Seeing Mathematical Practices in an African American Mother–Child Interaction

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Abstract

This article provides an in-depth analysis of the mathematical ways of thinking present in a 15-minute interaction between an African American mother and her preschool son as they worked together on a craft project as part of a family involvement activity. This analysis, which was conducted as part of a broader ethnographic research project, showed that the mother supported her son in working with a variety of mathematical concepts by making directive statements and referring him to the provided diagram. By engaging in these practices, the child had opportunities to engage with a variety of mathematics described in the kindergarten Common Core State Standards, including solving problems, recognizing and naming 2-dimensional figures, orienting shapes, and attending to precision. This study contributes to recent work that has sought to reconceptualize previous characterizations of family support in mathematics—particularly in relation to low-income and minority families—as lacking and in need of remediation. The purpose of the analysis is not to make broad generalizations about parents and other caregivers, but to provide a model of a strengths-based analysis of a parent–child interaction in mathematics.

Key Words: early childhood, families, mathematics, rural education, parents

Introduction

While much has been made of early achievement gaps in relation to mathematics in both research (Clements & Sarama, 2007; NRC, 2005, 2009;

Starkey & Klein, 2000) and the popular press, a significant strand of work on early numeracy (Baker, Street, & Tomlin, 2006; Seo & Ginsburg, 2004; Street, Baker, & Tomlin, 2008; Tudge & Doucet, 2004) has argued that the differences among different demographic groups of children before school are relatively small. As Street et al. (2008) point out, this raises the question of "why some groups fall behind once they are in school" (p. 6). Some mathematics education researchers have argued that the gap in performance between minority and low-income students and their majority and economically privileged peers may result from different mathematical values and practices in homes and schools as well as educators' inability or unwillingness to capitalize on the mathematical strengths children bring from home (Anderson & Gold, 2006; Baker et al., 2006).

The purpose of this article is to build on this line of work by providing an in-depth analysis of the mathematical ways of thinking present in a 15-minute interaction between an African American mother and her preschool son as they worked together on a craft project as part of a family involvement activity in a rural school. To do this, we draw on the theoretical frame used by Baker et al. (2006) and Street et al. (2008) which focuses attention on mathematical practices, defined as social interactions in which mathematics is the object of attention. Their framework, which they used to examine mathematical learning in the United Kingdom, grew out of work in literacy aimed at recognizing the literacy practices of diverse groups of people (e.g., Heath, 1983). We believe this theoretical frame can be used to analyze mathematical learning to highlight the diverse practices involved in competent mathematical performances as a way of understanding caregivers' mathematical engagements with their children from a strengths-based perspective.

In closely examining the interaction between one mother and her child, the goal is not to generalize to all interactions between African American mothers and their children. As Geertz (1973) has written, the point of ethnographic work is not to show "the world in a teacup" (p. 23). Rather, the goal here is to provide an analytic model for examining informal conversations in order to identify productive mathematical practices caretakers engage in with their children as ways of considering family strengths that may be leveraged for early mathematics learning.

Conceptualizing the Role of Families in Early Mathematics Learning

Historically, researchers concerned with the mathematical development of low-income and minority preschoolers wrote primarily about interventions that were designed to teach parents successful ways of developing the mathematical thinking of their children (Baker, Piotrkowski, & Brooks-Gunn, 1998;

Bryant, Burchinal, Lau, & Sparling, 1994; Starkey & Klein, 2000). Although these studies demonstrated some success improving preschoolers' performance on math assessments, the studies also began with the assumption that researchers and teachers had little to learn from low-income and minority parents.

For example, Bryant et al. (1994) compare children from "better" home environments to those in "poorer" home environments. The line between these two kinds of homes was determined by a survey, which asked about things like number of books in the home, organizational schedules, and family activities. The report about the survey did not address the possibility that families identified as having "poorer" home environments might have had alternative strengths and resources that were not measured by the survey. The authors of the study concluded that "determining how to improve the quality of Head Start child care and home environments are major challenges that still need to be addressed" (Bryant et al., 1994, p. 306). This notion that researchers must work to "improve" family lives makes it difficult to think about low-income and minority families as having strengths that researchers and teachers might tap.

