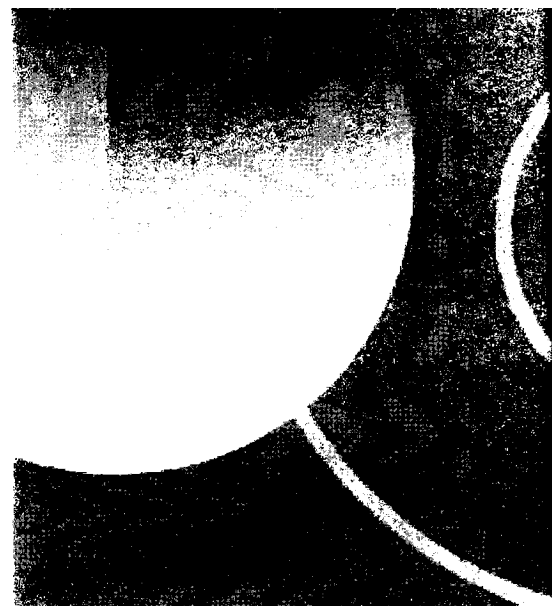


Parents Learning Mathematics: For Their Children, From Their Children, With Their Children



Adults find themselves needing or wanting to learn mathematics for many different purposes. Often, these adults want to learn mathematics in order to fulfill job requirements, to earn a GED or pursue higher education, or to better cope with the mathematical demands of daily life. But for some, the impetus to learn mathematics is grounded in their family lives, particularly in their desire to support their children's learning and progress in school. Many adults with weak mathematics skills fear encountering topics such as long division, fractions and percents, but they are even more profoundly challenged when their children bring home math homework that does not even resemble the mathematics they remember from their own schooling.

Over the last decade, many school districts in the United States have implemented mathematics curricula in kindergarten through fifth grade that were developed in response to cognitive science research on how children learn mathematics. These curricula, known as "reform" curricula, emphasize the importance of developing a conceptual understanding of mathematics, reasoning, and problem-solving, as well as developing proficient computational procedures (Senk & Thompson, 2003). Many of the learning activities and procedures used in the classroom and in the accompanying homework assignments are designed to support

this particular vision of children's mathematics learning.

For some parents, the primary difficulty emerging from children's homework has to do with the fact that the reform curricula often use conventions that look different from those they remember from their own schooling (Bartlo & Sitomer, 2008; Peressini, 1998; Remillard & Jackson, 2006). Some of these adults may feel confident in their own math knowledge, but have to learn a new "system," including new ways of doing addition, multiplication, and division. Many other adults, however, did not come away from their own schooling experience with the numeracy skills, understanding and confidence that they need to make sense of their children's work as it arrives at home in the form of homework.

In seeking to understand how parent/child homework activity may provide a learning opportunity for parents as well as for children, we examined three bodies of literature: research on parent involvement in homework, research on parent reengagement with mathematics learning, and research on the nature of parent/child math talk during mathematics activities. Hoover-Dempsey, Battiato, Walker, Reed, DeJong, & Jones (2001) identified the types of activities in which parents engage as they work with their children on homework and Cai, Moyer, & Wang (1999) identified five roles that parents take on

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with respect to math homework in particular: motivator, resource provider, monitor, content advisor and learning counselor. Additional work has examined the impact of providing parents with training interventions designed to help them help their children with the math content or instructional approach encountered in school (Hyde, Else-Quest, Alibali, Knuth, & Romberg, 2006; Shumow, 1997). The goal in each of these studies was to help parents understand and use instructional strategies that were being practiced by the teachers in school. These parents were well educated, and little or no attention was paid to any parent learning that may have been occurring simultaneously. Parents were simply positioned to facilitate, in various ways, children's completion of and benefit from homework.

The second body of research examined parents' reengagement with math learning in educational settings. Parents with gaps in their mathematics education are motivated by their desire to help their children and choose to participate in "math for parents" classes (Civil, 2001; Jackson & Ginsburg, 2008) or in more formal education (Brew, 2001). Once there, the parents continue to believe they are enhancing their ability to help their children, but powerfully find that they enjoy learning the math for themselves, especially as part of a learning community.

Finally, Civil, Diez-Palomar, Menedez, and Acosta-Iriqui (2008), Ginsburg and Farina (2009) and Ginsburg and Rashid (2006) examined the nature of parent/child conversation around mathematics activity, particularly homework-like tasks. These parents, with limited math achievement levels themselves, consistently bring their own current and past learning experiences and mathematical understandings to their conversations with their children. While they bring their own personal styles to their interactions, they and their children all engage in dialogue that is rich with questions, conjectures and mathematical reasoning and arrive at solutions that are mutually agreed upon rather than imposed.

