HOME-SCHOOL RELATIONSHIPS AND MATHEMATICS LEARNING IN- AND OUT-OF-SCHOOL: COLLABORATION FOR CHANGE

A QUALITATIVE CASE STUDY IN A BAHRAINI PRIMARY SCHOOL

A thesis submitted for the degree of Doctor of Philosophy awarded by University of Bristol

By

Osama Mahdi Al-Mahdi

Graduate School of Education, University of Bristol

February 2009

ABSTRACT

This study aimed to learn more about the perceptions of parents, children and teachers regarding home-school relationships and mathematics learning in and out-of-school in Bahrain, to introduce new ideas which emphasise the social and cultural dimension of mathematics learning, and utilise these new ideas to design and implement novel mathematical learning activities. These activities aimed to encourage social interaction between parents and their children and utilise home resources to enrich school learning.

This study draws on theoretical ideas and research which call for more recognition and utilisation of the social and cultural resources available in children's homes and out-of-school environments. This small scale case study drew on action research ideas carried out in one classroom in a primary boys school in Bahrain. The data collection process included: semi-structured interviews with teachers and parents, focus groups with children, visual data, namely photographs taken by children, and analysis of school documents. The project also included novel mathematics learning activities carried out by the children at home and in the classroom.

The results indicated there were variations between the different groups of parents and between parents and teachers in terms of their perceptions about home-school relationships and mathematics learning in- and out-of-school. Parents with different social and cultural backgrounds can have different relationships and types of communication with school. More work is needed to improve home-school communication and to involve parents more in their children's education. The results also indicated that children's out-of-school mathematical practices were not highly recognised and utilised by the participant teachers and parents in the process of children's mathematics learning. Finally, the outcomes of the project indicated that this intervention was successful in finding ways to improve some aspects of home-school communication through providing opportunities of home-school knowledge exchange and two-way communication; and, in enriching and extending children's mathematics learning by providing more opportunities for parental involvement in this area of learning as well as making some connections between children's in- and out-of-school mathematics practices.

AUTHOR'S DECLARATION

I declare that the work in this dissertation was carried out in accordance with the Regulations of the University of Bristol. The work is original, except where indicated by special reference in the text, and no part of the dissertation has been submitted for any other academic award. Any views expressed in the dissertation are those of the author.

Signed

Osama Almahdi

Date

13/3/2009

ACKNOWLEDGEMNETS

The completion of this thesis and the completion of the doctoral course would not have been a reality without faith in God and the encouragement and help of many people. I take this opportunity to acknowledge their support.

I wish to thank the members of the Graduate School of Education at the University of Bristol who have encouraged me throughout the process. I especially owe my supervisors, Professor Martin Hughes and Dr. Pamela Greenhough, my sincere appreciation for their invaluable support and guidance. Their incredible support, time, guidance, patience, understanding and advice will have a profound impact on me for the rest of my career. Special words of thanks also go to Dr. Richard Barwell and Dr. Jane Andrews. Their thoughtful comments and support were very helpful in building the foundations for this study. Many thanks go to Dr. Sally Barns and Dr. Anthony Feiler for their continuous help with administrative issues. I would also like to thank the examiners for the time and efforts dedicated for the evaluation of this PhD.

I would also take this opportunity to express my sincere appreciation to the University of Bahrain. Its scholarship programme has supported me financially and, more importantly, provided recognition and encouragement which consequently gave me additional incentive to work more. I also would like to thank my tutors and colleagues at the University of Bahrain for their genuine advice and full support.

I wish to thank the Ministry of Education in Bahrain and the school principal as they provided me with full access to the school where I carried out the research project. Special words of thanks go to the participant classroom Teacher J for his commitment and useful input throughout and after the data collection process. I am grateful to Mrs. M, the assistant teacher who carried out the interviews with the participant mothers. I am indebted to all the teachers, mothers, fathers and children who have participated in this research.

I want to thank my friends, colleagues and acquaintances in Bahrain and the United Kingdom, too many to mention. All have helped me by listening, guiding and assisting in overcoming all the obstacles. Just to mention a few: Dr. Lyla Brown, Dr. Habibah Ab-Jalil, Emile Al-Mahdi and Ali Jassim.

Finally, I would dedicate this work to my mother, my wife and my daughter. No word can express my gratitude to their support, assurance and pride in my achievements. Without their support and understanding, I may not have completed this major task.

