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EFFECTS OF PARENTAL ROLES IN STUDENTS' MATHEMATICAL LEARNING: HOW DOES THE EDUCATION LEVEL OF PARENTS EFFECT THEIR INVOLVEMENT?

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ABSTRACT: The purpose of this is qualitative study was to explain the parents' (specifically mothers' in this study) own experiences with mathematics, and how these practices affected beliefs and motivation about mathematics, their roles in involvement of their children's mathematics learning process. While explaining the phenomenon, the expectancy value and attribution theories were used. There were seven themes related to the obtained codes from the study. These were: Understanding of Mathematics, Importance of Mathematics, Knowing Mathematics, Nature of School practices, Mother Competency, Mother as Resource Provider, and Mother as Motivator. The study tried to explain whether their parental roles can be explained through the context of parental views of the importance of the subject and their involvement, through expectations for successful outcomes as a result of their involvement. Additionally, this study tried to investigate whether the education level of parents' effect their parental involvement their children's mathematical learning process.

Key words: parental involvement, parents' roles, mathematics, learning, teaching, student motivation.

INTRODUCTION

Parental Involvement

There is a long history of studying parental involvement in students' education (Berger, 1991). The home was recognized as the base of education nearly over 100 years ago, and the role of parents in their children's education continues to be recognized today (Cai, 2003). Jeynes (2005) created an operational definition of parental involvement as "parental participation in the educational processes and experiences of their children" (p.245). This definition includes parental involvement related to education within the school and also in the home of each child. Research has shown that parents who are involved in their child's education contribute not only to higher academic achievement but also to positive behaviors and emotional development (Eccles & Harold, 1993, Epstein, 1986, Cai, 2003). As the relationship between parents and school becomes more connected, student achievement increases (Epstein et al., 2009).

Pomerantz, Moorman, and Litwack (2007) differentiated between school- based and home-based involvement: School-based involvement requires parents to make actual contact with school personnel (for example, attending school meetings, talking to teachers, supporting school events, and volunteering time at the school). On the other hand, home-based involvement encompasses assisting with homework, responding to children's academic performance, and talking with children about happenings at school (Pomerantz et al., 2007). Recent studies suggest that the importance in examining the home involvement of parents' in their children's motivation and success (Cai, 2003). In a study of sixth through eighth graders, Grolnick and Slowiaczek (1994) found that the three dimensions were relatively independent and were associated with children's motivational resources and school performance. Specifically, mothers who were high in behavioral and cognitive involvement had children who felt more competent in school and more in control of school outcomes than those who were less involved. In turn, these motivational resources predicted school grades (Grolnick & Slowiaczek, 1994).

Among the studies examining parental roles supporting students' learning in home settings, only a few of them have been done to examine parental support in home settings involving mathematics with early childhood and elementary school children (e.g., Anderson, 1997). Recently, Cai et al. (1999) have identified five parental roles

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in middle school students' learning of mathematics: motivator, monitor, resource provider, mathematics content adviser, and mathematics learning counselor. Mathematics content adviser and mathematics learning counselor are roles that parents play in directly assisting students' learning of mathematics in the home setting. Parents as motivator, monitor, and resource provider are roles that parents play in providing emotional and resource support in students' learning. (Cai, 2003).

How does parents' education affect parental involvement?

Another issue is that parents' levels of involvement in school may be influenced by qualities of the parent-child communication and by characteristics of each member (Hoover-Dempsey, Bassler & Brissie, 1987). Within this category, parents' thoughts and beliefs about themselves as parents are one set of such characteristics. First, parents differ in terms of their ideas about their role in their child's learning. To the extent that they believe strongly that parents have a role in the teaching-learning process, they may be more likely to take on involvement activities. Further, personal efficacy is also likely to impact on behavior (Bandura, 1986). Parents who believe they can make a difference are more likely to be involved (Hoover-Dempsey, Bassler & Brissie, 1987). In this study, we will try to investigate how education level of parents' affects their motivation and willingness to parental involvement in their children's learning. According to the Tsui (2005), the education level of a parent is a significant predictor of a child's educational achievements and behavioral outcomes.

Theoretical Background

Expectancy-value theory and attribution theory are based in the notion of motivation and could explain differing parents' motivation to help their children learn mathematics in ways identified as meaningful in previous research (Cai, 2003). In expectancy-value theory, individuals' expectancies for success and the value placed on succeeding are important determinants of motivation to perform different tasks (Eccles & Wigfield, 2002).

