Parent Power Nights:
A model for engaging adults/families in learning mathematics

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Abstract

Located on the U.S./México border, The University of Texas at El Paso (UTEP) offers academic programs in K-12 school teacher preparation. Many of the courses integrate parents and families into teacher preparation courses. One example of effective adult/community learning is the "Parent Power Night" (PPN) component. This model builds a learning community (Eaker, DuFour, & Burnette, 2002), engaging university faculty members with pre-service teachers and family members in effective teaching/learning activities. Pre-service teachers are concurrently enrolled in mathematics content and pedagogy courses, taught together in a "block" on the campus of a public school. PPN activities aim to engage parents and community members together with the university students in meaningful investigations of mathematical concepts. Preliminary evidence suggests that, in this predominantly Hispanic, high-poverty area, PPN activities have impacts on participating parents', children's and pre-service teachers' knowledge and attitudes towards mathematics. An unanticipated outcome has been the impact on adults with limited previous formal education; many acquired the knowledge necessary to understand rather sophisticated mathematics concepts their children were learning

in school. The paper will discuss instructional methods used and implications for effective adult/family learning of mathematics content in Hispanic communities.

Key words: adult learning, informal learning, mathematics, Parent Power Nights.

Introduction

Numerous research studies (e.g., Epstein, 2000; Marschall, 2006; Shefelbine, 2006) point to the critical importance of parental involvement in children's cognitive development and academic success. Substantial evidence indicates that consistent parental involvement in mathematics is essential for building a strong foundation for children's learning and strengthens their attitudes towards mathematics (Civil & Andrade, 2002; Kliman, 1999; Sheldon & Epstein, 2005).

Parental involvement, in this paper, will be understood to include any relatives or guardians playing a parental role for the child. Our research model builds on Epstein (2001), who describes the goals and outcomes of parental involvement as a continuum, with specific and clearly defined functions – parenting, communicating, volunteering, learning at home, community collaboration and decision making. Our experience with children, parents, extended family members and caregivers in mathematics focused Parent Power Nights (PPN) sessions allowed us to observe and measure the outcomes of parents learning mathematics informally through active participation in innovative activities together with their children.

While the impacts of parental involvement have attracted attention in recent years and several research studies examine this important dimension of student development, there are gaps in the literature that remain. This paper contributes to the growing body of knowledge about adult learning by means of a school-focused intervention – the Parent Power Night model.

Background

Review of the literature

Our theoretical approach to adult learning is grounded in socio-cultural theory that considers culture to be dynamic and related to social reality. This theoretical construct has direct implications for the innovation discussed here, with a focus on valuing the knowledge and previous life experiences of students and their families (Moll, Amanti, Neff, & Gonzalez, 2005; Velez-Ibanez & Greenberg, 2005).

Our mathematically focused Parent Power Nights were inspired by Family Math Nights and their variations, including ‘Mathematics Fair’ and ‘Mathematics Olympics’ (Reys & Wasman, 1998; Koes & Saab, 2000). The literature describes the goals of these events as providing opportunities to show the fun and non-threatening side of mathematics to parents and children. The projects engaged parents as leaders (Munter, Tinajero & del Campo, 2007) by involving parents during the planning stages. These student-centred events allow participants to have many successful and diverse types of mathematical experiences over a relatively short period of time, enabling parents to learn new concepts and strengthen previous mathematical knowledge.

An important study that discussed parent learning mathematic knowledge (De La Cruz, 2000) described a successful research initiative focused on achieving academic success among Latino and other students from diverse backgrounds. Workshops for families focused on improving mathematics knowledge and parents were encouraged to attend these workshops to help children with their homework. The mathematical activities, games and booklets used in this program were designed as a part of a reform-mathematics curriculum called Children's Math Worlds (CMW, http://www.west.asu.edu/cmw/cmwframe.html).