CONTENTS

1.	**Introduction**	**1**
2	**Mathematics learning in social context: theoretical issues**	**7**
2.1	Introduction	7
2.2	Philosophical perspectives on the social nature of mathematics	8
2.3	Learning theories in a social direction	10
2.3.1	Behaviourism	10
2.3.2	Cognitive Constructivism	11
2.3.3	Sociocultural theory	14
2.3.4	Two metaphors that underlie learning theories	17
2.4	The social turn in mathematics education research	19
2.4.1	The ethnomathematics approach	20
2.4.2	Tools mediation: Everyday cognition	24
2.4.3	Social mediation: Scaffolding and guided participation	26
2.4.4	Context, transfer and identity: Situated cognition	29
2.4.5	Values and identity	32
2.5	Summary	34
3	**Literature review on home-school relationships**	**37**
3.1	Introduction	37
3.2	Parental involvement is multifaceted and complex	38
3.2.1	Definitions of parental involvement	38
3.2.2	Changing models of parental involvement in educational policy	41
3.3	Rationale for parental involvement	43
3.3.1	Parents are the primary educators of children	43
3.3.2	Improving children's learning and school achievement	44
3.3.3	Parental involvement as democratic action	45
3.4	Barriers to home and school relationships	47
3.4.1	Barriers related to families	47
3.4.2	Barriers related to school	47
3.5	The shift from the deficit model to the asset model of parental involvement	49
3.5.1	Funds of knowledge concept	51
3.6	Understanding and acknowledging diversity	52
3.6.1	Bourdieu's model	53
3.6.2	Social class	55
3.6.3	Gender	60
3.6.4	Power relations	61
3.7	Understanding the multiple perspectives of parents	64
3.8	Summary	67
4	**Literature review on parental involvement in children's mathematics learning**	**69**
4.1	Introduction	69
4.2	Investigating children's pre-school mathematics learning at home	69
4.3	Involving parents in their children's mathematics learning through shared homework	72

4.4	Investigating parents' perspectives on their children's mathematics learning	75
4.5	Promoting parents' and teachers' dialogue about mathematics education	79
4.6	Utilising home mathematics resources in school mathematics teaching	81
4.7	Investigating numeracy practices at home and at school	84
4.8	Promoting knowledge exchange between home and school	89
4.9	Summary	96
5	**Research rationale and questions**	**99**
5.1	Introduction	99
5.2	Research problem and significance	99
5.2.1	Investigating home-school relationships and thinking about possible ways of facilitating them	100
5.2.2	Looking at the social and cultural dimensions of mathematics learning and thinking about possible ways of meaningfully connecting them to school mathematics	104
5.2.3	Framework for analysis	108
5.3	Research questions	110
5.4	Summary	111
6	**Research methods and methodological issues**	**112**
6.1	Introduction	112
6.2	General methodological issues	113
6.2.1	Qualitative research	113
6.2.2	Justification for using a qualitative methodology	114
6.2.3	Case study	116
6.2.4	Action research	118
6.3	The project	120
6.3.1	Data collection methods used in the project	120
6.3.2	The early beginnings of the project	124
6.3.3	The first stage: Piloting	125
6.3.4	The second stage: Planning and preparation	128
6.3.5	The third stage: Implementing the project	139
6.4	The data analysis process	157
6.4.1	Transcription	159
6.4.2	Coding and memoing	160
6.4.3	Displaying data	161
6.4.4	Drawing conclusions	161
6.5	General ethical guidelines	161
7	**Parents' and teachers' views regarding home-school relationships**	**171**
7.1	Introduction to the findings chapters	171
7.2	Parents' and teachers' views regarding home-school communication	173
7.2.1	Research questions	173
7.2.2	Overview of Chapter 7	174
7.2.3	Theme 1: The need for moving beyond improvised communication	175

