

**Family Math Nights:  
A Tool for Fostering Home, School, and University Connections**

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### Abstract

*Numeracy has increasingly become a topic of importance and concern in our contemporary society. Student success in numeracy is influenced by the positive attitudes and values they hold about mathematics. This outreach project sought to foster the development of such attitudes and values through the design, implementation, and evaluation of a Family Math Night. A school division numeracy specialist, school staff, local university professors, and teacher candidates worked collaboratively on the project to hold a Family Math Night at one school in an urban community in southwestern Manitoba, Canada. Just over 20 families of grades 4–6 students attended the event, enjoying a meal together, and learning a variety of mathematics games from a professional mathematics educator, speaker, and author. Data was collected at the end of the event through the use of qualitative parent/family surveys (N=24) that included open-ended questions (available in three languages). Observations were also recorded by members of the collaborative research team at a meeting following the event. Two months after the Family Math Night, qualitative surveys were again distributed to both the parents/families who had attended the event and the teachers of the grades 4–6 students in attendance. Survey responses were received from ten parents/families and five teachers. Thematic and iterative analysis of data from the study suggested that the Family Math Night was successful in terms of: engaging parents and students in numeracy games in a non-threatening, fun atmosphere; promoting numeracy development at home; fostering positive relationships between school, university, and community; and providing teacher candidates with authentic opportunities to plan for and engage with curriculum and community. These findings have implications for practice, suggesting that Family Math Nights are a worthwhile strategy for improving attitudes and values towards mathematics, and for fostering academic and social connections between families, schools and universities. The research article contains four figures, an appendix with survey questions, and seven cited references.*

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Over the past decade, the international (PISA) and national (CMEC Pan-Canadian Assessment), standardized testing results have shown that students in Manitoba have relatively low results in the area of mathematics when compared to the rest of Canada. While the results of these tests must be understood in terms of the complexity of learning and societal factors, they nevertheless have resulted in concern from various stakeholders in the province. Regardless of how much weight we should afford such results, there is always a desire to

improve education, especially in the areas of literacy and numeracy. This is evident in the goals and initiatives cited by Manitoba Education and Training in statements such as the following:

The Manitoba government is committed to ensuring that all Manitobans have the literacy and numeracy foundations they need to lead full and productive lives from cradle to careers. This includes everything from parenting to budgeting, to success in school and the workplace, and active citizenship. (Manitoba Education and Training, 2018, para. 1)

Connections between numeracy skills and an individual's success in school, career, and everyday life are commonly made. The Conference Board of Canada (2018), in its *Employability Skills* list, highlights the importance of numeracy skills for successful employment. Given that numeracy skills are of critical importance to the success of students once they are active adult citizens, the question that arises is how to better support mathematics education to help students acquire the numeracy skills they need. One factor that influences the success of students in numeracy is the understanding and valuing of mathematics. Often the study of mathematics is faced with anxiety and fear. As a result, finding ways to demystify mathematics, foster appreciation for its value, and change negative attitudes about learning mathematics to positive ones are critical goals for educational improvement.

### **What Are Family Math Nights?**

Family Math Nights, first introduced by Stenmark et al. (1986), "are school-sponsored events in which parents, teachers, and students interact around a mathematics curriculum" (Lopez & Donovan, 2009, p. 220). Although the content and structure of these events often vary, the purpose of organizing them is typically the same. According to Jacobbe et al. (2012), "the goal of Family Math Night is to help parents and children have fun and build positive connections with school and mathematics" (p. 1164). By reaching out to the community, and inviting family participation in these events, parents, students, and siblings are able to engage in learning about mathematics (and strategies for strengthening mathematics skills at home) in a non-threatening, supportive environment.

While there has not been a lot of research conducted about Family Math Nights, despite the fact that they have been around for over 30 years (Jacobbe et al., 2012), some literature does exist about their specific use in a few contexts. Such examples illuminate some of the ways in which Family Math Nights have been implemented in school settings. In a 2004 article, Schussheim describes an annual large-scale Family Math Night held for grade 2 and 3 students and parents in a school setting. The event, which had been running for 13 years at the time of the article's publication, ran for 1 hour from 7:30–8:30 pm, and involved two parts. The first part included a math carnival in the cafeteria that involved data collection activities on posters (e.g. hair color, eye color, favorite sports, etc.), as well as 6–7 stations using activities from the *Family Math* book (Stenhouse et al., 1986) run by parent volunteers. The second part of the Family Math Night involved teacher-led activities in 13 different classrooms with 20–25 participants in each room that focused on 5–6 open-ended activities. Participants were encouraged to try the activities and to continue them at home. A sampler of activities and award certificate were also given to each family to keep as part of the event.