Chrispeels and Rivero's study (2000) described the ways in which parents learn to see their place in child's education, construct their role of how to be involved, and perceive their efficacy to help their children. Their research helps to clarify some of the factors that tend to limit the participation of Hispanic parents in U.S.A. schools. These authors propose that, if given information about how to be involved and the potential benefits, Hispanic parents will take up new practices and modify their concepts of parenting and their place in their child's education.

Another study (Peña, 2000) points out specific concerns and barriers that prevent successful parent involvement. The factors that this author uncovers include the following: a) limited systematic preparation for future teachers about family involvement and, b) tensions arising from cultural miscommunication between professionally trained educators and parents with limited formal education.

Hispanic parents' non-involvement in education may be a function of language, culture, and socioeconomic barriers, limited educational background, and the parents' own negative school experiences. Mexican American families often tend to view the academic development of a child as solely as a function of the school with which they should better not interfere. Some parents are afraid to interfere in teachers' professional duties. Other barriers to parental involvement include parents' work schedules, and limited knowledge about U.S. school policies/procedures.

The context

The University of Texas at El Paso's (UTEP) College of Education and College of Science are partners in pre-service teachers' education. Faculty from both colleges have been involved in team teaching, affirming the importance of parental involvement in establishing partnership between teachers, future teachers and university faculty. In this U.S./México border community, continuous involvement of parents and extended families in K-12 classrooms, after school activities and Parent Power Nights have been beneficial.

UTEP's Field-Based Teacher Preparation Program provides opportunities for university students and faculty members to interact directly with schools and communities. The program model is characterized by several unique features that recognize that experiential forms of education, such as internships and service-learning, offer powerful possibilities for college students to learn democratic skills. Professional development school (PDS) sites, in nearby border locations, provide unique opportunities for students to try out new practices, document outcomes, and reflect on lessons learned (Teitel, 2003). This program prioritizes the community and families as full partners in teacher preparation. Pre-service teachers combine theory with practice in their role as school interns through a variety of programs designed collaboratively, in which: a) a significant portion of pre-service teachers' course work takes place in the community and its schools, and; b) public school personnel and community members work closely with University faculty to design, implement, and evaluate pre-service teachers' efforts to serve the diverse needs of this region. A key feature of this program model is the emphasis on University faculty members' work in collaboration with K-12 school personnel to create opportunities for pre-service teachers to become meaningfully involved in effective parent-school collaboration.

Mathematics for future teachers

During their senior year, UTEP's pre-service teachers enrol in internship semesters at local elementary schools while concurrently taking courses in mathematics methods and mathematics content. One of the primary goals of the senior-level undergraduate mathematics

content/methods courses is to provide capstone-type mathematics classes for future teachers, while significantly increasing their understanding of pedagogical content knowledge. The two classes are offered together (back to back) to provide intrinsic connections between abstract mathematics concepts and applied pedagogical practices. The scheduling also provides great opportunities for team-teaching of these classes.

However, several challenges faced us in teaching the mathematics content and pedagogy courses in this field-based context. As a team, we have worked collaboratively to plan appropriate instruction and field experiences for pre-service teachers with widely varying mathematical backgrounds. Many of these pre-service teachers had never experienced active engagement in mathematical learning, and thus viewed mathematics as boring and unnecessary. Furthermore, many had developed stereotypical concepts of parental roles, particularly in low-income communities. In this context, the authors decided to incorporate the Parent Power Night model, focused on mathematics in these students' senior study.

In this study we worked with the Canutillo Independent School District (CISD). Canutillo, TX is an unincorporated rural community in the far west end of El Paso County just outside El Paso city limits. Of the 90% Hispanic population in Canutillo, 75% speak Spanish in the home. One hundred percent of CISD elementary school students receive free and reduced lunch. Munter (2004) describes previous and ongoing work at Canutillo developing a culturally relevant set of school-based programs within a service-learning framework; examples described in her work include a Mayan math/culture project and Parent Power Nights with parents, children and pre-service teachers working together on mathematically and culturally rich activities.

