



**UNIVERSITI PUTRA MALAYSIA**

***EXAMINING MALAYSIAN SECONDARY SCHOOL TEACHERS'  
PERCEPTIONS OF MATHEMATICS EDUCATION USING  
A Q-METHODOLOGY APPROACH***

**ZAHRA MEMARIANI**

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A Q-METHODOLOGY APPROACH**

**By**

**ZAHRA MEMARIANI**

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia,  
in Fulfilment of the Requirements for the Degree of Master of Science**

**February 2013**

## DEDICATION

To my husband, who believes in me, supports me, and helps me be my best every

day. To my son Shahriyar

I love you.



Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science.

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**Chairman: Assoc. Prof. Rohani Ahmad Tarmizi, PhD**

**Faculty: Institute for Mathematical Research**

Within constructivist theory framework, this study aimed to provide a clearer focus on factors that contribute to the process of teaching and learning mathematics using Q-methodology approach. Q-methodology provides systematic means to investigate personal beliefs by collecting a concourse, developing a Q-sample, identifying P-sample, conducting a Q-sort process and analyzing of collected data. Forty-seven mathematics teachers in secondary level from Selangor State in Peninsular Malaysia participated in this study.

The central research questions addressed in this study are: (a) What are teachers' perception on factors that influence teaching and learning of secondary mathematics? (b) Which factor most influence teaching and learning of secondary mathematics? (c) What are the influence of human factors such as, student individual difference, motivation, teacher enthusiastic and experience, community and family on teaching and learning of secondary mathematics? (d) What are the influences of academic factors such as, curriculum, instructional practice, and technology on teaching and learning of secondary mathematics? (e) What are the relationships between the identified factors?

Using previous literature, a concourse was developed. The P-sample of mathematics teachers sorted various statements into categories of most definitely influencing to most definitely not influencing factor. Factor analysis including varimax rotation was completed. Four factors emerged from the Q-methodology procedures indicating shared perceptions among the secondary mathematics teachers. These four factors were: technology and student motivation, student individual differences and family, student motivation and community, family and community.

In addition, factors such as community and student motivation were the most important factors in teaching and learning mathematics. Also factors such as student individual difference, family, and technology were emphasized by teachers as important factor in teaching and learning mathematics.

Recommendations for future professional improvement include integration of collaborative learning and encouragement among student to use technology in order to enhance the interest of the students and make them attentive in the class.



Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah master sains.

**KAJIAN PERSEPSI GURU MATEMATIK TENTANG PENDIDIKAN MATEMATIK DI SEKOLAH MENENGAH DI MALAYSIA DENGAN MENGGUNAKAN PENDEKATAN Q-METODOLOGI**

Oleh

**ZAHRA MEMARIANI**

**February 2013**

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Berdasarkan rangka kerja teori konstruktivis, kajian ini bertujuan untuk memberi tumpuan yang lebih jelas terhadap faktor-faktor yang menyumbang kepada proses pengajaran dan pembelajaran matematik dengan menggunakan pendekatan Q-metodologi. Q-metodologi merupakan cara yang sistematik untuk menyiasat kepercayaan peribadi dengan mengumpul *concourse*, membangunkan *Q-sample*, mengenal pasti *P-sample*, menjalankan proses *Q-sort* dan seterusnya menganalisis data yang dikumpul. Empat puluh tujuh orang guru matematik di peringkat

menengah dari Negeri Selangor di Semenanjung Malaysia telah mengambil bahagian dalam kajian ini.