In two articles published by Lachance (2007) and Jacobbe et al. (2012), examples of Family Math Night structures that draw on school–university partnerships are described in detail. In the first article, Lachance (2007), a teacher educator, describes being approached by a local elementary school about jointly planning and presenting a Family Math Night. The request led to the creation of a collaborative structure in which teachers and the school organized logistical matters (including such things as the venue, communication and publicizing, door prizes, and refreshments), and the author and her college students organized the mathematics tables. In order to ensure that mathematical learning was of the highest quality, the author created an assignment in her college course that required students to create learning activities based on curricular outcomes and to reflect on their experiences after engaging students in the activities at the Family Math Night. Lachance (2007) described the physical setup of the mathematics tables in her article, noting that the tables were arranged around an open space (a gymnasium or cafeteria) with posters and decorations outlining each activity. Families were assigned a starting table, but were free to move to tables of their choice thereafter. A bell was rung every 15 minutes to encourage families to move to new activity tables.

The second article outlining a Family Math Night structure involving a school–university partnership was written by Jacobbe et al. (2012), and looked specifically at the impact of participation in a Family Math Night on teacher candidates' perceptions of parental involvement. The Family Math Night described in this paper involved a local elementary school serving a predominantly African American community. All of the students from the school were invited to attend with their parents, siblings, and other family members; and food (pizza) and drink were provided free of charge. Teacher candidates ran stations in the cafeteria that engaged participants in mathematics activities for 90 minutes, and tickets were used for participants to win prizes as a result of their participation, creating a carnival–like atmosphere. Finally, resource kits and handouts describing the games were given to families to allow them to engage with the math activities they had learned at home.

While the structure of Family Math Nights in the three examples above varied somewhat, they share some common characteristics, including: a carnival–like atmosphere, math games and activities, an invitation to entire families to participate, food and refreshments, school–based venues, and take–home resources that enabled parents to continue using math activities at home. In addition to providing examples of specific approaches to implementing Family Math Nights, and evidence of common characteristics of such events, the articles described above also noted several benefits of their use. According to Lachance (2007), Family Math Nights allowed children and families to learn about mathematics in a supportive and fun setting; reinforced content being taught at school; allowed college teachers to see teacher candidates working with children; and provided authentic opportunities for teacher candidates to work with parents, recognize diversity and the need for varied instruction, and better appreciate the important role that parents and informal contexts for learning play in education. In addition to these benefits, Jacobbe et al. (2012) noted the following, based on the work of Durmmond and Sitpel, Epstein and Dauber, and Mapp:

These events may help address teachers' (both preservice and inservice) assumptions about the commitment of poor and minority parents to their children's education. And teachers' assumptions matter. When teachers reach out to parents, encourage involvement, and establish a trusting relationship with parents, then parents interact more with teachers and with their children around their schoolwork. (p. 1175)

Family math nights have the potential to foster reciprocal learning as families, students, teachers, college instructors, and teacher candidates learn from engaging with each other. Such interaction invites learning and growth in terms of mathematics instruction; mathematical content and numeracy skills; parental support; pedagogical skills; and beliefs, attitudes, and assumptions about the value of mathematics. As a result, Family Math Nights have tremendous benefit for students, families, school communities, and university communities alike.

### **A Local Family Math Night Project**

This project, funded by a small university/community "Outreach" grant was devised as a means of reaching out to a school community in order to support numeracy development. After discussions with a local school division numeracy specialist, a collaborative project was put into action and a successful grant application made. Ethics approval was then obtained from the university human research ethics committee. Support was provided by the school division and the professional development unit in the university's Faculty of Education. Funding allowed us to employ four teacher candidates in the B.Ed. program as assistants in the project. The project team, including the authors, the teacher candidates, the school division numeracy specialist, along with the Principal, numeracy coach, and some of the staff at a local school, met and a plan was devised to conduct a Family Math Night.

The original idea was to create an event with activities conducted by the student assistants; however, a professional mathematics education author and speaker was available, and it was decided to take advantage of this opportunity. Select students were invited by the school staff and included several immigrant/newcomer families. Criteria for selection of students was determined by the school staff, who decided to limit the choice (to participate) to grades 4–6 and focus on students experiencing some difficulties in numeracy. In all, about 20 students and their families were invited, with about 80 people in attendance. To help with language issues, Spanish and Mandarin translators were on hand. The evening unfolded starting with a meal of chili, buns, and dessert provided by the Education Students Society (the Faculty of Education student council). Sharing a meal together fostered conversation and a fun, family atmosphere. A childcare service was also made available for younger children so that parents could spend quality time with their older children playing numeracy games.