7.2.4	Theme 2: The importance of quality issues in home-school communication	188
7.3	Theme 3: Social positions and roles distribution between teachers and parents	207
7.4	Summary and discussion	214
8	**Parents' and teachers' views on mathematics learning in- and out-of-school**	**228**
8.1	Introduction	228
8.2	Research questions	228
8.3	Theme 1: Differences between home and school teaching strategies	229
8.4	Theme 2: Little utilisation of out-of-school resources in mathematics education	242
8.5	Summary and discussion	256
9	**The participants' views about the project's activities and its outcomes**	**265**
9.1	Introduction	265
9.2	Summary of parents' and children's views provided in the feedback sheets	266
9.3	The participants' views about the project discussed in the interviews	285
9.3.1	Parents' views about the project	285
9.3.2	Teacher J's views about the project	286
9.3.3	The impact of the project on home school communication	292
9.3.4	The impact of the project on children's mathematics learning	293
9.4	Summary	303
10.	**Conclusions**	**305**
10.1	Home-school relationships issues	305
10.2	Parental involvement in mathematics education and mathematics learning in- and out-of-school issues	311
10.3	Implications of the study	316
10.4	Limitations of the study	317
10.5	Suggestions for further research	317
10.6	Final remarks	318
References		**319**
Appendix A: Research context		**334**
Appendix B: General information about the classroom children and their families (who participated in the mathematical activities in the project)		**340**
Appendix C: Information about the photographs based on focus group interviews with the children		**350**
Appendix D: Mathematical activities introduced by the project		**365**

LIST OF TABLES

Table 4-1 Classification of sites and domains of numeracy practices: examples and qualities	88
Table 6-1summary of the main points of the shared homework activities	166
Table 6-2 Information about the interviewed mothers	167
Table 6-3 information about the interviewed teachers	168
Table 6-4 information about the interviewed fathers	169
Table 6-5 information about the parents who participated in the interviews	170
Table 8-1 Old and new currency's names in Bahrain	248
Table 9-1 Summary of parents' and children's characteristics and their level of participation in the project	284
Table A-1 The educational ladder in the Bahraini school system	339
Table B-1 Fathers' educational level	347
Table B-2 Fathers' occupation	347
Table B-3 Mothers' educational level	347
Table B-4 Mothers' occupation	348
Table B-5 Parental involvement level	348
Table B-6 Children's achievement level	348
Table C-1 The photographs taken by Group 2	351
Table C-2 The photographs taken by Group 3	354
Table C-3 The photographs taken by Group 4	356
Table C-4 The photographs taken by Group 5	358
Table C-5 The photographs taken by Group 7	361
Table C-6 The photographs taken by Group 8	363
Table D 1 People who assisted the child in performing the weekly activities	419
Table D-2 Parents' answers to the multiple choice questions on the feedback sheets of the weekly activities	420
Table D-3 Children's answers to the multiple choice questions on the feedback sheets of the weekly activities	421
Table D-4 Parents' and children's feedback in the open-ended questions of activity2	422
Table D-5 Parents' and children's feedback in the open-ended questions of activity 3	422
Table D-6 Parents' and children's feedback in the open-ended questions of activity 4	423
Table D-7 Parents' and children's feedback in the open-ended questions of activity 5	423
Table D-8 Parents' and children's feedback in the open-ended questions of activity 6	424
Table D-9 Parents' and children's feedback in the open-ended questions of activity 7	424
Table D-10 Parents' and children's feedback in the open-ended questions of activity 8	425

LIST OF FIGURES

Figure 2-1 Triadic sociocultural model of mediation	15
Figure 5-1 western Arabic numerals based on the idea of angles	105
Figure 6-1 The cyclical process of action research	125
Figure B-1 Grouping the classroom children according to their parents' level of education	349

1. Introduction

This research project is a small scale case study which drew on action research ideas. The project was carried out in one classroom in a primary boys' school in Bahrain. The project focused primarily on exploring two issues: (1) investigating the area of home-school relationships and thinking about possible ways of facilitating it; and, (2) acknowledging the social and cultural dimensions of mathematics and thinking about possible ways of connecting them to school mathematics.

This study focused on these two dimensions because they have been generally overlooked in the policies, research and practices of the educational system in Bahrain. This study intends to shed some new theoretical light on those two issues, change some aspects of current teaching practices in the case school, and reach useful recommendations for the policy-makers, teacher training and primary school teachers in Bahrain as well as for the wider educational research community.