Persoalan kajian utama yang dikaji adalah seperti berikut: (a) Apakah persepsi guru matematik terhadap faktor-faktor yang mempengaruhi pengajaran dan pembelajaran matematik menengah? (b) Faktor yang manakah paling mempengaruhi pengajaran dan pembelajaran matematik menengah? (c) Apakah kesan atau pengaruh faktor kemanusiaan seperti, perbezaan individu pelajar, motivasi, semangat dan pengalaman guru, masyarakat dan keluarga keatas pengajaran dan pembelajaran matematik menengah? (d) Apakah kesan atau pengaruh faktor akademik seperti, kurikulum, amalan pengajaran, dan teknologi terhadap pengajaran dan pembelajaran matematik menengah? (e) Apakah hubungan antara faktor-faktor yang dikenal pasti?

Menggunakan kajian literatur yang lepas, *concourse* telah dibangunkan. *P-sample* daripada guru matematik yang pelbagai, telah disusun mengikut kenyataan iaitu ke dalam kategori yang paling mempengaruhi sehingga yang paling tidak mempengaruhi. Analisis faktor termasuk kitaran varimax telah dijalankan. Empat faktor yang mempengaruhi pembelajaran dan pengajaran telah dihasilkan daripada prosedur Q-metodologi yang menunjukkan bahawa faktor ini dikongsi bersama di kalangan guru matematik sekolah menengah. Empat faktor tersebut adalah: teknologi dan motivasi pelajar, perbezaan individu pelajar dan keluarga, motivasi pelajar dan komuniti, keluarga dan komuniti.

Di samping itu, faktor-faktor seperti komuniti dan motivasi pelajar adalah faktor yang paling penting dalam pengajaran dan pembelajaran matematik. Faktor-faktor



seperti perbezaan individu pelajar, keluarga, dan teknologi juga telah ditekankan oleh guru-guru sebagai faktor penting dalam pengajaran dan pembelajaran matematik.

Cadangan untuk penambahbaikan aspek profesional guru matematik untuk masa depan adalah integrasi pembelajaran kolaboratif dan galakan di kalangan pelajar untuk menggunakan teknologi dalam usaha untuk meningkatkan minat pelajar dan menjadikan mereka lebih prihatin di dalam kelas.



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Last but not least, I also would like to thank my parents for encouraging me to always do my best and believing in me, my mother and father for her love and care and brothers and sister for their moral support.

I certify that a Thesis Examination Committee has met on 15 February 2013 to conduct the final examination of Zahra Memariani on her thesis entitled “Examining Malaysian Secondary School Teachers’ Perceptions Of Mathematics Education Using A Q-Methodology Approach” with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U. (A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science.

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## DECLARATION

I declare that the thesis is my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or at any other institution.

---

**Zahra Memariani**

Date: 15 February 2013



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# CHAPTER 1

## INTRODUCTION

### 1.1 Background

We live in a world of rapid changes in technology and information in which mathematics has become a necessary skill for successful living and careers. Hence, there is emergent need for students to develop their mathematics competence, so that they can function in today's world. Therefore, in our educational systems it is essential that everyone have the opportunity to learn mathematics, in order to reach a certain level of knowledge which is commensurate with their personal needs, aspirations, and potentials. Paris (2010) contends that students would better learn the value of mathematics and would explore more deeply into this subject if they are exposed to a well-balanced curriculum which is based on the national standards for mathematics, and includes realistic, exciting, and developmentally appropriate activities.

In addition, the National Council of Teachers of Mathematics (NCTM, 2003) stipulate standards for mathematics teachers including; teacher should provide an opportunity for students to communicate mathematics ideas and solve problems with others, engage students in mathematical activities with confidence and enthusiasm, encourage students to use their own mental arithmetic power, and use assessment strategies that focus on understanding rather than on right answers. Also, teacher instruction should focus on the meaningful aspects of using mathematics and mathematics concepts should be applicable in variety of situations. Gainsburg (2003)

also emphasizes that due to the importance of teaching mathematics, mathematics education must play a general role in achieving the needs of a developed and knowledgeable nation.