For the remainder of the evening, the speaker led families through a variety of game-based strategies for learning and practicing numeracy skills. The games targeted skills involving logical thinking, basic arithmetic, place value, and comparing and ordering numbers. Typically the speaker described the rationale for playing games, what skills they developed, the rules for playing each game, and a visual demonstration of game play. Families were encouraged to play

the games together, while the teacher candidates, teachers, and faculty researchers in attendance joined in the games and/or circulated to assist with questions. To add to the fun, prizes were given out as each game was debriefed.

At the end of the evening, each family was given a grab bag of pencils, notepads, playing cards, and dice so that some of the games could be played at home. The school also purchased one of the games (available from the presenter’s website) for each family to take home and play. At the conclusion of the project, remaining funds from the grant were used to purchase math games and materials for use in the school.

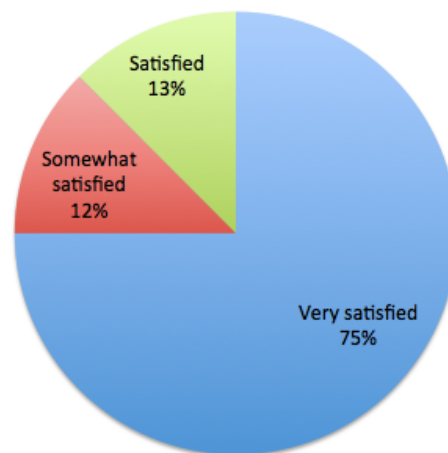
In order to assess the success of the event, data was collected by administering a survey to parent attendees at the end of the evening. The survey was provided in three languages – English, Spanish, and Mandarin. In addition, a meeting was held about one week after the event and research team members shared their observations. A follow up survey, also available in three languages, was administered about two months after the event. At this time both parents and teachers were surveyed. This survey was meant to find out if the math evening had any longer term effects or if it had simply ‘faded away’. Surveys included both Likert style questions and open-ended questions. The information from the surveys and team observations was collated and analyzed using descriptive statistics and by looking for themes in the qualitative data (surveys are included in an appendix at the end of this paper).

### Results and Discussion

The survey that was administered to parents/families at the end of the Family Math Night and had 24 respondents, with just over half being completed in Spanish. The first question, which asked participants about their overall satisfaction, provided favourable feedback as 18 respondents (75%) indicated they were 5 (or very satisfied) with the event (see Figure 1 below).

**Figure 1**

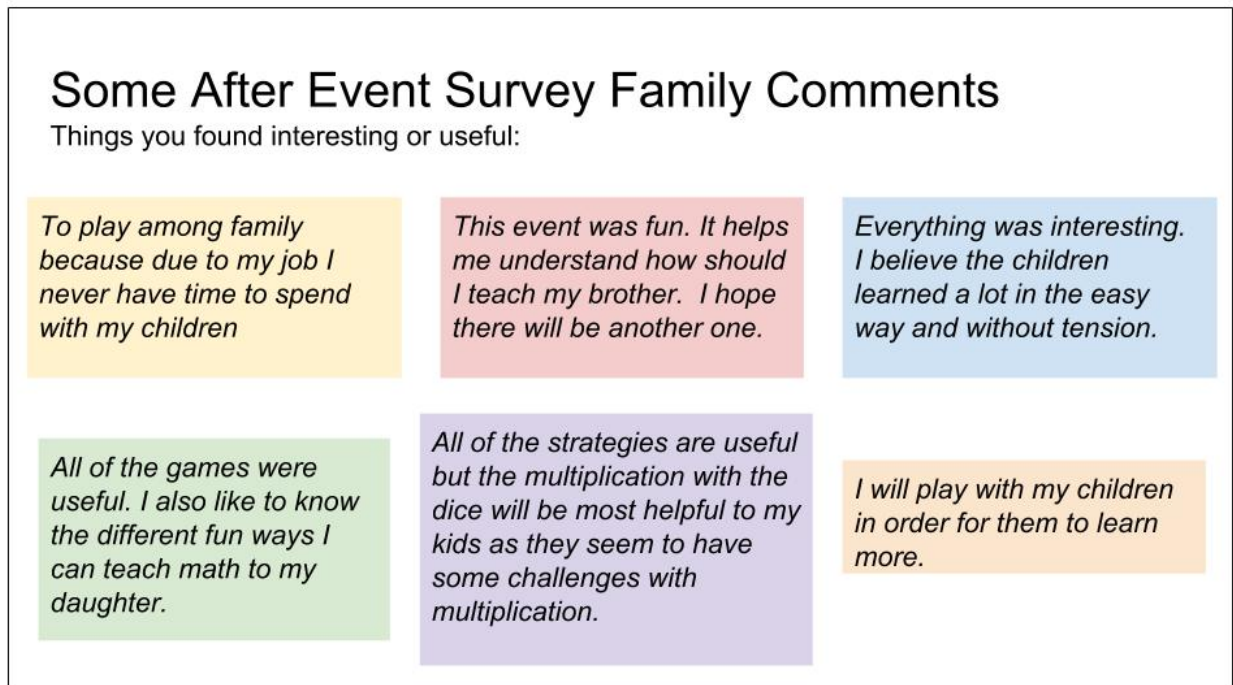
*Survey Responses to Overall Satisfaction with the Numeracy Event*



