	13	17	14
Total	31	19	29	18

I set up a fun activity that the students were familiar with the concepts involved that could be completed at home when they had time over a weekend. With the feedback I received, many parents enjoyed the activity and were impressed at how involved they felt.

Other teachers encouraged parents to praise and support their child in their work in order to promote an atmosphere of positive affect. One teacher wrote, “Families were encouraged to use the activities in a positive way. The activities were not intended for parents to ridicule the child and [worry about] how well they could do the activity. We were always encouraging positive interaction.” Teachers found that promoting positive emotions and reducing negative ones during math activities was an obvious and suitable way to proceed in implementing their family projects.

Positive beliefs. Parental involvement that encourages positive beliefs involves parents attending to children’s strengths and potential. Many teachers felt it was important to remind parents about the importance of showing interest in their child’s positive progress. For instance, one teacher created parent–child homework assignments that would show parents how much their children were learning: “During both of these activities, parents will notice their child’s strengths. Through the questioning, students will feel like they have the capability to solve problems and to teach others how to solve problems.” In NebraskaMATH, teachers themselves were learning how to support high expectations for *all* students as mathematical learners; and through their family projects, many sought to transfer those expectations to the other adults in students’ lives, so that students would internalize self-evaluations of themselves as capable math learners.

Family Projects as Tools for Reflective Practice in a Professional Development Project

The family project assignment was intended to strengthen not only teachers’ competency to join with parents as partners, but also their competency to engage in reflective practice, that is, to use systematic inquiry. To promote a cycle of inquiry, teachers were asked to conduct their projects in two stages (“trials”), being sure to collect feedback from colleagues, parents, or students to obtain evidence of how their project was perceived and to use that feedback in their ongoing planning and reflections. Teachers used many different strategies for gathering feedback, including survey forms sent home,

face-to-face interviews with parents during conferences, and even pictorial surveys with children; they often (especially in Cohort 2) used two or more strategies in combination. The feedback often proved to be useful. For instance, one teacher included small journals in the math bags sent home, and found out that parents wanted a special note of explanation about the bags. After making that change, this teacher found that parents were happy to be involved when they understood the purpose of the math bags. By requiring a two-trial process, the faculty instructors communicated to teachers that good teaching always requires risk-taking, self-assessment, and iterative improvement; teachers learn as much from errors as from successes. The two-trial process gave teachers permission to admit frankly their fears and challenges and to make adjustments that often led to surprise and gratification (see Table 1 for examples of the two-trial process).

At the very same time that the teachers in the course were engaging as inquirers, so too were the course instructors (two of whom are the authors of this article). Thus, on the basis of the close and systematic scrutiny of the family project reports, the instructors have received an opportunity to improve our course from cohort to cohort. We, the authors of this article in collaboration with our colleagues on the faculty team, have made minor, but ongoing, adjustments in the ways that we have introduced the family project to the teachers and instructed them to carry it out. These changes appear to be correlated with changes in the projects that the teachers conducted. We have two pieces of evidence for this assertion. First, in Year 2, when introducing Cohort 2 to the family project assignment, the instructors provided a description of the diverse kinds of projects that Cohort 1 had conducted, with specific examples of the many kinds of home-based and school-based formats they had devised. Cohort 2 then went on to *combine* these two formats much more often than had Cohort 1 (as described earlier), although there was no suggestion by the course instructors that they should do so. Second, in Year 2, the instructors introduced the findings and key concepts from a literature review (Pomerantz, Moorman, & Litwack, 2007) that concludes that four qualities of parent–child interaction lead to effective parent involvement and student success. Our faculty instructors asked teachers, in their final project reports, to make connections to that article, and this instructional change appears to be associated with changes in teacher reports. Cohort 2 teachers, relative to Cohort 1, made more explicit mention of the themes of quality parent–child interaction, especially of involvement that encourages autonomy and positive beliefs about the students’ potential to learn mathematics (see Table 3).