Malaysia as a nation, through its Ministry of Education has conducted an assessment and reviewed comprehensively her education system with particular attention to enhance the mathematics education program. Specifically, two recent curriculums which are the Integrated Secondary School Curriculum (starting in 1988), and English for the Teaching of Mathematics School Curriculum (starting in 2002). The Integrated Curriculum for Secondary School Mathematics aimed to enable people think mathematically and be able to make decisions and solve problems through effectively applying their knowledge of mathematics. The outcome is to have individuals who are able to deal with everyday life problems as technology develops (Ministry of Education Malaysia, 2004, p. ix) .

The mathematics curriculum consists of three main areas, namely, numbers, shape and space, and relationship. Topics such as numbers, algebra, mathematical reasoning, probability, geometry, and statistics are covered. Five emphases in teaching and learning of mathematics were also stated, namely, problem solving in mathematics, communication in mathematics, reasoning in mathematics, mathematical connections, and lastly, application of technology. In addition, approaches such as cooperative learning, contextual learning, constructivist learning, inquiry learning, and problem-based learning are to be considered by teachers in conducting mathematics lessons. Hence the curriculum not only emphasizes students need to develop the ability to think logically systemically, creatively and critically,

but also, another important feature that is being emphasized is to present mathematics as an enjoyable, and yet intellectually challenging to the learners.

What teachers are supposed to do is to instruct their students with a focus on the problem solving heuristics. Teachers may be selective in choosing appropriate strategies for each student; however, Polya's (1973) problem solving strategies are strongly recommended to be used by teachers in classrooms. Their personal everyday experiences can also be used as a source to better explain mathematics to their students. Further, they are supposed to have students solve problems both individually and cooperatively.

"Constructivist learning" is a module introduced by Malaysia Curriculum Development Center in the year 2001. The module is aimed to make it easy for teachers to know and apply the above-mentioned approach. That such a module was introduced means that constructivism is highly significant to the Ministry of Education, mainly at such subjects as natural sciences, mathematics and technology. As put by Ahmad Ramli (2002), the aim of constructivism education is to develop students' understanding and make it possible for learners to have a practice on and improve their skills of thinking.

Constructivism has found its way in mathematics, just as any other subject to be learned, in that learners are instructed in a way that they would be able to construct solutions to solve mathematics problems on their own (Elkind, 2004). According to Elkind (2004), within the learning environment children should be viewed as having more potential to process new information rather than being viewed as empty

containers who wait to be filled with grade specific standards. Teachers who embrace constructivist beliefs would organize student-centered activities that promote independent learning, group discussions and student meaning-making (Brooks,2002). Thus students would internalize the received instruction and concepts, which would lead to better, maintainable learning. Also, they work cooperatively with their peers and through new experiences construct their own knowledge ( Cobb, Wood, Yackel, & McNeal, 1992). Here, students -rather than teachers-are more active in doing experiments and drawing conclusions on their own. Teachers have the role of a facilitator of learning in the class. They teach and then help students develop new insights and relate the newly-developed insights to their prior competence. The task of discovering and discussing, however, is left to learners, not teachers (Vast, 1998).

Constructivism emphasizes that teachers consider that the students have their individual characteristics and differences. Therefore, the strategies teacher uses in the classroom are supposed to satisfy all students' needs, and consider every factor which is likely to affect both teaching and learning. Teachers actually facilitate the process of learning through helping learners to construct new knowledge and, therefore, actively and cooperatively learn something new. Constructivist mathematics teachers tend to focus on asking questions, giving students opportunities to have a voice in class, and examining problems. Here teachers are not the only speakers in class focusing on uttering sentences. In addition, memorization of rules and isolated computations are not emphasized by teachers. In fact, they stimulate learning. The teachers further make their students aware of how valuable their knowledge is, and encourage them to actively construct their own knowledge through group-work. In



addition to student-student interaction, active communication between students and teachers is supposed to lead to knowledge construction (Brooks,1993).