Similarly, other research has focused on discrepancies between the performance of children in low-income and middle-income families, reporting that low-income families do fewer mathematical activities with children (Starkey et al., 1999) and that they play fewer mathematical games (Ramani & Siegler, 2008). Research beyond the fields of mathematics education (e.g., Delpit, 1995; Valencia, 2010) has documented the ways that these sorts of deficit-oriented discourses "systematically marginalize or pathologize difference" (Garcia & Guerra, 2004, p. 154) and has suggested that educators and researchers move toward more strength-based conceptions of children and families.

For example, in social work, Early and GlenMaye (2000) advocated a strengths-based approach to working with families, rather than a problem-based one. While not denying the real challenges of living in the U.S. if you are poor or minoritized, this stance argues that professionals engaging with families are most productive if they begin by recognizing and working from families' strengths. Working from this perspective, Dempsey and Dunst (2004) described positive impacts from interventions based on relationships and shared participation. In mathematics education, Anderson and Gold (2006) in a study of the mathematical practices of low-income, minority children in informal settings, such as game-playing at home and school, wrote:

> Too often, teachers and schools fail to recognize or credit the knowledge, skills, and strategies that children bring with them from home—especially when a child comes from a family background that differs from that of the teacher's in social class, race, or ethnicity. (p. 262)

Researchers are only just beginning to identify home-based knowledge, skills, and strategies that may be useful in early mathematical learning. Studies have identified some funds of knowledge (Gonzalez, Moll, & Amanti, 2005) that families possess which may be drawn on in mathematics classrooms, such as knowledge of gardening (Civil, 2001; see also Goldin, Khasnabis, & Atkins, 2018, in this issue). In addition, Mistretta (2017) found that with support, preservice teachers could learn tools for supporting productive conversations with family members around mathematics. Jay, Rose, and Simmons (2017) found that workshops supported parents in recognizing mathematics in their children's everyday experiences and in questioning narrow, school-centered views of mathematics. However, more work needs to be done that looks not only at the particular knowledge and skills that families in communities may have as a result of their work or home lives, but also at how ways of speaking to and interacting with children in non-majority communities can be seen as sites for building mathematical competence.

More broadly, work on family involvement has found that higher levels of engagement with schools can be particularly protective for minority children and that the best predictor of involvement is the extent to which families feel welcome in schools (Bryan, 2005; Milner, Murray, Farinde, & Delale-O'Connor, 2015; Overstreet, Devine, Bevans, & Efreom, 2005). However, researchers in urban schools have found that when schools emphasize the importance of educational expertise in decision making, many family members feel unwelcome in school buildings (Trotman, 2001; Weiner, 2003). "Often [families] feel as if they lack the knowledge and ability to work effectively with school faculty who are sometimes viewed as unapproachable, hostile bureaucracies," (Trotman, 2001, p. 279).

In contrast to these expert-based conceptions of family involvement, Souto-Manning and Swick (2006) have recommended that schools focus family involvement practices on recognizing strengths and building relationships. Overstreet et al. (2005) found that when schools organized activities for families, they increased caregivers' perceptions of whether they were welcome in the school. The family involvement activity described in the current study provides an opportunity to closely examine caregivers' participation in a school-based event from a strengths-based perspective.

Theoretical Framework

We ground our descriptions of resources available in non-majority families in the theories described by Street et al. (2008) in their work describing numeracy events and practices. Drawing from research in literacy (e.g., Cook-Gumperz, 1986; Heath, 1983) that has sought to document the "boundaries

and barriers [marginalized] children face between formal and informal literacy practices" (2008, p. 18), Street, Baker, and Tomlin used the concept of numeracy practices to focus on the social practices participants bring to bear when engaging with mathematics.