Evaluation of the Project

We have no conclusive data on the family project's long-term impact on the teachers. However, we have two pieces of evidence suggesting that the project may have been influential for at least some of the teachers involved. The first piece of evidence is the data from the confidential (anonymous) survey administered by the NebraskaMATH Project to all Primarily Math teacher participants annually. At the end of the spring semester (2009 or 2010) before which participants began their Primarily Math coursework, teachers ($n = 40$) were already reporting high communication with parents. Eighty-five percent of the respondents reported that they communicated suggestions for parents to help students practice mathematics skills at home, 79.5% said they sent home family mathematics activities, 75% communicated district expectations and standards for student mathematics achievement, 50% sent home periodic class newsletters that included mathematics concepts, and 32.5% reported they held a family mathematics night.

In the following year, during which the teachers took the graduate course with the family project assignment, these percentages rose; with 40 teachers reporting, the affirmative numbers were 97.5% (suggestions for parents), 100% (activities sent home), 87.5% (district expectations), 52.5% (newsletters), and 50% (family math nights). Finally, in the second year out from taking the course, with 41 teachers reporting, the affirmative numbers dipped a bit but still remained higher than baseline, at 87.8% (suggestions for parents), 80.5% (activities sent home), 82.9% (district expectations), 55% (newsletters), and 43.9% (family math nights).

To gather a second kind of evidence, the authors of this study recently sent an electronic letter to Cohorts 1 and 2 participants asking them to tell us whether or not they are still continuing to implement math work with families at their school or in their classroom. They were also invited to say whether the work they did on their family projects was or was not useful to them in the long term. This email was sent about three months after the last of the two surveys.

Twenty-one teachers responded to the questions in the email (35%). Although teachers had been encouraged to respond “whether or not” they were continuing to implement work with families, it appears that the results may be biased toward positive reports (email responses were not anonymous). Even so, the reports contain many encouraging elements. First, many teachers reported adapting what they had originally done to deal with a new teaching situation, such as changing grade levels,

starting to work with a new curriculum, or moving from classroom teacher into a coaching role. Thus, their learning had been sufficiently internalized to generalize to a new situation. For instance, one teacher wrote that her district has implemented a new homework policy and she can no longer send home guided practice pages for parents and students to do together; instead, she has found a different way to encourage parents to go over completed work with their children and contact the teacher about concerns. Another teacher moved into the role of math coach at a new school and there instituted a new math and science night. She wrote,

Parents really enjoyed the evening, and we were able to give each family some games, dice, and playing cards. I have heard from several students that they are still playing the games at home. I believe that these family nights have really contributed to increased parent involvement and higher student achievement in math.

Second, several teachers reported shifting strategies for practical reasons, but they still communicated with families. For example, one teacher said she discontinued math bags because of the time they took to prepare; instead, she always sends letters home to explain the new curriculum and particular concepts, occasionally even adding short videos of herself performing certain addition/subtraction algorithms she knows are new for parents.

Third, a number of teachers mentioned participating in leadership activities where they presented to others about parent involvement; for example, teachers reported sharing materials and ideas with building colleagues, giving a talk to their school parent teacher organization, and partnering with their school literacy facilitator.

Finally, teachers learned strategies from their peers in the Primarily Math class that they have taken over and incorporated. One teacher said,

I don't recall exactly what I did for my project, but I do some things in my classroom [now] that I know specifically came from projects in our cohort. I grabbed the ideas and concepts that I knew I could use from our cohort and have applied them to my classroom for about three years.

Thus, the findings suggest that the Family Project assignment led to some practices that sustained and perhaps even expanded and rippled outward in subsequent years.

Summary and Discussion

NebraskaMATH is a Math–Science Partnership at the University of Nebraska—Lincoln that involves a component intended to promote K–3 teachers’ competencies in teaching mathematics to young children. The teachers who are the subjects of this study brought a strong commitment to improving their pedagogical skills and improving math achievement for all students when they entered the graduate certificate program containing a course with an inquiry-oriented family project as a major assignment.

Within this context, the present study employs an established approach to qualitative case study research to uncover the formats selected, risks taken, benefits sought, and process quality of family projects for two cohorts of teachers as they conducted a major course assignment and designed their own projects, inviting parents to become their partners in math education. We would claim that the reports of the teachers demonstrated that they took steps to work with parents through a variety of home- and/or school-based initiatives and that they could be reflective and inquiring about their efforts to work with parents. Our study of these projects contributes to a growing literature base on professional development in early childhood mathematics education.