Although, much effort have been done to move from traditional teaching to constructivist learning and teaching but still teachers are presented with students who are at-risk and struggle constantly with learning, students who perform at the competent level and significant outlier students and perform beyond expectations (Tomlinson, 2001). Thus, it is almost impossible for teacher to develop mathematical skills without considering factors related to student academic achievement. If teachers identify the reasons of student poor performance in learning mathematics; they can use feasible strategies to help student and hopefully encourage students in adopting meaningful and positive attitudes toward mathematics.

## **1.2 Factor Related to Mathematics Achievement**

Worthy of mentioning is the fact that both teaching and learning mathematics are complex phenomenon; as a matter of fact, a great number of different factors are supposed to affect them. Suggested by various related literature (Attwood, 2001; Brodie, 2004; Maree, 1999; Murray, 1997), there are many variables that affects secondary school students' mathematics achievement. The variables are learners' mathematics skills, belief, understanding mathematical, family's social class and socio-economic condition, parental influence, and peer influence, in addition, variables that are related to their school, like low-achiever environment, various cultures of knowledge learning, racial discrimination related to the past, and last but not least, school principals and teachers' low levels of expectations.

To investigate factors that influence teaching and learning mathematics in secondary school, variables related to student individual differences, motivation, teacher enthusiastic, family, teacher instructional practice, and technology were reviewed briefly. Chapter 3 provided more explain of these factors.

Students are different in learning mathematics; therefore, each student needs different forms of instruction to learn mathematics. Motivation on the side of learners' is absolutely essential in learning anything, as learning is typically a complex and tough phenomenon. Motivated students are more likely to engage learning willingly and actively; they are also responsible for their own learning. They become more self-confident, which causes an air of enthusiasm in the learning context.

Teacher's enthusiasm in mathematics also was proven to be superior to other instructional variables, thus, also influenced learners' attitude towards this subject. Besides teachers, parents also play a significant role in guiding students and promoting their educational level. Experts in the field of education often ask teachers to make use of parents in the process of education by involving them in class and school activities, and having them as a pillar of school.

In addition, technology in teaching-learning process would provide learners with more meaningful contexts of learning in which they can more actively engage in the learning process, which would ultimately lead to higher levels of mathematics achievement.

### 1.3 Teacher Perception and Student Achievement

How a teacher perceives knowledge and later presents it in classroom can influence the extent to which students learn it (Berns, 2012). Because teachers' perception are considered central to the way how teachers conceptualize and actualize their roles in the classroom, their choice of classroom activities and moving instruction in more innovative ways. Beliefs shape expectations of what will happen, and we prepare to respond to events based on those expectations. Teachers act on their beliefs about what good teachers do and those beliefs are probably the most important factor in determining the success or failure of a new approach to teaching (O'Donnell, Reeve, & Smith, 2011)

Mathematics teachers are expected to discover and identify the differences among various students in their classes, try to enhance and make use of the differences in their teaching methods, so that all of the students-both high- achievers and low-achievers- are equally given the chance to take part in class activities and learn mathematics. Cobb (2004) states that within today's classrooms in light of addressing the needs of academic diversity teachers not only need to amend some instructional practices but also shift their perceptions of teaching and learning. Nelson (1999) asserts that "because teaches stand at the intersection between the subject and the student, education change ultimately depends on them" (p.3).

According to Tomlinson (2004) the teachers have the role of directing the way students grow, as well as opening students' eyes to new horizons which would be invisible to them unless the teacher helped them. In light of this affirmation, the teacher's awareness of his/her role and their perception of what lies in their

responsibility as a teacher could affect levels of student achievement as well. According to Bandura, Barbaranelli, Caprara, and Pastorelli (1996) it is essential for students to be better learners if they possess self-regulatory learning strategies and acquisition of skills. Pajares and Schunk (2001) maintain that school is the primary setting in which cognitive capabilities are cultivated and evaluated. The development of a student's personal competence, self-worth and ultimately the habits of thinking are shaped by the teacher's perceptions and influences.