The Parent Power Nights (PPN) intervention

Objectives

The PPN model (see Figure 1) aims to engage pre-service teacher education students and in-service teachers with parents in open communication. By engaging parents and children in these activities, pre-service teachers have unique opportunities to interact with children and parents in teams, enabling parents to learn key elementary mathematics concepts and skills necessary to assist children in their learning at home. Both pre-service teachers and parents' goal is to promote student achievement. The structure and objectives of these events is consistent with and supported by NCTM (2000), which makes clear the value and importance of engaging and involving parents in school goals.

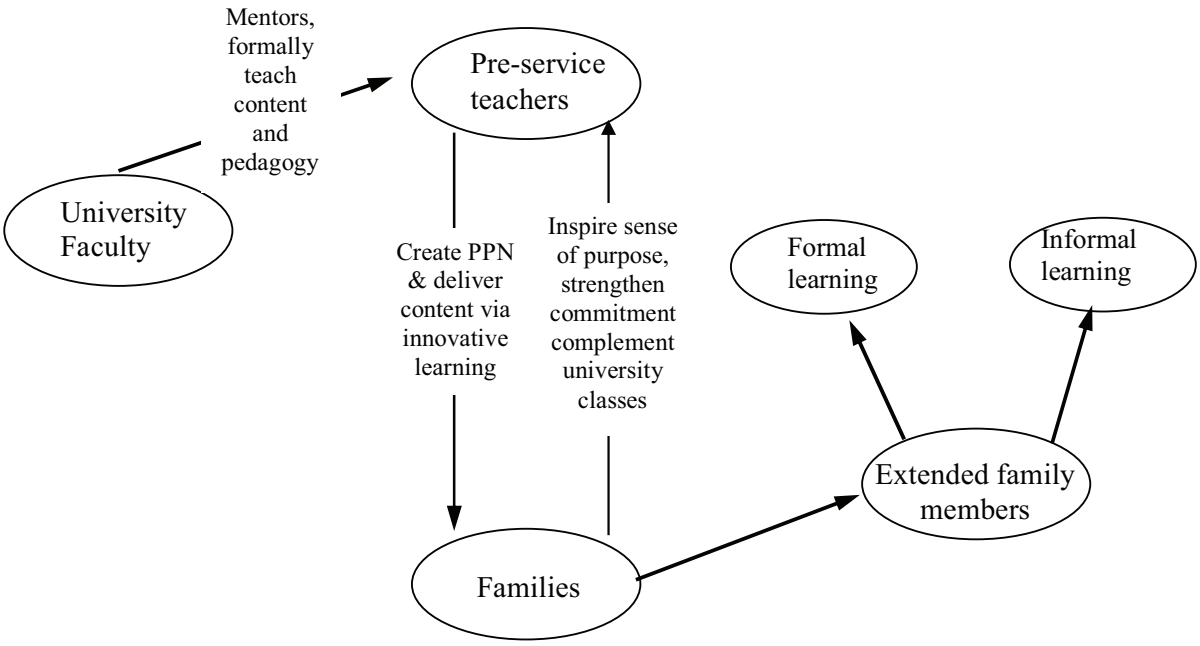

Figure 1. Diagram describing PPN model.

The preparation phase

During the preparation phase, pre-service teachers work as teams to design various hands-on, engaging elementary school mathematics projects that parents and children can complete in 20 minutes or less. The activities are developed from the mathematical content that pre-service teachers have learned in their mathematics class, the pedagogical approaches from mathematics methods class, and observations of expert teachers in the field-based internship. The field-based program allowed pre-service teachers to observe innovative mathematics teaching in action (e.g., see Aceves, 2004). Students were free to choose the mathematical topic for their activities, and they worked on preparing and practicing their projects in class with their mathematics and education professors/instructors.

Implementation

Our first PPN event was organized and implemented in Fall 2001. Since then, we have organized one or two Parent Power Nights each semester. Parents are informed about dates for upcoming PPN events through PTA meetings and flyers distributed in schools. A typical PPN event attracts between 40 and 130 adult participants. Events are conducted in selected elementary schools, with activities set up in individual classrooms and in the school cafeteria.