On the 5–point Likert scale, none of the respondents indicated a score lower than 3 (or satisfied). Similarly on the remaining 6 questions on the survey, all of which required written responses, nearly all of the comments were positive in nature. Figure 2 (below) provides some examples of the comments provided by respondents on the initial survey (administered at the end of the Family Math Night).

**Figure 2**

*Selected Parent Comments from the Post Event Survey*



Evident in the comments made by families, are some of the themes previously described in relation to Family Math Nights. Positive connections with school and mathematics were built in a supportive and fun setting, and parents learned strategies for strengthening mathematics skills at home (Jacobbe et al., 2012; Lachance, 2007).

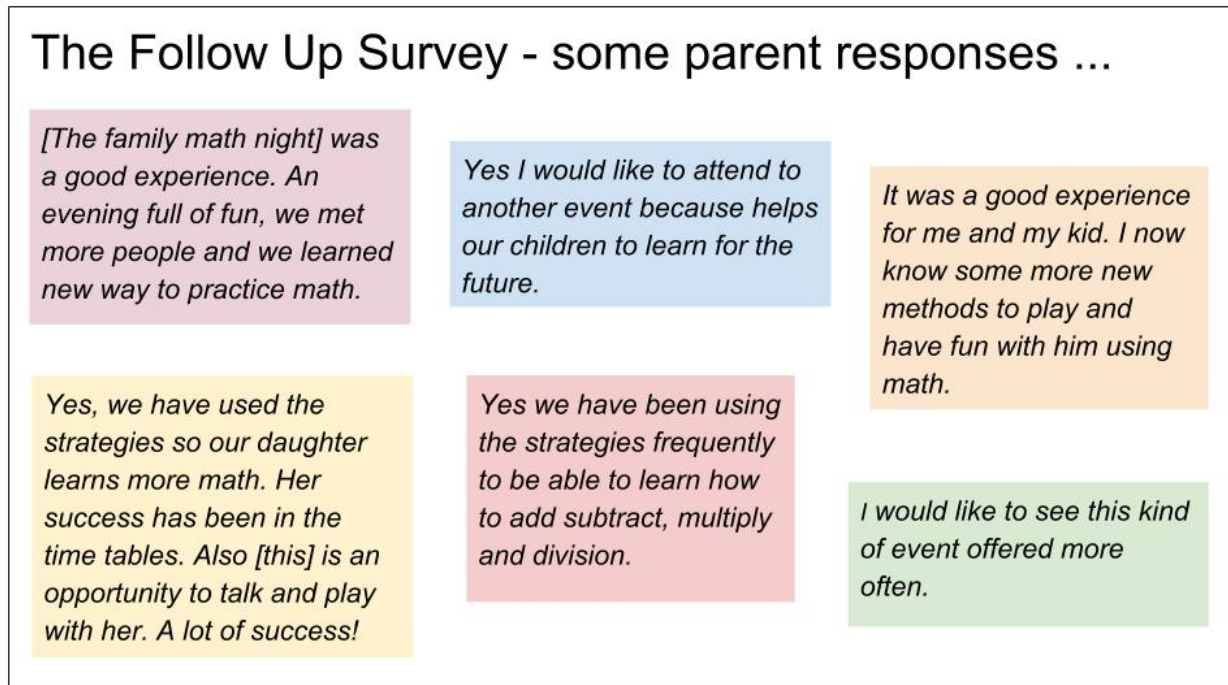
A week or so after the event, the research team gathered to debrief. Reflections about the event were positive, with teachers and teacher candidates noting relationship building, small interactions within families, laughter and engagement as strengths. Again, these observations supported the previous findings of researchers such as Jacobbe et al., (2012) and Lachance (2007). The prizes, supper, childcare, and participation of many staff members were also seen as positive points. The take home grab bag and games were valuable to help encourage continued play at home. A few logistical issues were noted for improvement, for example, everyone being clear on what their job was and timing of the event.