In our study, we use the slightly broader term mathematical practices to indicate a concern with geometric and spatial reasoning as well as thinking related to number. Street et al. (2008) emphasized that describing literacy practices requires not just observation, but ethnographic engagement that allows researchers to make sense of various meanings that participants bring to interactions. Our study, which is located in a broader research project with the community that spans five years, includes three years of preschool observations, observations of afterschool family events, documentation of home mathematics activities, and parent focus groups and interviews. Data collected in these varied contexts provided us with important background information with which to read and interpret the data presented in the current analysis as we sought to understand how the mathematical practices that we observed made sense for our participants given the particular context in which they were enacted.

Creating an Opportunity to Learn from Caregivers

As a result of our theoretical commitment to identifying the resources that young children and their families brought to mathematical learning, we wanted to design an opportunity for us to learn as researchers about how family members at one rural school scaffolded their children's learning in mathematics. To explore caregivers' mathematical practices, we organized a parent math night for the families in the preschool. Our goal in doing so was to present some engaging activities that were likely to allow mathematical concepts to emerge during parent–child interaction with very little support from the teachers and the research team. Our goal was not to teach parents how to recognize mathematics in these activities or to model for them appropriate ways of structuring children's thinking. We chose four activities that we believed would both allow us to see mathematical thinking and would feel familiar to parents: Lego blocks, a scarecrow craft, puzzles, and a math game. In this article, we focus on interactions around the scarecrow craft activity.

We were introduced to this activity in the first year of the study when high school students led a family involvement activity for the preschoolers during the school day. We noticed that the craft offered opportunities to talk about shape names and orientation and provided a chance for children to read a diagram to design their scarecrows. In addition, family members were able to successfully support their children in the making of the craft with little help from either the high school students or the teacher and paraprofessional who worked in the preschool.

Modes of Inquiry

The data reported in this paper comes out of a larger study located within interpretive ethnographic traditions (Eisenhart, 1988; Geertz, 1973). For three years, we studied the mathematical learning of children in a preschool classroom located in one of the most rural counties in the southern United States. The school where the study was located was in the least populous county in the state in a town that was more than an hour's drive from major urban centers. Oliver County Public School was a PK–12 school with fewer than 300 students. Most of the students were African American (approximately 85%), and nearly all students qualified for the free lunch program (approximately 95%). These characteristics made it an ideal setting to study the mathematical learning of underrepresented students in a rural context. All of the names of the participants and of the county and school itself are pseudonyms.

Over three years, we visited the classroom weekly to observe both formal instruction and center time when children engaged in more open-ended play. In total, we observed three cohorts of preschoolers, all of whom turned 4 before August 31 of the year they entered preschool. During these visits, we wrote fieldnotes, audiorecorded conversations, took digital pictures, and collected student work. In the final year, we also took video of children in the classroom. To supplement the written fieldnotes, all audio files were transcribed. All teachers and parents consented to being video- and audiorecorded. Children were asked for assent when they were individually recorded, and the project was approved by our university's Institutional Review Board.

In addition to our work in the classroom, we also organized a parent night during the third year of the study and documented parent–child interactions during that event with video cameras. After the event, we invited parents to do one-on-one interviews at a later date with a member of the research team. The primary data analyzed for this article includes transcripts and fieldnotes of parent–child interactions during the scarecrow activity for two cohorts of children. One cohort ($N = 15$) completed the activity during the school day with the parents and high school students, and the other cohort ($N = 12$) completed it in the evening as part of the parent night. We noticed no significant differences between the two cohorts.

To frame our argument for this article, we present a single transcript of a 15-minute interaction between a mother, Patrice, and her four-year-old son, Markus. In doing so, our goal is to offer readers a deeper sense of the interaction by providing a single conversation, rather than unrelated excerpts. However, we used transcripts of other parent–child interactions as well as some of the interview data to illuminate significant moments in our focal transcript.

Little (2002) did similar work when she chose a short segment of conversation to analyze in her study of collaborative learning in teacher study groups. She noted that "there is crucial strategic value in looking closely at bounded segments of text" (Little, 2002, p. 920) because the "mundane exchanges" of any moment reveal interaction patterns, ways of speaking, and shared values and expectations.