Snapshot of a "themed" PPN

Pi (π) day: A special vehicle for PPN

For two decades at least, math clubs and museums around the country have been celebrating March 14 as "Pi (π) Day", because the calendar date (3-14) corresponds to the beginning of this

special number. While the event centres around the number pi, it is more generally a vehicle to celebrate the creativity, usefulness, and beauty of mathematics all around us in the real world, and so has served as a natural vehicle for Parent Power Nights in a local school district. We built upon the ideas of Lesser (2004), who maintains a Pi Day resource page at: www.math.utep.edu/Faculty/lesser/piday.html.

In one activity led by pre-service teachers, families compared numbers of stars they can place around the circle, and across the circle. They did this for different circles. For each circle they computed how many more stars would go around the circle versus across the circle (see Figure 2).

Figure 2. Discovering pi activity: using stars to measure around and across the circle.

In another activity they used string to measure across and around the circle; then they also used strings and beads to do similar comparisons (see Figures 3 and 4).

Figure 3. Discovering pi activity: using string to measure around and across the circle.

Figure 4. Discovering pi activity: using beads to measure around and across the circle.

In a more advanced activity (see Figure 5), pre-service teachers made cylinders from kitchen cones that had both the same height and the same base. Each cone and cylinder was decorated in the same colour to make it easier to tell which cone and cylinder went together. The children were asked whether they thought the cone or cylinder would hold more. Here is an excerpt from a pre-service teacher reflection paper:

> I wanted the children to notice that it took around three full cones to equal one cylinder. This three to one ratio was also being used in another of my group members' activities. I wanted the students to see that this relationship or ratio applied to more than just plain circles. I wanted the students to be able to see PI in more places than just circles.

Figure 5. Discovering pi activity (using cylinders and cones).

Other activities made use of innovative Tablet PC technologies. Tablet PC's are fully functional PC's running an enhanced version of Windows XP Professional. One of their most interesting features is the "digital ink" that allows a user to write on the screen using a stylus pen. The same pen is also used as a mouse. The Tablet PCs were used as ways of organizing interactive self-learning. Pre-service teachers created a PowerPoint presentation enhanced with

animation features. The presentation started with a circle, followed by stars flying across. The participant would count the stars, and then he/she would be asked to estimate how many stars would fit around the circle. After that stars landed on the circle itself, with clear colour distinctions showing approximately three times more than the initial count of the stars (see Figure 6).

Figure 6. Discovering pi activity (using Tablet PCs).

The Pi Day events we have organized at various schools in El Paso County have involved a coming together not only of that school's students and teachers, but also of parents in the community. When we facilitated Canutillo Elementary School's debut Pi Day event in 2006, we involved not only UTEP pre-service teachers, Canutillo teachers, and Canutillo students, but also a fair number of adults from the community, and this particular Pi Day event attracted media coverage by the *El Paso Times*, CBS-affiliate KDBC-TV and Univision. As a vehicle for further outreach to adults, Lesser wrote a radio script for Pi Day that was broadcast multiple times for the Centennial Museum's Desert Diaries program on KTEP 88.5 FM. The script not only made natural and cultural history connections to pi but also initiated the creation of a "math category" of subsequent scripts for the radio program. Also, a pi song was published in the Winter 2007 *The Problem Solver*, a math newsletter for adult educators in Massachusetts.

