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Organizing a Family Math Night

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Family involvement is something that all schools seek to cultivate, and a number of resources have been created to support these efforts. For example, *A Family's Guide: Fostering Your Child's Success in School Mathematics* (NCTM, 2004) is designed for families and summarizes what today's mathematics classroom is like, offers tips for family members on how to help children develop positive attitudes toward mathematics and presents practical suggestions for doing mathematics at home together. Another similar resource, *Helping Children Learn Mathematics* (NRC, 2002), outlines the important role of parents and other caregivers in supporting mathematics learning, including what it means to become mathematically proficient and what parents and caregivers can do to support these proficiencies.

We know that families are more likely to become involved in the school community when family involvement is encouraged by teachers and administrators (Drummond & Stipel, 2004). One strategy for encouraging family involvement is to host Family Math Nights at the school. While a number of books and articles have been written about Family Math Nights (e.g., Hall & Acri, Kyle, 1995; McIntyre, Miller, & Moore, 2001; Taylor-Cox, 2005), these primarily focus on the games and activities themselves. This paper describes how we planned and coordinated our Family Math Nights, the majority of which were held in high-poverty communities that serve minority populations, and where participation ranged from 200 and 400 family members. We believe our planning and coordination contributed to the success of these events.

Advertising, Recruitment, Incentives, and Funding

Each school designated a teacher or administrator as the organizer for the event. This particular individual did not necessarily need to be a mathematics specialist. The most important qualification is that they were dedicated to ensuring participation in the event by consistently following-up with students and families to encourage their attendance.

An important part of the process of ensuring participation was the design of a flyer to advertise the event. The flyer included logistical information as well as advertising that pizza and door prizes would be available. These flyers were distributed widely in the community as well as sent home with students. Family members were also encouraged to attend the event when dropping off or picking up their children or whenever they were present in the school.

Another important part of the process involved having families RSVP a week before the event in order to have an accurate count for refreshments and door prizes. Families were informed they would receive an additional number of game tickets for the event if they responded by the deadline. One school informed families that completed RSVP forms would be drawn daily from a box of completed forms for daily prizes. This particular strategy resulted in the greatest level of participation for any of the Family Math Night events we hosted.

The funding for an event like this may be of concern to some schools, but these events do not cost an extremely large amount of money to host, and community organizations and businesses are often willing to make contributions.

In addition, Title I funds were often available when these events were held specifically in low-income communities. For our Family Math Nights, our budget included approximately $300 for the supplies needed to construct the games and activities, approximately $400 was spent on pizza and beverages, and about $150 was spent on door prizes. Door prizes consisted of math games that families could play with one another (e.g., SET, 24 Game, Yahtzee). Classroom materials like individual whiteboards as well as other school supplies have been given out as well.

Finally, several of our schools had relationships with local colleges and universities, and as a result, a number of preservice teachers had been placed in these schools. They, too, were involved in the Family Math Nights. They played an important role in helping run the game tables, thus freeing up teachers to talk with family members about the mathematical goals of the game and how similar games could be played at home. This contributed to the engagement of family members while also providing preservice teachers with experience coordinating such events.

Layout and Floor Plan for Event

All of the Family Math Night events were held in the cafeteria of each school. Folding tables were set up along the perimeter of the cafeteria to set up game stations and each table was set up to accommodate folding chairs behind the folding tables for those assigned to run the games. A number of cafeteria-style tables were positioned in the center of the cafeteria where families could eat their pizza and drink their beverages. We found it to be essential that enough space was available around the perimeter of the room for lines to gather at each of the game stations. Figure 1 shows the typical layout of the cafeteria.