As stated earlier, the goal of this analysis is not to make sweeping generalizations about how parents interact with their children around mathematics. Instead, the goal is to provide a model for identifying productive practices that caregivers used with children to support other researchers in looking for strengths in family interactions. To meet this goal, we began our analysis by asking the following research question: What mathematical practices did children engage in during this craft-making experience, and how did parents support this engagement? (Although we use the more inclusive terms family members and caregivers in many places in this article, all of the interactions we recorded occurred between parents and their children).

Drawing on both transcript and video data, we did a content analysis of the mathematical knowledge and skills represented in the interactions we documented at the family math night, as well as a conversational analysis of the conversational moves used by the parents and children. To complete the analysis we used a qualitative software program to code first for mathematical skills and practices. Then we identified a small set of focal transcripts for closer conversational analysis. Drawing on Tannen (1984), we broke all parent–child conversations into conversational episodes, identifying new episodes primarily through pauses and changes of topic. Within episodes we focused on questions and statements made by parents, coding for different kinds of questions and for the purposes of statements. We also identified and coded for the purposes of gestures used in the communication. We use the focal transcript below to describe the most common content and conversational moves.

The Activity

The scarecrow project was a purchased craft kit that included a paper plate with a smile drawn on and a variety of foam pieces intended to be used for facial features, a hat, and a decoration. The kit included one page of directions (see Figure 1) along with a black-and-white drawing of the finished product. The directions used vocabulary and sentence structures appropriate for adults, rather than young children.

48/4580 Paper Plate Scarecrow Craft Kit
Be sure to have adult supervision if using a hot glue gun for this craft.

1. Glue the brown foam brim to the foam hat. Glue the brown foam circle to the center of the foam sunflower. Glue the green foam leaves to the back of the foam sunflower. Glue the completed sunflower to the hat.
2. To make the hair, fold eight pieces of long yellow felt in half and glue to the backside of the foam hat as shown. To make the bangs, fold four pieces of short yellow felt in half and glue to the backside of the foam hat as shown.
3. Glue the remaining felt strips to the top of the foam hat. Glue the completed hat to the paper plate scarecrow head as shown.
4. Glue the orange foam nose to the center of the scarecrow's face. Glue the red gingham bow to the front of the paper plate.
5. To make the hanger, glue the two ends of the yellow satin ribbon to the back of the foam hat. Allow time for craft to completely dry.

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Figure 1. Directions for scarecrow craft.

Although the foam cut-outs themselves supported some mathematical content, such as the spontaneous identification of shapes and comparisons of length, much of the mathematical content came from negotiating the diagram, which encouraged children to think about the orientation of shapes, spatial reasoning, and recognizing important similarities between the black-and-white diagram and the full-color materials.

The Conversation

Below is the majority of the transcript between one mother and her son. We chose this transcript to highlight for a variety of reasons. First, it included all of the mathematics and conversational moves that we identified across the data set. Second, it was one of the clearest audio recordings we had. Third, it had few unrelated interruptions—such as questions from siblings or conversations among adults. Some parts of the conversation have been summarized instead of quoted.

Patrice showed Markus the black-and-white paper with the directions on it. He looked at it in her hands as she talked.

Patrice: See this page?

Markus nodded.

Patrice: See what's supposed to go at the top? See that triangle?

Patrice pointed to the drawing of the triangle on the paper. Markus looked at it and then at the foam pieces spread out in front of him. He reached for the large brown triangle that was the biggest part of the hat and was supposed to be glued on top.

Patrice: (*Pointing to directions.*) You see how that goes at the top?

Markus put the piece on the top of the scarecrow's head. Patrice picked up the piece that was supposed to serve as the brim.

Patrice: And this. (*Holding the brim piece*.) This goes like that. (*Pointing to the directions*.)