A qualitative study

Methodology

The theoretical framework was purposefully non-experimental. Many researchers in education operate from a belief system which says that teaching cannot be studied by reducing it solely to objective measures (e.g., behavioural outcomes, summative evaluations or test scores). This methodological approach allowed new questions to emerge from the data, taking into account the contextual nature within which both researchers and the research phenomena exist (Lancy, 2001; Lincoln & Guba, 2000; Patton, 2002). Data for the study were collected during Parent Power Night (PPN) events, primarily through participant observation by the project research team, together with structured and semi-structured interviews of self-selected participants (i.e., participation was voluntary). Parents consistently demonstrated high levels of motivation and engaged in active learning with their children throughout the lifetime of the project. The

involvement and collaboration of these adults as full partners in these learning events extended to the research components of the project as well. In several instances throughout the data collection phases, they shared their opinions and reflections on topics such as their views on the importance of working with children at home on their assignments; and teaching/learning activities besides homework that are happening at home. Researchers asked how often parents visit the school and for what purpose(s), and which barriers were preventing them from coaching their children to their fullest potential.

Data collection was ongoing throughout the lifetime of the study. The nature of the project encouraged collaborative learning at every level. Early in the study, the research team developed an open-ended research design that focused on documentation of impacts of the PPN experience, particularly in relation to learners' content knowledge acquisition. We had no preconceived notions about what kinds of effects diverse project participants might share with us. As interview followed interview, a commonality began to emerge among the various experiences. That is, although the primary goals focused on K-6 student performance objectives, it became clear that a number of unintended outcomes were surfacing. A prime example of this is encapsulated in the attitudinal changes of parents (and other adults) towards learning mathematics, demonstrated through statements such as the following: "I believe that it is critical for parents to be involved in Math learning because it [mathematics activity] shows the children that Math can be used in everyday life. The children will see what the parents do."

We worked with a two-tiered sample for the data collection processes in this project. One-on-one and small-group interviews were held with a group of 23 people consisting of university students, K-12 teachers, parents and children who were involved with Parent Power Night activities over a period of 12 months. A smaller self-selected subgroup worked with us in greater detail and with more intensity, engaging in in-depth discussion of the research project and data analysis processes. This group consisted of participants who were involved during the last year of the project and were willing to spend more time and attention on the research project as it unfolded.

Triangulation was incorporated into the design of the study to ensure credibility (see Patton 2002). This can mean using several kinds of methods or data, including using both quantitative and qualitative approaches. In this study, qualitative data were collected to explore the views and perspectives of perspectives of diverse individuals involved in Parent Power Night events in a K-16 partnership on the U.S./Mexico border. The research design of the study involved collecting qualitative data at the baseline (Year 1) and at the conclusion (Year 5) to gain a deeper understanding of barriers to parental involvement in this predominantly Hispanic community, to understand participants' experiences during the intervention (i.e., PPN events), and to explore key elements of the PPN events that had effectively brought about change over time.

Informal learning of mathematics via PPN

In this paper we will follow the definition of informal learning provided by the National Science Foundation (NSF):

> Informal learning happens throughout people's lives in a highly personalized manner based on their particular needs, interests, and past experiences. This type of multi-faceted learning is voluntary, self-directed, and often mediated within a social context (Falk, Dierking, & Foutz, 2007); it provides an experiential base and motivation for further activity and subsequent learning.
> (National Science Foundation, 2008).

We argue that Parent Power Nights provided truly informal learning environments for all the participants -- parents, their children and adult pre-service teachers. While the environment was in a school building, these events took place outside the hours of the regularly scheduled instructional day. The learning happening at these events was voluntary and self-directed. We observed high levels of engagement from all participants. The adults we worked with typically came with low-education backgrounds. Parents were encouraged to participate in mathematics explorations with their children. They were not intimidated by lack of mathematical knowledge, and they often asked questions. Sometimes we had situations when it was a child who was teaching their parents about mathematics. The mathematical activities were prepared for multi-age groups, so participants with more advanced mathematical knowledge would be provided with more advanced mathematical activities.

Typical actual comments from parents who participated in PPN in 2006 were: “I had no idea that learning could be so simple when it is explained in a different perspective” and “Learning activities presented tonight for the children and parents learning were exceptional”.