Gibson and Dembo (1984) finds that teachers with positive perceptions and a strong sense of self-efficacy devoted more time to academic learning, taught in small groups, provided more assistance to struggling students and offered more praise. On the contrary, teachers with negative perceptions toward teaching and learning spent less time on academics, instructed primarily whole group, quickly gave up on students with learning disabilities and diversities and criticized rather than praised students. In contrast, those teachers higher in general teacher efficacies were found to have students with elevated achievement in mathematics.

It is stated by the National Council of Teachers of Mathematics (NCTM, 2000) that in order to effectively teach mathematics, one should first, identify what learners already know and what they actually need to learn; next, encourage and help them in the process of learning it. Whenever there are attempts for all learners in a class to understand mathematics, there are complex interactions between as well as equal participation of learners and teachers, in addition to contextual teaching and learning of mathematics. In such an environment, further teaching should be based on learners' prior knowledge and teachers are expected to encourage learners' critical

thinking abilities on mathematics so that they might understand better. An atmosphere of safety, mental and physical satisfaction, positive attitudes must be created by teachers, in which free, respectful self-expression is common, and students are not afraid of coming up with questions or requirements for further explanations.

#### **1.4 Statement of the Problem**

Mathematics teaching and learning at secondary schools in Malaysia has been great concern too many such as teachers, curriculum developers, parents, principals, learners, etc. One of the major causes of concern is poor performance among learners in problem solving tasks when dealing with mathematical concepts and problem. Abd Kadir (2004) investigated learners' problem solving failures, and found that the failure started upon reading the mathematical question. In other words, some special words, statements and ideas were not intelligible to the students. Diagrams were used by nearly none of them in order to first know the question itself and second, think of strategies to solve it.

One of the critical and well known causes is student perception on mathematics learning. Mathematics is normally perceived as being a tough, boring, and hard subject at school. The majority of students believe that it is equal to a set of problems and symbols -not concepts- which have no meaning at all. Students also, see mathematics as a set of combinations of rules and procedures which have to be memorized by heart. Learners' points of view toward mathematics are generally in direct relation with their opinion about the act of solving problems, note Effandi and Yusoff (2009). Moreover, they believe that negative perceptions about mathematics

have to be overcome; otherwise, learners would not acquire many problem-solving skills in future. Such kinds of skills are essential to learners because they need to use in their daily life. O'Connell (2000) has confirmed Effandi and Yusoff (2009) viewpoint. According to O'Connell (2000), students' success is dependent on the extent to which they think positively toward solving problems. Other necessary factors in problem-solving are, according to O'Connell (2000), patience, persistence, hard work, and wanting to take risks. Hence, mathematics teachers need to play important role in overcoming this poor perception leading to poor performance.

Another point to be concerned about secondary school students is the problem of students with poor reasoning skills. Extracting the needed pieces of information out of certain data is really difficult and lots of students are not able to do so. Further, even more students cannot find the relationship between the answers that they have found, and therefore, cannot come to any conclusions, either. Teachers usually give only one example; besides, they do not explain mathematical problems step-by-step in a focused way. Traditional approaches of teaching, according to Idris (2006), may also cause learners to have negative points of view to mathematics. Idris (2006) mentions the "chalk-and-talk" method as an example of traditional teaching methods in which teachers are mere speakers and learners are mere listeners. Teacher-centered instruction rarely allows students to have conversations with each other in order to solve mathematical problems logically. In such classes, what matters is the extent to which learners can remember, rather than think or reason. Therefore, there is forced learning which is rarely satisfactory and pleasing to learners (Idris, 2006).

Teachers also usually emphasize the fact that mathematics would be difficult to learners. It has been shown that understanding questions, getting the pattern, and, last but not least, coming to the required generalization, would be difficult to students. According to Montague (1997), students' weak academic self-concept, low levels of self-esteem, poor viewpoints, or instructors' incorrect opinions about students who have learning problems might correlate with negative social and academic results.