About two months after the Math Night, a follow–up survey was distributed to parents/families who had attended the math night. There were ten respondents to this survey. In addition to the

parent survey, it was decided to survey the teachers who had students involved in the event as well, there were five respondents to this survey. Again, the results were translated as needed and collated.

### Figure 3

*Selected Parent Responses from the Follow-Up Survey*

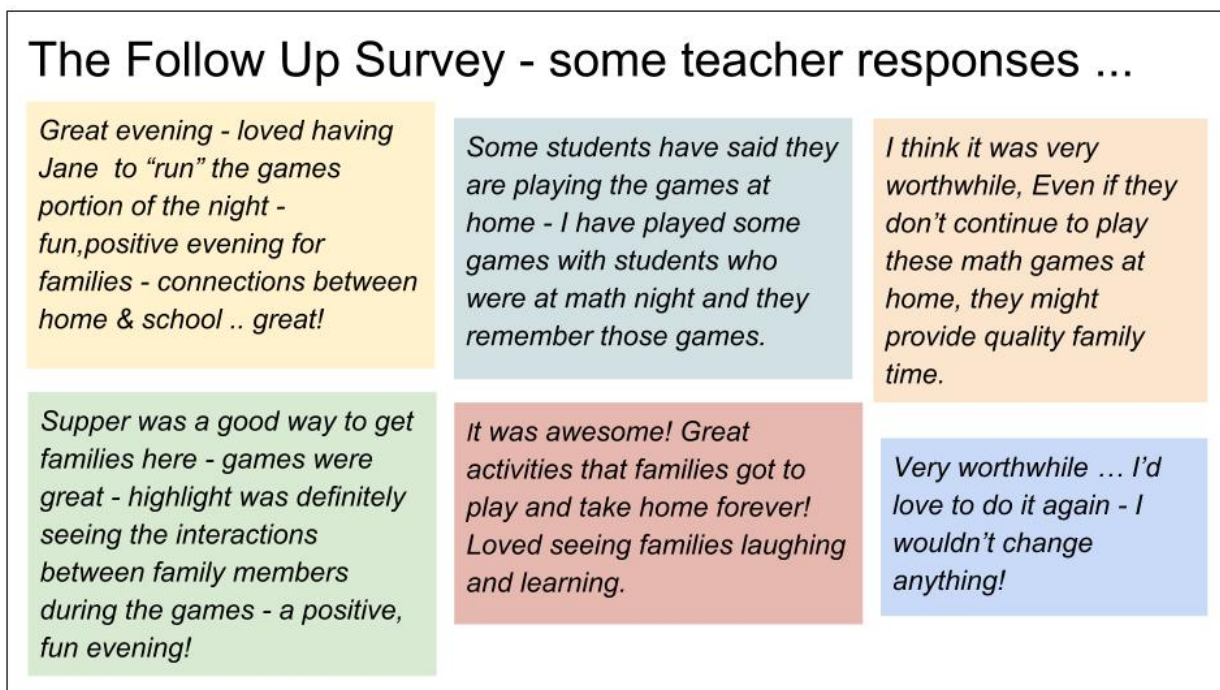


Figures 3 (above) and 4 (below) include a selection of comments from the survey. All respondents, both parent and teacher, found the event a positive one with many wishing to see it occur again. All but one parent respondent reported that they continued to use the strategies at home with their child. When asked for suggestions for future events, most had none; however, one interesting idea was to find a way to encourage more interaction between families. From the teacher perspective, it was interesting to note that many comments were about the social aspect – the smiles, laughter, and relationship building – which indicates the benefits of the event extended far beyond the building of numeracy skills.