As part of a larger study, we interviewed over 50 parents of children in second through fifth grades at public schools in northeastern urban areas to learn how they are managing with the reform mathematics homework their children bring home. Virtually all parents voiced their concern for their children's learning and feelings of responsibility towards helping their children with

homework. As we examined the interview data, we began to see that mathematics homework set in motion learning opportunities for the parents. Their perspectives about this work and their comments about how and why they are learning mathematics are shared below.

Adults' Feelings About Their Math Knowledge

Some parents voiced feelings of frustration, anxiety, and sometimes shame with their limitations in mathematics knowledge and ability. One parent said, "Well, I feel like I'm older, but then again, he's smarter, you know, as far as like numbers go. And I feel really embarrassed. Something like, he's seven, and I'm going to be 29, and he knows more about this stuff than I do. I feel like an idiot

sometimes, believe it or not." (*Ms. Gonzalez, parent of 2nd grader*)

Another looked forward to one day being the one who would know how to go about helping her children with math homework. As Ms.

Morton-Jones, the parent of a 4th grader, said, "I wanted my children to be able to say, 'Mom!' And I could say, 'Oh yeah! We don't have to call anyone!'"

In the meantime, this parent and others reported they could and often did ask for help—from children's teachers, from family and community members, and from instructors and other parents at parent education programs. Regardless of whether they sought outside help, we found that almost all parents were themselves learning mathematics along the way, whether they were learning math for their children, learning math from their children, or learning math with their children.

Learning for Their Children

One of the primary motivations for many parents to re-engage in mathematical learning has been to enhance their ability to help their school-aged children. They believe their children want, need, and deserve their help. Some parents returned to formal mathematics learning in the form of adult basic education programs and GED classes, and others participated in less formal math settings such as Family Math programming or school-based parent workshops. As Ms. Andrews, the parent of a 5th grader, said,

I now see that I need to learn. I really, I don't like the fact that she doesn't have somebody she can depend on to help her. ... I'd like to be a better help to [my

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daughter]. You know, I really would. And this is why I was going ... for my GED. And so I was, and, and I struggle with math now. ... So that's why I went to school, because I want to be able to help her. Cause I feel bad when she comes home with homework and I don't know it.

Some parents were not interested in developing their general mathematical knowledge but were eager to learn exactly what their children were facing in school. They took it upon themselves to learn more about their child's curriculum and sought information on the internet or in stores selling teachers' materials. One parent reported going into a store and perusing the instructional materials until he found information about his child's curriculum for the appropriate grade level. Not having the money to buy the materials, he had to read the chapters he needed at the store.

Often, the parents did not go outside of their homes to learn the math they needed to help their children. They looked to the materials that came home with the children and tried to follow the explanations or work backwards from answers that were provided. They were motivated to learn so they would be ready and able to help. According to Ms. Donovan, the parent of a 4th grader,

Like, here's partial sums, which I did not learn in school. I learned it because he learned it in Everyday Math. And so, when he was trying to do that homework, I could not have helped him if I hadn't had some explanation of what partial sums were. Because I really, I didn't know what that was.

These and other parents perceived that their own limited mathematics knowledge and unfamiliarity with their children's school curriculum could have negative consequences for their children's learning, and they chose to devote time and effort to learning for the sake of their children.

Learning From Their Children

Some parents see their participation in the homework process as a way of engaging their children in homework, but also as a way of finding out what children are learning in school. During these sessions, they recognize their children's skills and understanding and find that they can learn mathematics from their children. Most of the parents in the study discussed times when their children were teaching them how to do the math. Ms. Andrews, the parent of a 5th grader, shared, "I didn't have a clue. This math, and the way they was doing the problem, I ain't never seen it in my life ... But she [the teacher] showed her [the daughter] how to do it. She knew how to do it. She was showing me how to do it."

Similarly, another said,

I guess it's a learning experience for me too because he's showing me how to do whatever it is he's learning in class. Things I've never seen before. [He] was able to explain to me and then I understood it. He goes, 'No, Mom, like this, like this.' and I was like, 'Oh! I get it.' That's how I understood it through him. He's even gave me ... little math problems for me to do, because they say sometimes, 'Parents should have homework too!'" (Ms. Morton-Jones, parent of a 4th grader)

Many parents shared comments indicating their children were taking the lead in introducing them to new mathematical ideas and procedures. For example, Ms. Churchill, the parent of a 3rd grader, remarked, "Chris probably had to show me what he was doing." However, parents were not always able to grasp what their children were explaining. This may have been because the children had only a fragile understanding themselves or because the parent could not grasp the different ways of calculating or conceptualizing the procedures. One parent, Ms. Gonzalez, sought help from the teacher when her 2nd grade son was unable to help her. According to her,

I asked him, 'How do you do it? Explain to me?' Well, he goes, 'You do it like this.' 'No, no, no, no. Tell me how. Show me how to do it. I want to know what you think, you know?' I actually had to have the teacher write me instructions on it. He did it fine, but he could get frustrated because I wasn't understanding

Most parents did not report feeling embarrassed, ashamed, or denigrated before their children by asking them to explain the math work. They recognized that if they were to be most helpful to their children, getting help from those children was sometimes required. And, regardless of the reason the parents requested explanations from the children, the activity of explaining became a learning opportunity for the children.