The concept of *expectancy* represents the idea that most individuals will not choose to do a task or continue to engage in task when they expect to fail. The expectancy construct concerns the answer to the question "Can I do this task?" If the answer is yes most people will choose to engage in the task. If the answer is no or there are doubts about one's capabilities to succeed, individuals are less likely to engage in the task (Pintrick & Schunk, 2002). The other half of the equation is the *value* component. Value refers to the different beliefs students have about the reasons they might engage in a task. It concerns the answer to the question "Do I want to do this task and why?" Both components are important for predicting people's future choice behavior, engagement persistence and actual achievement. (Pintrick & Schunk, 2002). All parental involvement in mathematical learning is likely to be influenced by parents' perceived importance of mathematics which is value; and an expectation of success that may result from their involvement which is expectancy (Hunt & Hu, 2011).

Attribution theory suggests parental involvement in mathematics depends heavily on the controllable or uncontrollable factors involved in the task and the connected need for achievement (Weiner, 1972). Attributing an outcome to a stable cause such as ability or skill has a stronger influence on expectancies for future success than attributing an outcome to an unstable cause such as effort. This is an important point when considering parental roles and why certain parents become more involved than others. Weiner (1972) states that if individuals are high in achievement motivation perceive that effort is an important determinant of outcome that is high effort produces success and low effort results in failure. This study will expand understanding of the nature of involvement in students' mathematical learning by explaining the influences of mothers' perceptions and beliefs toward mathematics through expectancy-value and attribution theories. Specifically, this research answers the following questions:

1. What are the mothers' personal experiences in learning mathematics?
2. Why might their views, experiences and education level influence engagement of parents' regarding their child's mathematics learning?

METHODS

Design and Context of the Study

A purposive sampling was used throughout all sampling process, that's while choosing the school, the class, and the parents (mothers). Three seventh grade students' (students were also chosen from boys to eliminate the

possible biases come from gender differences regarding the motivation and success in mathematics) mothers were accepted to participate to the study. Each mother was from different education level, that's one left the school from second grade and did not turn back again, another was graduated from high school, and the last one graduated from university. Additionally, two of them were housewives and the last one graduated from university, was working as Turkish teacher. Efforts were taken to interpret all research data by using various verification strategies. Verification of data analysis, resulting codes and themes, and guards against external threats to validity were achieved through a variety of means. First, two independent coders reviewed transcripts at stages two of data analysis (Grbich, 2007). Codes were deemed to be reliable if we achieved 90% agreement or greater. We reached consensus on our disagreements by having discussion on them. Second, reliability of source information was obtained through the use of verbatim translation (Grbich, 2007).

Data Sources and Data analysis

Interviews were the primary data collection method employed in the study to gain an in-depth understanding of the research questions. Each mother participated in one interview session focusing on parents' perceptions of mathematics teaching and learning and questions relating to each mother's perceived roles in her child's mathematical learning. An interview protocol was utilized during the interview process. Questions used were open-ended to allow participants to supply researchers with as little or as much information as they felt necessary to express their thoughts (Grbich, 2007). Each mother was interviewed five to ten minutes. The analysis of interview data involved stages of identifying, sorting, and analyzing. First, all interviews were audiotaped and transcribed verbatim (Grbich, 2007).

RESULTS AND FINDINGS

We came to a consensus on seven themes that were obtained from the interviews. These are Understanding of Mathematics, Importance of Mathematics, Knowing Mathematics, Nature of School practices, Mother Competency, Mother as Resource Provider, and Mother as Motivator. Table 1 shows the obtained themes from the study. Following each theme will be briefly explained.

Table 1: Seven Themes Obtained from Interviews

Interview Themes	Indicators		
	Parent 1	Parent 2	Parent 3
Understanding of Mathematics	Calculations	Calculations Difficult Formulas Practice Develop thinking	Calculations Certainty
Importance of Mathematics	Will use in future/other areas Shopping	Will use in future/other areas Shopping Requirement	Will use in future/other areas Shopping Requirement
Knowing Mathematics	Hard work Practice Listening teachers	Hard work Practice Application Integration	Hard work Interest Ability Practice Application Motivation Repetition
Nature of School practices	No idea	Too simple Lack of depth Lack of application	Lack of student interest Crowd of classes Different levels of students
Mother Competency	Bad Can't do	Not good, not bad Can't do Try to be better	Not good, not bad Can't do Doesn't like
Mother as Resource Provider	Provide additional test books	Provide additional test books Send to course Search on internet Get help from teacher	Provide additional test books Send to course
Mother as Motivator	Verbal motivation	Verbal motivation Modeling	Verbal motivation

Understanding of Mathematics

The first theme uncovered relayed parents' perceptions of the nature of mathematics. This theme revolved around ideas and memories of parents' own learning of mathematics and parent's perceptions of the learning process.