**Figure 4**

*Selected Teacher Comments from the Follow-Up Survey*



Comments from parents and teachers on the follow-up survey indicated, again, that connections with families were made in a positive, fun atmosphere (Jacobbe et al., 2012; Lachance, 2007). Moreover, both teachers and parents indicated that strategies were potentially being used at home. While teachers' prior perceptions about parental involvement at home were not surveyed, the teachers' comments seemed to indicate that the event had a positive effect on teacher attitudes and perceptions. This point, which echoes the work of Jacobbe et al. (2012), suggests that Family Math Nights have the potential to foster reciprocal learning as not only did students and parents learn about the school and mathematics strategies for use at home, but the teachers also learned about family dynamics through an authentic experience that brought families and teachers together.

Following the Family Math Night, some students at the school who did not attend the event expressed that they felt left out after hearing several positive comments about the event. The team decided to organize a math afternoon that would include all grades in the school, from kindergarten to grade 8. Another math education professor from the university (not a part of the research team), was instrumental in getting this follow-up event off the ground. About 30 teacher candidates volunteered to help out. Each group prepared a numeracy game suitable for the grade range they had chosen to work with. Entire classes rotated through three different games throughout the afternoon. As the researchers circulated around the school, we observed students at all levels engaged in math learning and having fun. Since this event did not fall under the scope of the original project, feedback was not gathered; however, from the

researchers' perspective, it was evident that it was a successful way to engage the school community and provide a unique experience for many of our pre-service teachers.

As suggested by Lachance (2007), the work teacher candidates did with students as both members of the research team, and as facilitators in the follow-up math afternoon, provided them with authentic opportunities to work with students, parents, and teachers; and a way for them to think about the need for varied instruction and the role of parents within the school and at home. While the teacher candidates were not surveyed about their experiences, due to the fact that the follow-up math afternoon was not part of the original study design, comments from teacher candidates involved with the research team indicated that the experience did impact the perceptions of teacher candidates about diversity, school-parent relationships, and parental involvement in positive ways.

### Conclusion

The local Family Math Night hosted as part of this research project echoes many of the findings authors such as Schussheim (2004), Lachance (2007), and Jacobbe et al. (2012) have previously described. The endeavour fostered positive relationships between school, university, and community; engaged parents and students in curriculum-based mathematics activities in a supportive, non-threatening, and fun atmosphere; and potentially had a positive effect on teacher perceptions of parental involvement and school-parent partnerships. The emergent school-wide follow-up event that occurred also provided teacher candidates with opportunities to plan for and engage with students in an authentic way and opened up dialogue between university and school/division faculty and students in a productive and collaborative manner. The surveys conducted two months after the Family Math Night indicated there was a lasting effect in terms of families continuing to play the games at home, as well as a palpable sense of appreciation for connections made between home and school. Family Math Nights have the potential to foster stronger school, university and community partnerships, as well as a greater appreciation for the value of mathematics and numeracy skills at the local level.

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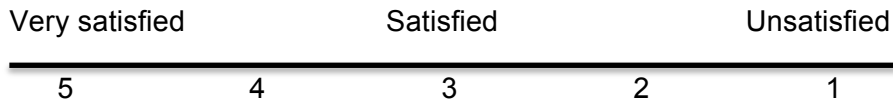
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## Appendix

The survey questions used in this study are included in this appendix. Only English language versions are included.

### Post Event Survey for Parents.

1. Please rate your overall satisfaction with the Numeracy event tonight.



2. Please share one (or more) thing(s) that you found interesting or useful. Why?
3. Please share something that you did not find useful.
4. Please share an idea that you found difficult tonight?
5. Do you have any suggestions that might make this event more beneficial?
6. Will you use any of the strategies or resources presented tonight with your children/grandchild etc.? Please comment or explain which one(s).
7. Do you have any questions about the program or about Numeracy that you did not have a chance to ask?

### Follow Up Survey for Parents

1. Have you used any of the strategies or resources presented at the Numeracy Evening in the past few months? Please comment on the one(s) you have used, how often, and the success or non-success.
2. In retrospect, was attending the Numeracy Evening a worthwhile experience? Please comment.
3. Do you have any suggestions for us if this event was to be repeated in the future?
4. Please add any other comments you may have.

### Follow Up Survey for Teachers

1. Please give your impressions of the Family Math Night. What was good? What could use improvement? What were the highlights for you?
2. Have you noticed any effects of the Family Math Night on students who attended? Consider the following;  
A) Have the students talked about the event?

B) Do you know, based on your interactions with students, if any are using the games/strategies they experienced at home?

C) Have you noticed any gains in numeracy skills or changes in attitudes towards mathematics in these students?

3. In retrospect, was the Family Math Night a worthwhile experience? Please comment on what should change if another event like this was held.
4. Please add any other comments or observations you may have.