The inventory of the teachers’ project reports found that teachers selected both home-based and school-based strategies (and sometimes a combination of the two) to carry out their objectives. Home-based strategies (such as games/activities sent home, math bags or backpacks, and parent–child assignments) were somewhat more common than school-based strategies (such as family math nights, math and muffin mornings, and child–parent–teacher conferences); Cohort 2 used many more combined formats than did Cohort 1. With few exceptions, the teachers appeared to invest substantial effort and creative energy in their projects.

The analysis of family project reports allowed close examination of the felt risks taken by teachers, the benefits they anticipated, and qualities of parent–student interaction they sought to support and strengthen. The qualitative methodology identified several themes in teacher discourse around these issues, using a criterion that a theme must be mentioned by 25% or more of teacher participants to be included in the final analysis.

Teachers were asked by their faculty instructors to take a personal risk in their work, that is, to go beyond their usual comfort zone in planning and carrying out their projects. From the thematic analysis, three themes emerged in the teachers’ reports. The findings

suggest that the teachers took risks related to practical constraints including resources, logistics, communication, and parental strain issues, for example, worries about depleting their own or the families’ time and energy, or about difficulties in communicating with parents about the intricacies of the contemporary math curriculum. In addition, they felt it risky to try new strategies they had never employed—to step off into unknown territory—and to go forward in the face of doubts about whether they could generate participation from families who had not shown themselves in the past to be highly involved.

Anticipating benefits, teachers discussed their objectives and differentiated between values focused on four kinds of targets, or beneficiaries: students themselves (e.g., by improving their understanding of the usefulness of math); parents (e.g., by improving their knowledge of how to support their student’s homework activity); the home–school, or parent–teacher, connection (in boosting trust and rapport); and the mathematics curriculum of the home (toward becoming a place where math is more visible in the daily lives of children and adults).

As they recounted the ways in which they carried out their projects, teachers elaborated on concrete ways in which they addressed the very processes of parent–child interaction. Their descriptions were found to map onto four dimensions of high quality parent–child interaction previously found (Pomeranz, Morman, & Litwack, 2007) to underlie strong parent involvement in education: process-focused, autonomy-supporting, positive affect, and positive beliefs. Thus, teachers reported that they encouraged parents to notice and reinforce the process, *how* the student was engaging with the math (e.g., with curiosity and persistence), as opposed to naming attributes of the student (e.g., whether he/she is “good” or “not as good” at math). Teachers described ways in which their projects supported parents increasing their student’s autonomy and self-initiative while learning mathematics, as opposed to depending on parental intervention. Teachers discussed increasing positive affect (enjoyment, satisfaction, fun) while doing mathematics, and/or reducing negative affect (complaints, resistance, frustration). Finally, teachers promoted parent–child interaction that encouraged positive beliefs about the students’ math potential, rather than pessimistic or discouraging ones.

In sum, the findings of this article suggest the feasibility of incorporating a focus on partnership with families into a professional development program for elementary school teachers that has as its major focus improving teachers’ knowledge of mathematics and their pedagogical skill in delivering excellent mathematics instruction in the classroom. Moreover, the findings suggest that an inquiry

approach can be usefully applied to this endeavor, giving teachers opportunity to take risks, brainstorm with colleagues, and regard working with parents as a skill that requires ongoing evaluation in the same way as does classroom instruction.

Limitations

This study has many limitations. First and foremost, the methodology allows for no causal inferences, that is, we cannot conclude which aspect of the family project assignment, if any, led to particular aspects of the observations we report. Furthermore, we have not presented quantitative findings on student outcomes, and therefore we cannot conclude that the family projects made a change in student achievement. We have no data on changes in teachers' confidence or anxiety level as a result of their professional development, and only limited (although encouraging) evidence that teachers made sustained changes in their approaches to parent involvement and participation. Finally, we have no data on changes in child and parent mindsets as a result of the projects. All of these issues await future investigation.