Therefore, a study on teachers' perceptions is necessary as they play a major role in educating mathematics for the learners. Their perception on the important factors that influences the process of teaching and learning mathematics will largely influence learners' performance in mathematics. Many studies have been conducted to explore teachers' role in improving mathematics achievement (Aubrey, 1996; Bishop, 1994; Ernest, 2001; Jaworski, 1994b; Tomlinson, 2004).

However, a Q-methodology study on exploring teachers' perceptions on the process of teaching and learning mathematics, especially in Malaysia has not been conducted. Therefore this study embarks into investigating teachers' perception on the process of teaching and learning mathematic. This study seeks to investigate the factors that might influence both teaching and learning mathematics utilizing the Q-methodological approach.

## **1.5 Research Questions**

The present study is that of Q-methodological type and seeks to evaluate Malaysian secondary school teachers' perception about both human and academic factors which are likely to have an influence on teaching and learning mathematics, as well as

learners' academic achievement. To achieve the aims of the study the following research questions were addressed:

1. What are teachers' perception on factors that influence teaching and learning of secondary mathematics?
2. Which factor most influence teaching and learning of secondary mathematics?
3. What are the influence of human factors such as, student individual difference, motivation, teacher enthusiastic and experience, community and family on teaching and learning of secondary mathematics?
4. What are the influence of academic factors such as, curriculum, instructional practice, and technology on teaching and learning of secondary mathematics?
5. What are the relationships between the identified factors?

#### **1.6 Significance of the Study**

The present study has some implications for students, and teachers. These findings will be a rich source of information for education and research in general. The understanding of teacher's perception will be an invaluable insight for those involved in teacher education in determining the curricular constructs of teacher-related programmers and training. It is also hoped that through this enriching experience the teachers' perception will emerge and explain the rationale for its pedagogical



implementation. Decision making based on a selection of strategies and techniques will be fruitful and indirectly shape the teacher's knowledge and approaches.

In fact, the results of the study are supposed to provide a deep understanding of teachers' opinions about human factors -such as individual differences among students themselves and their motivations, the experience of teachers, students' families, and the communities to which students belong -as well as academic factors- for example, curriculum, strategies used by teachers, and making use of technology. The findings also have the potentiality to determine the effects of these two types of factors on mathematics teaching and learning in Malaysia.

To the researchers' knowledge, little related literature is there which focus on the influence the human and academic factors have on both teaching and learning mathematics in Malaysia. Therefore, there is a need to analyze this relationship because it is directly related to the improvement of students' mathematics achievement. It is important that educators implement instructional strategies that are effective in moving their students forward in their achievements toward academic success in mathematics. Teachers are the sole provider of learning opportunities and experiences that are presented to initiate the learning of mathematics. Thus, they can better know mathematics teaching-and-learning process in the light of constructivism, so that they can enhance this process, revise their teaching strategies in order for students to learn better, and ultimately make a revolution in the current systems of education.

## 1.7 Limitations of the Study

The limitation of this study:

1. In order for this study to be carried on, statements were used by researchers as a tool. The outcome of the study depends on the extent to which the statements are understood, integrated, and honest while being sorted.
2. From among the numerous factors which influence on mathematical achievement, only few are taken into concern in this study.
3. The study involved only 47 secondary teachers from West Malaysia. As the study is based on a small sample who were chosen from only a special location in Malaysia, the results cannot be generalized.
4. Only 4 of the Secondary School in Selangor, Kajang, and Kuala Lumpur taken as a location of the study because of the long distance respondent and less time in conducting the study.
5. The study is focused on Malaysian secondary school mathematics teachers' opinions about teaching and learning mathematics. Therefore, the findings should not be applied to other levels such as primary and tertiary.