UTEP pre-service teachers, however, are also members of the adult population. The age of traditional undergraduate students is considered to be 18-23 (e.g., Justice & Dornan, 2001), while the average age of UTEP undergraduates is 23.7. Literature reports that there is evidence that this group has different aptitudes, and motivations for learning compared to the traditional-age students (Kasworm, 1990) and despite family and career demands, older students achieve at levels comparable to younger students (Kasworm, 1990). Previous academic experiences and life experiences, demands of career and family affect knowledge and abilities of older students (Donaldson & Graham, 1999). Important factors are cognitive developmental changes in older students (Granott, 1998). Richardson (1994, 1995) found that older students were more likely to adopt a focus on deeper understanding while younger students were more inclined to study on the surface level and focus on test preparation approach and rote learning. Mature students reported increased use of higher-level cognitive strategies in their learning (Justice & Dornan, 2001). The relevant conclusions of this study suggest that courses with a majority of non-tradional students should be developed in such a way that students have opportunities to learn subjects with deeper understanding and not just rote learning.

These findings applied to the study of mathematics and mathematics methods by non-traditional-age students go hand-in-hand with recommendations we followed when designing our courses in mathematics methods and mathematics content. One of the primary goals of these courses was to provide capstone-type mathematics classes for future teachers, and significantly increase students' understanding of the mathematics concepts and mathematics pedagogy.

In connecting mathematics and mathematics pedagogy we had to take into account intrinsic intertwined nature of these subjects. Ball and Bass (2000) describe the work of professional mathematician as a very efficient way to "compress" information. For example, an observer collects data, and the mathematician comes up with a formula for the function that describes this data. The task of a mathematics teacher is quite different. He/she needs to proceed with "decompression", that is, not just present a formula, but use multiple representations and different contexts to explain ("expand") the formula. (Ball & Bass, 2000). As described in Ball & Bass (2000, p. 98):

> [O]ne needs to be able to deconstruct one's own mathematical knowledge into less polished and final form, where elemental components are accessible and visible. We refer to this as decompression. Paradoxically, most personal knowledge of subject matter, which is desirably and usefully compressed, can be ironically inadequate for teaching. In fact, mathematics in which compression is central…. Because teachers must be able to work with content for students in its growing, not finished, state, they must be able to do something perverse: work backward from mature and compressed understanding of the content to unpack its constituent elements.

Our pre-service teachers' grade-point average indicated that their previous mathematics classes was quite low, between 2.3 and 2.5 (for different semesters). In the beginning of semester, they typically displayed negative attitudes toward the study of mathematics, and towards using new reform approaches to teaching mathematics. Lesser (2005, p. 1) says:

> Pre-service elementary teachers often have poor attitudes and/or poor backgrounds in mathematics. For example, on item #13 from the UTEP Student Evaluation at the end of the author's recent course for pre-service elementary teachers (n = 27 students responding; 3 were absent that day), we learned that 100% of the students were taking this course to fulfil a requirement, rather than as an elective or for their own interest. We also see (on item #12) that before taking the course, students' level of interest in the subject was reported as: 0% "high", 7.4% average, 70.4% low, and 22.2% unsure.

Pre-service teachers' experiences in designing mathematical activities and conducting these activities during PPNs provided them with a great opportunity to conduct teaching mathematics not in the formal classroom setting. They were able to see the significance of focusing on the process of mathematical learning as opposed to focusing on outcomes such as test scores. Their satisfaction with the mathematics course increased. We can find in Lesser (2005) the following statistics:

> Despite the fact that students had very low interest or desire when the class began … the overall rating of the course was: 74.1% excellent, 14.8% good, 7.4% satisfactory, 3.7% poor, 0% very poor. The overall rating of the instructor: 81.5% excellent, 7.4% good, 7.4% satisfactory, 0% poor, 3.7% very poor.

A former pre-service teacher, an organizer of PPN in 2004 (and now a successful in-service teacher), reflects in writing:

> As an intern I had the opportunity to interact and discover new methods and strategies to become a better teacher. The purpose of this Parent Power Nights was to show parents the importance of learning together with their children. For me it was a great experience because just knowing that many parents eager to learn would come or parents that just wanted to have a good time would actually take the time to attend.