Importance of Mathematics

We defined this theme as importance of mathematics, which revolved around parents' appreciation of mathematics as a learning phenomenon as well as the relevance of mathematics to life events.

Knowing Mathematics

Knowing mathematics refers to parents' views on what it takes for someone to come to know and excel at mathematics.

Nature of School practices

The fourth theme revealed thoughts concerning how mathematical practices occur in classroom environment. Specifically, it was focused on the mothers' beliefs related to effectiveness of these practices.

Mother Competency

In general, last three themes dealt with parental roles in children's mathematical learning and factors that might have influenced these roles. Specifically this theme uncovered related to parents' feelings of competency regarding their own knowledge of mathematics.

Mother as Resource Provider

The seventh theme was about parents as resource providers for their children.

Mother as Motivator

The final theme dealt with a mother being a motivator of her child's learning process.

DISCUSSION and CONCLUSION

The results of this study suggest that parental roles in mathematics can be explained through the context of perceptions of their views about math, expectations for successful outcomes as a result of their involvement.

Apparent in the results was the difference in the importance of mathematics between mothers. According to expectancy-value theory, perceptions of task utility (important or unimportant) could be influenced by a person's interpretations of their own past performance in mathematics and their affective memories (Eccles & Wigfield, 2002). Indeed, two mothers remembered doing not too bad in math seemed to value the subject more than another who remembered doing poorly or who attached a negative connotation to the subject. This valuing or devaluing could prove to affect the support given to children or the type of support given like being motivators (Eccles & Wigfield, 2002).

According to attribution theory, beliefs about a person's own mathematics ability or efforts may lead to feelings of controllability or uncontrollability on the part of the parent. This can lead them to become more or less involved in their child's learning or to become involved in qualitatively differing ways (Weiner, 1972). For example, second mother who has the most comfort with math, mentioned to do extra work with their children or brought mathematics into daily life routines. But the first mother who has a not a good education memory seemed to not to be involve in the process that she states that she have no ability of mathematics.

In Eccles (2005) revealed that parental involvement is actually more important than the school itself when it comes to students' academic achievement. She also pointed out that children learn by example, often through

observations at home. If a child's parents are reading books, attending ongoing education classes and taking him along to the museum and they are engaging him in a number of direct-learning experiences that will help him value achievement and success (Eccles, 2005). This kind of role modeling can be seen as in the current study. One mother mentioned her taking night courses of mathematics to be more helpful for his son; and her studying with him is a good example for this issue. Also her efforts seemed to make him give more value to studying math. Again according to Eccles (2005), parents with higher education levels have stronger confidence in their child's academic abilities, and they also have higher expectations of their child. They expect that their child will earn good grades, behave well in school and attend college. These high expectations motivate their child to do well. The confidence they have in their child builds his own confidence in his academic abilities and makes him more likely to succeed. Mother 2 and mother 3 were good examples of this explanation regarding their high expectations from their children.

The study of Tsui (2005) indicated that the education level of a parent is a significant predictor of a child's educational achievements and behavioral outcomes. Parents, who are educated raise children to have healthy self-perceptions when it comes to their academic abilities, engage them in intellectual activities that help them develop a healthy attitude about learning. In current study, mother 1 was non-educated and she was and felt herself inadequate to help her child. Since her education background was bad, she thought she do not have ability and prefer to refrain from the education process. Moreover she does not have any ideas, who are the teachers of her son and what is going on in school practices. This is a result of expectancy-value construct as well as a result of education level of parents. When we look at the mother 2, it is clear that there is not a very good memory of math with her, but she seemed to spend admirable effort to be better in math for being more helpful for her child. This is what her education level makes her more motivated to success, believes herself to be better, and related to these to participate in her child's mathematical learning process.

RECOMMENDATIONS

The results of the present study extend previous research literature in two important ways that hold implications for teacher educators and parents. First, the use of attribution and expectancy-value theories offered unique perspectives on the reasons parental support offered in mathematics to children may differ that have not been previously discussed. Previous research identified how support is offered by different parents; notions of mothers' need for achievement in parental roles.

Additionally, although the sample size was small and means of data collection were modest, the study leaves open the door for important future research regarding the possible improvement of parental involvement in mathematics learning.

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