This study aims to contribute to the general efforts of building better home-school relationships in Bahrain through: (1) investigating parents' and teachers' experiences and perceptions about this topic; and, (2) introducing new ideas which can instigate or facilitate home-school relationships. This dimension of the study was guided by the general argument that school should open their doors and build strong relationships with the families. Families should also be encouraged to take a more active role in their children's education and have a more powerful position and voice in school. Investigating these relationships and looking for possible ways of facilitating them would be a worthwhile task as these efforts could move us a small step toward more democratic social practice. This study also tries to achieve a better understanding about how parents and teachers conceptualise their relationships, how they conceptualise their roles and responsibilities, how they communicate, what their needs are, what the needs of different groups of parents are, whether there are any conflicts between parents' and teachers' standpoints, and to what extent the two parties are aware of each other's standpoints.

With regards to the issue of connecting children's in and out-of-school mathematics learning, this study attempts to move away from the narrow view of learning and tries to encourage parents and teachers to see their children not as mere knowledge receivers, but also to understand and appreciate the wonderful ideas of the children and the rich resources of their cultural and social environments. This study also tries to achieve a better understanding about how parents and teachers conceptualise mathematics, what their epistemological assumptions are about the nature of mathematics, what kind of theoretical ideas underlie their teaching practices, to what extent teaching methods used in home and at school accord or diverge, and how children's in and out-of-school mathematics practices are recognised and utilised by their parents and teachers.

Accordingly, this study draws on theoretical ideas derived from social approaches in mathematics education research and from new approaches in the home-school relationships research which call for more recognition and utilisation of the social and cultural resources available in children's homes and out-of-school environments.

I carried out a project with the help of one class teacher in a Year 2 classroom in a primary boys school located in a Bahraini rural village. The project drew in methodological ideas from the tenets of action research and case study. The project consisted of three interconnected phases. Throughout these phases I worked on two tasks. The first task was concerned with interviewing the participant parents, teachers and children in order to elicit their perceptions about the topics under investigation and to find ideas which could be utilised in further classroom work. The second task was concerned with planning and implementing novel mathematics learning activities carried out by the children at home (with the help of their parents and other family members) and in the classroom (with the help of the teacher and other children). In these activities, the children took photographs of mathematical events located in out-of-school contexts, worked on shared homework activities with their families at home, shared their experiences with other students in the classroom, and worked in classroom activities which extended ideas that emerged from the homework activity.

The data collection methods used in this study comprised:

- Semi-structured interviews with teachers and parents
- Focus groups with children
- Visual data: photographs taken by children
- Documents: activity sheets, feedback sheets completed by parents and children and the textbook

In addition, in this study I was concerned with two things: first, to improve my understanding through investigating the participants' perspectives about the two above issues. This effort would hopefully inform my understanding on the theoretical level. Second, I wanted to move from the theoretical level to the practical level. I wished to build upon the theoretical idea (found in the literature) and ideas of others (from the interviews with the participants) to develop new ideas which can introduce positive changes in classroom teaching practices and social relationships. Finally, I wanted to see whether this intervention has any impact on classroom practice and children's learning.

This work is divided into ten chapters, organised as follows:

Chapter 2 discusses a number of theoretical issues connected with the topic of mathematics learning in social contexts. It is divided into two sections: the first section begins by sketching the main aspects of the absolutist and the fallibilist perspectives on the nature of mathematical knowledge. Then it presents the main features of three general learning theories: behaviourism, constructivism and sociocultural theory. Commonalities, differences and educational implications of the three learning theories are then discussed. The second section focuses more specifically on the social approaches in mathematics education research and it is organised around five theoretical themes derived from the sociocultural literature: (1) mathematics and cultural practices: namely, the ethnomathematics approach; (2) tools mediation: the everyday cognition approach; (3) social mediation: scaffolding and guided participation; (4) context, transfer and identity: the situated learning approach, and, (5) values and identity.

Chapter 3 reviews literature in the area of home-school relationships. It begins by exploring different conceptualisations (definitions, types and models) concerned with home-school relationships. Then, it moves to discuss the

rationale for promoting positive home-school relationships and the barriers which can hinder such relationships. Next it discusses the current shift in practices discussed in the literature which has tried to move from the deficit model to the asset model of home-school relationships. Then, it focuses on studies which emphasise the need for understanding and acknowledging the diversity among different groups of parents. This diversity includes aspects such as: cultural capital, social class, gender, ethnicity, and power positions. Finally, it presents studies which highlight the importance of understanding the multiple perspectives of parents.