The main value of this study lies in its suggestions for practice. We hope that it encourages the inclusion of family–school partnership projects within elementary teacher professional development.

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Appendix A: Family Project Assignment

“It is essential that parents and community members be involved in mathematics education so that they understand, support, and contribute to the teaching of school mathematics. . . . All parents who have an interest in our students’ mathematical development [should] have a role in which they can meaningfully participate.” (Dominic Peressini, 2002, *What’s All the Fuss About Involving Parents in Mathematics Education?*)

In this assignment, you will plan and implement a mini-project to promote your partnership with parents or other family members around mathematics. The project will involve two “trials” so that you can plan, implement, reflect, revise, implement again, and draw final conclusions. If what you did was successful on trial one, try it again, perhaps with minor revisions. If not, revise in a major way and try again. The goal of this assignment is to create and practice a strategy for working with families in a way that feels new and somewhat risky for you. Your process should cause you to become more *planful*, *intentional*, *observant*, and *reflective* in this work.

Create an action plan for implementing and revising your strategy in any format that works for you. You will begin this planning today. You may choose to conduct the same or a similar project as a peer, but if you do, please submit separate reports. Before beginning, reread the five articles on working with parents that we have given you in your binder, and in your paper, make reference to these articles when appropriate. Include the following information as a part of your assignment:

1. Describe the family partnership objectives for your project. What kind of interactions for what purpose do you hope to accomplish? —4 points
2. Describe how the math content of the project connects to your math curriculum. —4 points
3. Describe the specific strategy for partnering with families you have chosen, and describe why it feels new and risky for you. —4 points
4. Describe the specific benefits you believe your strategy will provide to one or more of your families with respect to becoming empowered to promote their children’s math learning. (In this description, include demographics of your class or particular characteristics of your students or families to which you are responding in formulating your plan.) —4 points
5. Describe how you will focus on the “quality” of the family involvement, i.e., how you will encourage families to concentrate on the quality of their involvement (four levels discussed in class) while they are participating in the math education of their children. —4 points
6. For Trial 2, describe the specific parents’ or children’s words or behavior you are using to make deliberate connections between Trials 1 and 2. —4 points
7. Collect evidence on your work with families. For example, you might tape record or video a parent-teacher conference you conduct according to some new (to you) format or structure. Or you might interview a few parents or children about a new format of newsletter that you create. Or you might get feedback on the success of your math backpacks or interview some children in your class about the math games they enjoyed at home with their families. —4 points
8. Describe the decision process you followed in revising your strategy between Trials 1 and 2. Bring notes on your project (through Trial 1, or whatever you have completed) to your March Professional Day. We will provide time for you and colleagues to share results to date and give each other feedback and offer suggestions. —4 points
9. Describe the results of Trials 1 and 2 and your findings and conclusions. Turn this in by **April 20**, on Blackboard. —3 points

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**For anyone in a coaching role, we would like you to plan, implement, and reflect on a family project carried out in collaboration with one or more of your teachers, or with the parents of students in one of these teacher’s classes.

Appendix B: Family Activity

Dear Second Grade Families,

We will soon be learning about geometric figures in our math class. Over the weekend I would like you to help your child go on a “figure search” at home or in your neighborhood.

Look for items that are figures, such as spheres (a ball), cones (a funnel), cylinders (a paper towel roll), rectangular prisms (a shoebox), and cubes (dice). Encourage other family members to join in the search.

When your child finds a figure, have them do a quick sketch in their Shape Books. Have them label their pictures with the name of each item. The students will be using their Shape Books in class, and will be adding to them as we learn more about the figures. I will be explaining the directions to your child as well. They know what I expect them to do.

I encourage you to talk about math daily with your child. You are your child’s number one teacher!

Sincerely,

Mrs. Topf

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Appendix C: Math Bags

Materials included in a given math bag. Includes a math activity book with math-related games for parents to do with their children. Also includes a worksheet and materials to complete the activities.

Examples of different themed math bags. Some themes include a pizza topping activity, which allowed students to practice sorting, and a tooth fairy bag containing an activity in which students practiced charting.

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Appendix D: Sample Letter to Parents

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