Patrice: (*Picking up a rectangle of perforated yellow foam*.) See this? This is the hair. We got to take these apart. I guess. (*Looking back at the diagram and pulling one of the pieces off.*) Here, you can help me. (*Handing Markus some of the foam*.)

Markus: Where the hair go?

Patrice: Look on the picture and see. (*Handing him the diagram*.) You see? Up under there? (*Pointing to the hair*.)

Markus put down the foam and pickeds up the diagram to study it.

Markus: Under the hat?

Patrice: Yeah. I'll take it apart for you and you can put it on.

Patrice took back the foam and quickly ripped it apart while Markus laid three pieces of foam down over the forehead of the scarecrow and tucked them up under the hat, just like in the picture. He sat back.

Patrice: That's all the hair you want?

Markus: Uh-uh. (*Starting to put more pieces on*.)

Patrice put the strips she had separated into two piles in front of Markus.

Patrice: They got long hair and short hair. (*Picking up the directions*). You can use them so it can look like this, with the short hair in the front and the long hair can go on the back.

Patrice took off the hair that Markus had put on, got a glue stick, and spread glue on the top. She then started to replace the hair.

Patrice: You see. You do the rest of them.

Markus started to lay down more strips of foam across the forehead of the scarecrow.

Patrice: Make sure it sticks now. Press it down.

Markus pressed on the hair.

Patrice: Can you get one more on there?

Markus picked up another strand of hair and placed it in line next to the others.

Markus: Now, you're going to put the long hair on the sides, but you need more glue.

While Patrice got glue from another parent, Markus picked up the paper with the directions on it and traced the long hair on the sides with his finger. Then he looked back at his own scarecrow. Patrice took the glue stick and spread it on the sides and then put more glue on the top of the plate above the hair that had already been glued down.

Patrice: Look at your picture. Remember.

Markus picked up the directions and studied them.

Markus: The triangle goes on top?

Patrice: Uh-huh. How?

Markus pointed to the top of the scarecrow.

Markus: Like that.

Patrice: Uh huh. You show me.

Markus picked up the triangle top the hat and placed it on the scarecrow to match the picture.

Patrice: And then…this. (*Picking up the brim of the hat*).

Without prompting, Markus picked up the directions and looked at them. After a moment he pointed to the bottom of the hat.

Markus: It go right there.

Patrice: Okay.

Patrice put glue on the bottom of the hat, and then Markus put the brim on.

Patrice: What else we got there? (*Picks up directions.*) We need a nose, don't we? You got a nose?

Markus looks at the directions.

Markus: Uh-huh.

Patrice: What kind of nose?

Markus picked up the triangle piece that matched the black-and-white drawing in the directions.

Markus: Orange.

Patrice: Okay. And what kind is it?…What it look like?…Shape.

Markus: That way. (*Holding the triangle so it was oriented the same way as in the picture.*)

Patrice: Triangle, right?

Markus nodded. Patrice put glue in the center of the face, and Markus put the triangle on. The conversation continued as they finished the project.

Mathematical Competencies

This section of the article describes the content of the mathematical thinking in which Markus engaged during his conversation with his mother. The next section will describe the mathematical practices Patrice used to support her son's learning.

Throughout this conversation, Markus demonstrated competencies related to geometric vocabulary, shape recognition, spatial reasoning, and representation. The Common Core State Standards ask that kindergarteners "describe objects in the environment using names of shapes, and describe the relative positions of these objects," "correctly name shapes regardless of their orientations or overall size," and "analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, and parts" (National Governors Association, 2010, p. 12).

In addition, all students are expected to make sense of problems and persevere in solving them and attend to precision. Repeatedly, Markus studied the written diagram presented in the directions to place objects on the paper plate circle that represents the scarecrow's face. He began by placing the large triangle that represented the hat on the top of the paper plate, not only putting it in the correct place, but also orienting the triangle to match the diagram. He went

on to place the brim in the correct place, as well as the hair, the eyes, the nose, the mouth, a flower, and a bow tie (some of which happened in the portion of the transcript not reported).