Results: Family collaborations motivate parents' further engagement and learning

Two samples of parent populations were selected for analysis. The group called Year 1 consisted from the parents from the first cohort and they participated in PPN in 2001. The group called Year 5 consisted from parents from the last cohort and they participated in PPN in 2005. Due to resource constraints that did not support collecting data continuously, a decision was made to collect data only for those two years in order better to see accumulated effects of impact as the program evolved. Tables below provide the information about interview responses. Semi-structured interviews were conducted at the end of Parent Power Nights.

Interview questions addressed a wide variety of issues. We will describe some of the answers that support our observation about influence of collaborative PPN learning environment and parent participation on their further engagement in learning, and specifically learning mathematics (both formally and informally).

Table 1. Age of Parents

Age	Year 1 (44)	Year 5 (31)
Under 18	2.2% (1)	3.2% (1)
19 – 24	2.2% (1)	0% (0)
25 – 29	22.7% (10)	6.5% (2)
30 – 35	34.1% (15)	29.0% (9)
36 – 40	18.2% (8)	38.7% (12)
41 – 45	15.9% (7)	16.1% (5)
46 – 50	2.3% (1)	6.5% (2)
51 and older	2.3% (1)	0% (0)

As shown in Table 1, the majority of parents from Year 1 were younger parents, 61% were people of 35 years or younger. In Group 2 (referred to in the Tables as Year 5) we had older parents, 61% of them were older than 35.

Table 2. Responses to question: "How important do you feel it is to work with your child on his/her school assignments?"

	Year 1 (46)	Year 5 (34)
Very Important	97.8% (45)	97.1% (33)
Important/somewhat important	2.2% (1)	2.9% (1)
Not Important/Not very importar	0% (0)	0% (0)
Uncertain	0% (0)	0% (0)

Table 3. Responses to question: "How often do you work with your child on his/her homework after school?"

	Year 1 (45)	Year 5 (34)
Everyday	88.9% (40)	44.1% (15)
Once or twice a week	2.2% (1)	23.5% (8)
Not very often	6.7% (3)	17.6% (6)
Never	0% (0)	2.9% (1)
Other	2.2% (1)	11.8% (4)

A significant majority of parents in both groups expressed their belief about importance of being involved in working together with children on homework assignments (97.8% in Year 1, and 97.1 % in Year 5, see Table 2). The majority of parents from Year 1 spent every day with a child working on homework assignment. Only 44% of parents from last cohort worked with a child every day (see Table 3). To understand this change we should look at the description of the barriers that parents described (see Table 4).

Table 4. Responses to question: "If you and your child do not read/study together, what are some of the barriers that prevent you from coaching your child in his/her studies?"

	Year 1 (15)	Year 5 (14)
Work schedule or studies	60.0% (9)	35.7% (5)
Language problems	6.7% (1)	42.9% (6)
Younger siblings	20.0% (3)	0,0% (0)
Other	13.3% (2)	21.4% (3)

For parents from Year 1, these were work or their own study schedule, followed by the need to spend time with younger siblings. For parents from Year 5, the most significant barrier was language problems.

Table 5. Responses to question: "Describe some of the other teaching/learning activities you engage in at home with your child."

	Year 1 (39)	Year 5 (19)
Reinforcing learning of Spanish	12.8% (5)	0% (0)
Reinforcing writing and reading	38.5% (15)	31.6% (6)
Reinforcing math	15.4% (6)	10.5% (2)
Outdoor and sports activities	12.8% (5)	15.8% (3)
Puzzles and computer games	12.8% (5)	0% (0)
Play activities	7.7% (3)	0% (0)
Help study for exams	0% (0)	10.5% (2)
Other community programs	0% (0)	31.6% (6)

**Parents responded with multiple answers*

When asked to describe type of teaching/learning activities parents practiced at home, we can see that parents considered mathematics related activities as important activities they could be engaged with children at home. Parents from Year 1 were more enthusiastic about these types of activities: 28% of home activities mentioned were related to mathematics, puzzles and computer games. However, writing and reading activities were bigger priorities for both groups of parents. One parent described mathematics related activities conducted at home as:

> For example ….Math games in the car – especially multiplication. Word games and I Spy or other car games …. I try to teach them to observe the world they live in and learn how it affects them.