Coordination of Games and Raffle

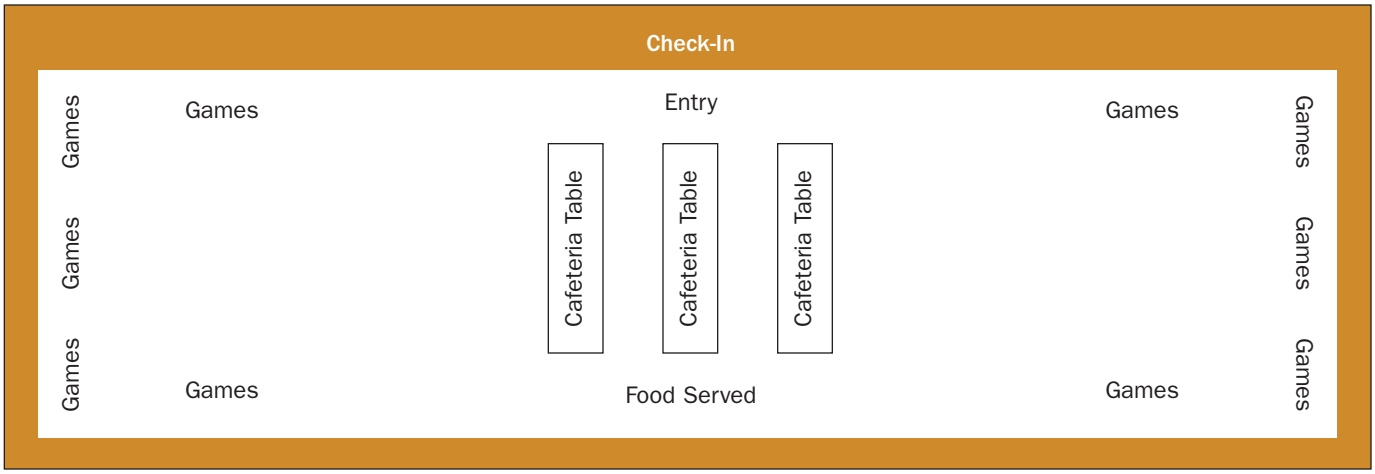
Family Math Nights typically were scheduled to start at 6 or 6:30 p.m. Games were played for about 1 hour and 15 minutes, with an additional 15 minutes spent wrapping things up and getting ready for door prizes. As students and their family members checked in just outside the cafeteria, each student received 10 single blue game tickets, with an additional 15 tickets provided to those who submitted their RSVP forms by the deadline. These tickets provided students with access to the game stations.

Double-portion orange tickets were created for use when students or family members participating in game activities won a game. The winning student or family member was given the "Keep This Coupon" portion of the orange ticket and the person running the game table kept the other half which was filled out with the family members name and contact information. At the end of the evening, tickets were collected from the game stations, and names were called out for prizes. Students and family members proceeded to pick up the door prize of their choice in the order in which they were called.

Description of Games and Handout

Games that were used varied depending upon the grade levels of the students and family members participating in the Family Math Night. Games were also selected in order to target areas of needed improvement based on state assessment data. Parents received a handout for each game that explained how to play the game, identified the mathematics that was addressed by the game, and discussed how the game could be played at home. A list of websites was also provided to help families become more aware of resources available to help support the mathematics learning

Figure 1 – Layout of Cafeteria



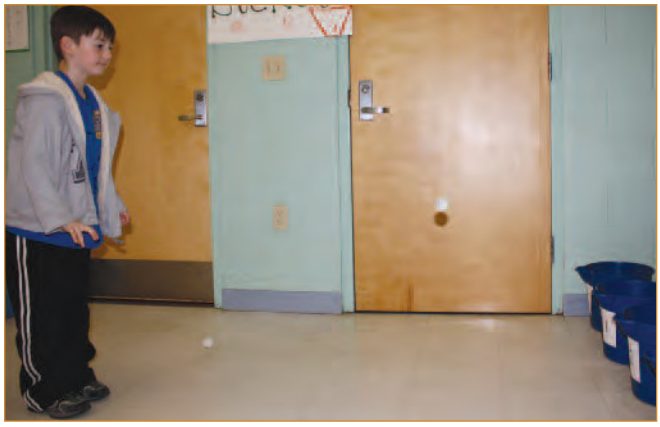
of their children. This included NCTM's Illuminations (http://illuminations.nctm.org/) and Figure This (http://www.figurethis.org/). The eight stations briefly described below provide some examples of the games most frequently used at our Family Math Nights.

STATION 1: ESTIMATION GAME

Players scoop out beans and put them in a cup. They estimate how many beans they think are in the cup and write down their estimate. Players then count the beans by placing them in groups of 10. For example if there are 48 beans, they make 4 piles with 10 beans in each pile and then a pile with 8 beans. Players compare their estimate to the actual count. Depending on their age, they can determine if the estimate is less than/greater than the actual count or find the difference between the two. The purpose of the game is to help strengthen students' number sense and their understanding of our base ten number system. At home, whenever possible, it can be helpful to provide children with the opportunity to count groups of objects by separating them into groups of tens and ones so they can understand that if there are 48 of something, then that means there are 4 tens and 8 ones.

STATION 2: MAKING TEN GAME

Players receive three ping-pong balls and try to get a combination of ping-pong balls to land in buckets (labeled with integers from 0 to 9). The object is to bounce the balls into the buckets to obtain a sum of 10. For example, if one of the ping-pong balls lands in the 8-bucket they can either get two more to land in the 1-bucket or one to land in the 2-bucket and another to land in the 0-bucket. The purpose of this game is to help students think about combinations of 10. For instance, if students get a ball in the "4" bucket, they will have to think about which bucket or buckets they will have to land in to get a total of 10. At home, children can be encouraged to think about number combinations that add to 10 by talking how many more of something you need in order to make ten.