Making these placements was not simple work for a four-year-old. In the written representation, the picture of the scarecrow was complete, in black-and-white, and much smaller than the craft Markus was making. Thus, to identify the correct piece among the foam cut-outs, Markus had to mentally scale up the black-and-white image, disregard the color, and often transform the orientation of the cut-out to match the image in the diagram. This demonstrated not only competency in reading a written diagram, but also in visualizing to solve geometric problems. In order to make his own scarecrow match the one in the diagram, Markus had to attend to details in order to ensure that the orientation of each shape and the placement of all figures was correct.

Some of the foam cut-outs were regular 2-D figures that preschool children are commonly asked to identify—the center of the flower was a circle, the nose and hat were triangular, and the long and short hair were rectangular. When working, Markus occasionally used the names of these shapes. When talking about the hat, he asked if "the triangle goes on top," and in the unreported part of the conversation, he described the center of the flower as a circle. However, when his mother asked him to identify the shape of the nose, he did not use the word "triangle." He talked instead about its orientation. Because this question is prominent in the conversation (and most closely resembles the kinds of questions preschool teachers typically ask), one might assume that Markus had difficulty using shape names. However, his casual use of the terms in context, as when he asked if the triangle went on top, suggests that this is not the case, and rather, that it was the problem of orientation that he found more interesting at the time.

Another emerging competence demonstrated by Markus in this conversation was his use of the written directions and the visual diagram to direct purposeful activity. In both prompted and unprompted moments, Markus returned to the written directions to make decisions about his craft. This demonstrated his expectation that directions are meaningful and that he was competent to interpret them. This meaning-making around visual images can be seen as a literacy that is increasingly important in an age of technical diagrams and machines. Despite its value, the interpretation of visual images and diagrams is a literacy rarely measured in most standard assessments of preschool and kindergarten readiness.

Caregiver Scaffolding Through Mathematical Practices

Throughout the conversation, Patrice scaffolded her son's emerging mathematical competence in a variety of ways. One practice she used was the making of "see" statements to direct Markus's attention and to model ways of thinking about and performing a task. She introduced the written directions by saying to Markus: "See this page? See what's supposed to go on top? See that triangle?"

In the complete transcript, she told Markus to "see" a dozen times. These statements communicated to Markus what was important. Often, even when the statement was phrased as a question, Patrice did not expect Markus to answer, but instead looked at him to make sure that he understood what she was saying. In that opening question series, after asking Markus "See what's supposed to go at the top?" she did not allow him to reply but continued by directing his attention to triangle. She reinforced this move by pointing to the triangle on the written diagram. She then remained silent while he looked for the corresponding piece among the foam cutouts. When he located the correct piece, she reinforced the connection between the foam cutouts and the diagram by saying: "You see how that goes on top?" which was another question that Markus was not intended to answer (and, in fact, did not answer).

Some might critique Patrice's questioning here as not being sufficiently open-ended or as taking over the thinking for the child. However, her prompts can also be seen as promoting opportunities for Markus to make connections between the black-and-white pictoral representation and the colorful cut-outs and to think about how to arrange his own pieces to mirror the image in the diagram. Later in the conversation, Markus picked up the diagram to decide where to place the hair on his own. It seems likely that he did this because his mother encouraged him to see the diagram as a source of information and provided him with the necessary support he needed to interpret it. In a conversation after the activity, Patrice confirmed that she saw helping Markus read the diagram as an important part of the activity, saying that she didn't want to "just tell him what to do."

Patrice also modeled her work interpreting the written directions as a way of figuring out what to do next. After she picked up the yellow foam that was to be taken apart to make the rectangles for the hair, Patrice looked back at the written directions to make sure her actions were correct. She did not explain this to Markus, but simply engaged in the practice of using a diagram for information. This is a different kind of modeling than the sort often done by teachers of young children. Patrice did not overdramatize her actions, narrate each step, or quiz Markus about what she was doing. Instead, she used the directions for information as an adult. Again, this could be seen as problematic

because the modeling was not made explicit or because she was taking over the work of interpretation for Markus. However, Patrice's practice can also be seen as productive. Patrice's actions demonstrated to Markus that the reading of directions and the interpretation of a diagram is genuinely useful in the adult world, rather than acting as if this was the case. It is in many ways a much more genuine modeling of how adults solve problems in the world.