Learning With Their Children

Parents who do not approach their children's math homework from a position of confidence and secure knowledge may find that they are learning along with their child. In their interviews, parents describe an egalitarian dynamic, in which both parties are portrayed as learners and teachers, with the activity being mutually beneficial. Sometimes, parents and children encounter mathematical content that the parents believe was not part of their own mathematical learning experience in school. For example, Ms. Gonzalez, the parent of a 2nd grader, reported, "When he does his homework, I learn with him, 'cause a lot of the stuff they're doing now, it's new stuff — like family trees,

number trees. I never heard of that when I was going to school, never.”

Even though a teacher might describe such content as merely a convention used to convey ideas of factors or relationships in a particular curriculum, to the parents these concepts and symbols are unfamiliar and inaccessible at first glance. Together, the parents and children struggle to make sense of and solve the problems in the homework assignments, sometimes benefiting from the experience of older children or other resources as was the case for this family. “He and I would probably sit down and talk about it together, try to figure out how to do it, you know. The majority of the time my daughter would come over and say, ‘Oh you’re doing it wrong.’ Then she’d put her two cents in and we would try to do it her way.” (Ms. Decker, parent of a 3rd grader)

Many of the parents are quite comfortable with the idea that they and their children can learn math together. In fact, when parents were asked if they would be interested in participating in school-sponsored workshops for parents to become more familiar with the children’s math activities, some parents suggested that for such workshops, they would prefer to include the children. For one parent, having her child there would reduce her own anxiety. She noted,

Not just a class for me, but a class where you and your child sit down, and...you know, this is the concept that we’re going over, and this is how it is, and this is how we’re gonna teach it. So that might be helpful.... And it’s only because of, you know, again, me, like, feeling, ‘Oh gosh, would I have to go through that all over again, and sort of like, alone.? And would I have to go through it alone?’ (Ms. Jansen, parent of a 3rd grader)

Clearly, for many of these parents, learning with their children informally and even in more formal, structured settings is perceived to be positive for all parties. No one seemed to fear that his or her parental power, respect or positioning vis a vis the children would be diminished. In fact, they seemed to feel that by engaging with their children, they were responsibly providing the children with the support and commitment expected of good parents.

Discussion

That adults learn mathematics in both formal and informal settings has been well established. Researchers have examined the nature of “informal” learning in work contexts as diverse as carpentry (Milroy, 1992), nursing (Hoyle, Noss & Pozzi, 2001), automobile manufacturing (Smith, 1999) and carpet laying (Masingila, 1994). Yet,

in a study that examined self-initiated informal learning among those with limited educational attainment, participants were not asked about any learning related to children’s homework (Strawn, 2003). Clearly, researchers have not recognized the adult learning opportunities available within the context of parent/child homework activity nor have they examined the nature of adults’ informal mathematics learning that occurs in the home.

Earlier research has demonstrated that parents are motivated to participate in adult education activities outside the home to enhance their ability to help their children with mathematics. But, studies of the nature and benefits of homework have heretofore been relegated only to children’s learning. This study has shown that parents perceive that they are learning mathematics within the home as they work with their children. Further research is needed to explore how the adults integrate their own mathematical understanding with what they learn with and from their children.

Implications for Educators of Adults

Adult educators frequently build instructional activities that draw from contexts that are meaningful for their learners. In teaching mathematics, educators frequently use financial situations such as comparing alternative telephone plans or work related activities, such as pricing or inventory tasks to enable learners to explore mathematical dilemmas and develop mathematical problem solving skills. Clearly, one more context that is important to adults is facilitating children’s mathematics learning.

Adults are learning math in informal ways as they work with their children. And sometimes, the parents recognize that their new mathematics learning could be useful to them beyond being able to help with homework. Regarding partial sums (an addition process involving decomposing numbers relative to their place value and then adding the components together (i.e., $145+328=100+300+40+20+5+8=400+60+13=473$), one parent said:

Um, I think it makes for better head math [laughs a little]. At least for me. I found it to be a helpful skill since I learned it from him. Um, that is, it’s a, it’s a way to do math that sort of maximizes on the easy, the easy addition that you can do in your head. And um, and gives you a chance to estimate probably more quickly, and just build off of those things that come easily, to get to a more complicated answer. (Ms. Donovan, parent of a 4th grader)

Adult educators might consider how they can help adults make connections between their own developing mathematical skills, understandings and experiences and their children’s learning. Parents should be encouraged

to bring in examples of their children's homework, particularly those examples that were difficult or raised questions. By including curriculum materials from local schools as a resource in adult classes, parents and other adult learners can become resources for the children and other parents in the community.

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