STATION 3: TEN FRAME STATION

This game has a number of variations that can be played depending upon the level of the players. The youngest players are presented with a 10-frame that has a certain number of dots. The person running the game asks several questions, such as "How many dots are there?" or "How many more would I need to make 10?" Older players are presented with multiple 10-frames with various numbers and are asked to add or subtract the numbers. Families are provided with a handout of 10-frame cards so they can use them at home. Using these 10-frames can help children reason about addition and subtraction. For example, given the problem 8 + 5, children can realize that if you have 8, you need 2 more to make 10, and then you have 3 more, which makes 13 (e.g., 8+5 = 8+2+3 = 13). This kind of reasoning helps strengthen understanding without having to rely on memorized information. At home, when doing addition or subtraction, it is helpful try to connect numbers to 10 or groups of 10.

STATION 4 – 24 GAME

Players try to combine four numbers using the operations of addition, subtraction, multiplication, and division to make the number 24. For example, if the numbers were 2, 3, 4, and 6, players could say that (2x6) + (3x4) = 24. This

game is most appropriate for older students and family members who understand all the operations (addition, subtraction, multiplication, and division). The purpose of this game is to developing fluency with addition, subtraction, multiplication, and division. Special 24 Game cards are not necessary to play this game at home. The game can be played by rolling four dice or selecting four cards from a deck of cards, with an ace being treated as 1 and 10 being treated as 0. It is important to note that not all combinations of four numbers can be combined to make 24.

STATION 5 – TANGRAMS

There are two variations to this station depending on the age of the player. Younger children get pre-drawn versions of puzzles where they will need to place the seven Tangram pieces in the appropriate place. Older children have to fill in a given shape without lines to show the pieces. The purpose of this game is to explore how shapes relate to one another and how they can be rotated to make certain designs. At home, these kinds of puzzles help strengthen spatial skills. Tangrams are relatively inexpensive and can be purchased for about $3. There are also online versions available at the following website: http://nlvm.usu.edu/en/nav/frames_asid_112_g_2_t_1.html?open=activities

Families can also make your own Tangrams. For instructions, visit this website: http://mathforum.org/trscavo/tangrams/construct.html

STATION 6 – PLACE VALUE GAME

Players randomly draw numbers from a deck of cards (labeled 0 to 9) or roll a 10-sided die. The goal is to make the largest or smallest number possible, but once you place a number in a location you cannot move it. For example, if you are trying to create the largest two-digit number possible and selected a 7, you could put it in the 10's place. However, if you selected a 9 as your next card, you could not replace the 7 in the 10's place, so the largest number you could make would be 79. This game is most engaging if two or more players compete against each other or compete against the person running the game. Another version of the game includes making the smallest number The purpose of this game is to emphasize place value understanding and to know that each digit in a number does not just represent that digit, but the place value associated with it. Using the language included in the game keeps the focus on place value understanding. Place value understanding can be strengthened at home by finding opportunities to break down numbers into their place value parts, particularly when working with money and making change.

STATION 7 – FRACTION BENCHMARKS

A piece of masking tape, labeled with 0, ¼, ½, ¾, and 1 is spread across the floor. Players flip over a card with a fraction that is not equal to any of the benchmarks and have to jump to the closest benchmark. For example, if a player flipped over a card with 13/24, he or she would try to jump as close to ½ as

possible. The purpose of this game is to learn to compare fractions by relating them to various fraction benchmarks using their reasoning about the relative sizes of numerators and denominators. While cooking together at home, it can useful to discuss any fractions that are used in recipes in terms of nearby fraction benchmarks.

STATION 8 – INTERACTIVE WHITE BOARD STATION

Activities involving white boards are intentionally selected from websites that family members can access at home including the applets available at NCTM Illuminations (http://illuminations. nctm.org).

The purpose of this station is to help parents realize the ample resources that are available online that they can explore with their children at home.

Conclusion

Family Math Nights provide a useful opportunity for administrators and teachers to interact with students and their families in an informal manner. Events like these can provide families with math activities to do at home, they can help family members feel more comfortable asking teachers for suggestions about how to help their children with math at home, and they can also help family members appreciate the importance of the development of mathematical reasoning and sense making. Family Math Nights can also have an impact on teachers' attitudes toward family members, communicating their interest in being involved in the mathematics learning of their children. Events like these can change teachers' and parents' perspectives on new ways to interact with one another. Everyone benefits from participating.

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