In addition to examining the mathematical practices present in the interaction, it is also worthwhile to think about the kinds of practices that are not represented here, particularly those that mathematics educators and preschool teachers might expect to see in such an activity. For example, Patrice never asked Markus to count any of the foam cutouts in the project. The only reference to enumeration was when she asked Markus if he could add "one more" hair. (He did.) Stopping to quiz Marcus about how many of each shape he had would have presented an opportunity to practice counting but would have also distracted Marcus from the primary task at hand.

During this activity, both the teacher and the paraprofessional, who were helping children whose parents could not attend, repeatedly asked children to count eyes, noses, and hair. This emphasis is understandable given the focus on counting in many preschool standards and in many of the assessments that are used to make judgments about children. In some ways, Patrice missed an opportunity to help her son practice these often-assessed skills; however, by focusing on the kinds of mathematical practices necessary for the task, she presented an image of mathematics aimed at purposeful activity rather than as one imposed unnecessarily on the world. In similar ways, Patrice did not ever ask Markus to explain his thinking, as many educators might do. There are certainly drawbacks to this; however, it is important not to confuse the articulation of thinking with thinking itself in considering Patrice's ability to support her son's developing mathematical competence.

Another difference between the ways that parents and the educators interacted with children involved the degree of specificity in the directions given to children. For example, like Patrice, most family members directed their children to the diagram when children asked about where to place particular figures, such as the hair or the flower. In contrast, the teacher and the paraprofessional were far more likely to say: "You can do it however you want" or "It's up to you." Like many early childhood educators, both of these women had commitments to supporting children's creativity; however, in this case, the freedom from constraints provided both fewer and less rich opportunities for mathematical thinking.

Children who completed the task with the support of the educators rather than parents were far less likely to be referred to the diagram and thus missed opportunities to both read the diagram and to solve problems such as ensuring

that the orientation of the triangular nose was the same as that on the diagram. Instead, the mathematics that these children engaged in tended to be more rote and less related to the completion of the task, such as naming shapes or counting pieces of hair when prompted to do so. Indeed, the task itself, because of its structure and detailed directions, provided opportunities for a particular kind of mathematical thinking, which may not be present in the art activities often used in progressive classrooms. This is not an argument against the use of open-ended activities, which provide children with many important opportunities for learning, but instead a suggestion that in an effort to value diversity we remain open minded about the possibilities of a variety of tasks and interaction styles.

Conclusion

In discussions of the early achievement gap, the emphasis on counting, reading numerals, sequencing, comparing, and shape identification has created a narrow view of early mathematics. In addition, comparisons between predominantly middle-class teachers and working-class families have led to deficit-oriented understandings of the kinds of supports that some families are able to provide for their children. However, this study demonstrates that family involvement activities that are based on valuing and recognizing the strengths caregivers already have in terms of supporting their children's engagement can both support young children's mathematical growth and can create welcoming environments for families in school buildings.

In terms of research, broader lenses must be used so that we can appropriately value and assess the mathematical competencies that all children bring to school and the mathematical practices used by family members to support their children. The mathematics competencies demonstrated by Markus in this episode were in many ways more sophisticated than those required by many of the preschool assessments often used to label low-income and minority children as behind.

Because making sense of problems, perseverance, and attention to precision are challenging to assess and require close observation to document, they are often less emphasized than practices that are easy to see and assess, such as counting and naming shapes. In addition, the practices his mother engaged in allowed Markus to focus his attention on significant mathematical problems, even though those practices looked and sounded different than the instructional practices typically used by preschool teachers. Systematically looking for diverse mathematical strengths may both broaden our conceptions of young children's mathematical competencies as well as challenge our notions about who is capable of supporting their children's learning.

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