Another parent described how they taught their child "practical life" experiences such as "Bank/Change" games that helped the child with their counting.

During Parent Power Night, parents were involved in advanced mathematical activities. In his comments one parent specifically stressed how important it is to continue to "challenge a child for problem solving or further investigation."

Table 6. Responses to question: "If you could change things in the school-community relationship, what would you change?" (Year 1 = 15 parents, Year 5 = 23 parents*)

	Year 1 (28)		Year 5 (34)	
Language	0%	(0)	11.8%	(4)
Scheduling	7.1%	(2)	5.9%	(2)
Opportunities to learn	25.0%	(7)	23.5%	(8)
Communication	42.9%	(12)	20.6%	(7)
More parent participation	3.6%	(1)	2.9%	(1)
More activities for the students	0%	(0)	2.9%	(1)
More monitoring of students	0%	(0)	2.9%	(1)
Would not change anything	17.9%	(5)	17.6%	(6)
Other not specified	3.6%	(1)	11.8%	(4)

**Parents responded with multiple answers*

We also observe that in their responses both groups of parents (25% from Year 1 and 24% from Year 5) indicated that creating more opportunities for learning would strengthen the school-community relationship (see Table 6). We interpret this as an indication of interest to be involved in more adult learning opportunities provided by school.

One parent commented (regarding the importance of creating more opportunities to learn) that "because if parents learn they will … [understand] and value how important it is for parents to be involved."

Table 7. Responses to question: "What are some of the purposes of your visits to your child's school?" (Year 1 = 27 parents, Year 5 = 43 parents*)

	Year 1 (85)		Year 5 (52)	
To progress in my own studies	28.2%	(24)	44.2%	(23)
To assist teachers	11.8%	(10)	9.6%	(5)
To resolve problems	18.8%	(16)	11.5%	(6)
To pick up a child	30.6%	(26)	26.9%	(14)
Other	10.6%	(9)	7.7%	(4)

**Parents responded with multiple answers*

When asked about reasons for visits to child's school, 28% of parents from Year 1 indicated that the purpose is to "*progress in my own studies*." Here we can observe a drastic change with Year 5 group. Forty-four percent of parents from Year 5 selected this answer. This is an indication that issues of adults learning have become more important for parents in our community (Table 7).

Conclusions

Our preliminary findings indicate that participation in Parent Power Nights empowered parents and encouraged them to be involved in their children's learning process.

Parents appeared relaxed participating in mathematical activities together with their children in front of pre-service teachers (in-service teachers were not involved in implementing PPNs). They felt empowered and dignified by the special attention provided to their families.

We did not ask parents formally to learn mathematics; their role was to help their children. In practice we saw during our observations that it often was children who were helping parents in mathematics activities and games (from anecdotal evidence collected from observation of the group of gifted and talented students). Children took pride that they could be helpful to their parents in these interesting mathematical activities. Both parents and children did not perceive these activities as formal mathematics as evidenced by their oral and written reflections; this learning was their free choice and they described it in their written reflections as very meaningful learning. The outcome of this learning was increased interest in continuing this type of learning of mathematics at home, and parents were also motivated to continue with their own study (formal or informal) of mathematics (as evidenced by their oral and written reflections, and the high percentage of parents in Table 7 who visited their child's school "*to progress in my own studies*."

Pre-service teachers, also adults, showed significant progress in learning mathematical concepts, changing their attitudes towards math, and attitudes toward innovative methods of teaching math. They also experienced a change in their stereotypes about low-income parents. Their participation in PPNs provided them with invaluable teaching and learning experiences and established good foundation for future successful communication with the teachers.

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