## 1.8 Definition of Term

To have a better conceptualization of the methodology part, key terms are defined here. The key terms of the present study are related to teachers' perception about

human and academic factors that influence the process of teaching and learning mathematics and explain the meaning of these factors. Below are the definitions:

### **Human Factors**

**Student individual differences:** individual people can differently process pieces of information, construct meaning out of them, and use them in new situations (Jonassen & Grabowski, 1993). Teachers' belief about student individual differences like their age, gender, motivation, abilities skills, self-esteem can help student's actual achievement. When students are taught based on their individual needs, unfamiliar and unattached content becomes relevant as students begin to make their own connections with past experience.

**Student motivation:** If a student needs, desires and is willing to take part in and succeed in learning something, one could say that he/she is motivated to learn (Bomia et al., 1997). Teachers' perceptions about student motivation influence teachers' perceived control of motivation, leading to the formation of specific behavioral intentions to increase motivation in specific ways. Research suggests that teacher perceptions of their students influence the approach and strategies teachers use with their students (Wenglinsky, 2000).

**Teacher enthusiastic:** refers to a sense of concern with and curiosity a mathematics teacher has about the teaching of the subject. Teachers interest in the teaching of Mathematics could be describe as their feelings of wanting to teach the subject and learn more about it (Tulla, 2008). Teachers' enthusiasm is related to the concept of

teacher efficacy, the teacher's belief that he or she can be successful in bringing about increased student learning. Also, enthusiastic teachers convey the message that they have confidence in their instruction, talents and skills, as well as their students' learning skills (Hunt & Touzel, 2009).

**Family:** parent involvement refers to a wide range of activities including helping student in homework, encourage student to think, and providing computer for their child to make mathematics learning more enjoyable and connections among schools, families, and communities. It was believed by teachers that school activities and whatever efforts students make in order to learn should be supported by parents. Such a support from parents tended to imply a unidirectional relationship between parents and a teacher, in which the process of interchanging knowledge about learners is one-way (Eberly, Joshi, & Konzal, 2007).

**Community:** includes every formal arrangement a school can make with an individual, association or public institution to provide a program, service or resource that will help support student achievement (Anderson-Butcher et al., 2008). In Social Constructivism, a classroom is considered as a community in which through social interactions learning occurs. Students are supposed to learn through actively constructing meanings, which is a job that takes place when students have continuous communications with each other. Such conversations between and among different students are of numerous advantages to students. They can actually learn new points from each other - a significant point in Social Constructivism.

## **Academic Factors**

**Curriculum:** is defined as the whole educational experience delivered to learners, in order for them to acquire general abilities and skills in different learning situations (Marsh & Willis, 2003). Instructors' attitudes are likely to form their lesson planning and curricular decisions. In other words, what teachers believe in about education determines the material to be taught, as well as the teaching method. Paris (2010) believes that curriculum is a carefully plan for the course, requiring teachers' proactive preparation for organizing, arranging, and controlling learning situations; they should also prepare themselves for the content knowledge arranged in the syllabus, and develop learner skills. These points are significant in developing a syllabus. Included in a curriculum is the knowledge that should be delivered to the class, as well as the expected outcomes.

**Technology:** is defined as making use of learning tools-for example, the Internet, visual CDs, and graphing calculators, to mention a few-as a way of making mathematics instruction easy to conduct. Teachers' beliefs about technology determine whether or not they integrate technology into their classrooms (Teo, Chai, Hung, & Lee, 2008). Technology in the class, in addition, broadens the boundaries which surround the students. They can easily experience real-life activities and learn independently (Tubin, 2006).

**Instructional practices:** are research-based methods of facilitating learning for students. Knowledge of mathematics, in teachers' opinions, was an absolute and rigid group of concepts. Such attitudes were clearly reflected in their instruction strategies

and techniques. Teachers' perceptions about mathematics formed their teaching plans, including the classroom tasks they would chose, as well as their choice of interaction type and evolutionary methods.



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