Chapter 4 looks into numerous projects and studies in the area of parental involvement in children's mathematics learning. The literature review here is organised around these dimensions: (1) Children's pre-school mathematics learning in the home environment; (2) Involving parents in their children's mathematics learning through shared homework; (3) Investigating parents' perspectives about their children's mathematics learning; (4) Promoting two-way dialogue about mathematics education between parents and teachers; (5) Utilising home mathematics resources for school mathematics teaching; (6) Investigating numeracy practices at home and school; and, (7) Promoting knowledge exchange between home and school.

Chapter 5 articulates the research problem and its significance and presents the research questions to be addressed. Chapter 5 is connected with Appendix A which provides background information and describes the context in which the research was conducted and includes general information about me, my country, the main features of the educational system, and the current challenges facing education in Bahrain.

Chapter 6 presents the general methodological issues of this study. The research is based on a qualitative design which draws on ideas from case study and action research. The first section also presents the rationale for using this approach and discusses how for data collection methods were determined.

The second section of Chapter 6 presents the small scale project which was carried out by me and a class teacher in one (Year 2) classroom in a primary boys school in Bahrain. The project comprised three stages: piloting, preparation and implementation. The project's overall aims were twofold: (1) to

understand and facilitate the connection between children's mathematics learning experiences between home and school; and, (2) to understand and facilitate home-school relationships. The project included these activities:

1. The data collection process: semi-structured interviews with parents and teachers, focus groups with children, visual data (photographs taken by children), short questionnaires and documents (activity sheets and textbook).

2. The mathematical activities which included:

- The camera activity whereby the children took photographs in out-of-school contexts of everyday situations which represented some mathematical aspects
- The shared homework activities which encouraged more parental involvement in their children's mathematics learning through sharing work embedded in everyday mathematical situations
- The classroom activities which extended ideas from the shared homework activities, tried to utilise everyday resources in mathematics lessons and encouraged children to engage in group work and discussions

The final part of Chapter 6 highlights the various ethical and methodological considerations encountered throughout the research process. It also presents an overview of the data analysis process.

The analysis and findings of this study are divided into three chapters as follows:

- Chapter 7 presents parents' and teachers' views regarding home-school communication and relationships;
- Chapter 8 focuses on parents' and teachers' views regarding in- and out-of-school mathematics learning issues; and,
- Chapter 9 presents parents', children's and the class teacher's views regarding the project's outcomes.

The main aim of the findings chapters is to investigate and discuss the participants', that is, parents, children, and teachers, views about the issues under investigation: home-school relationships, parental involvement in children's mathematics learning, aspects of in- and out-of-school mathematics learning, and the project's outcomes. Chapters 7 and 8 drew mainly on data derived from parent and teacher interviews. Chapter 9 drew on additional data sets such as focus groups with children and their work on the project's activities.

Chapter 10 is the conclusion chapter which puts together all the main findings and implications which emerged from the findings chapters and discusses the limitations and recommendations for further research.

2 Mathematics learning in social context: theoretical issues

2.1 *Introduction*

Mathematics education is an established area of study which comprises various research trends and theoretical perspectives. These trends and approaches rest on different philosophical assumptions derived mainly from both mathematics and education disciplines and also on other subjects such as philosophy, psychology and sociology.

Because of the interconnection between theory and practice, I think that learning more about different theoretical concepts and philosophical standpoints would help in the following ways: (1) to guide the research process; (2) to provide more in-depth understanding of the issues under investigation; and, (3) to look at how certain educational practices based on particular philosophical assumptions can affect children's mathematics learning.

The chapter consists of two sections. The first section begins by sketching the main aspects of the absolutist and the fallibilist perspectives on the nature of mathematical knowledge. Then it presents the main features of three general learning theories: behaviourism, constructivism and sociocultural theory. Commonalities, differences and educational implications of the three learning theories will then be discussed.

The second section focuses more specifically on the social approaches in mathematics education research. This body of research shares a broad interest in investigating the possible influence of social and cultural factors embedded in the out-of-school contexts on children's mathematics learning. The discussion will be organised around five theoretical themes derived from the sociocultural literature: (1) mathematics and cultural practices: namely, the ethnomathematics approach; (2) tools mediation: the everyday cognition approach; (3) social mediation: scaffolding and guided participation; (4) context, transfer and identity: the situated learning approach, and, (5) values and identity.

2.2 *Philosophical perspectives on the social nature of mathematics*

The philosophy of mathematics is a branch of philosophy which studies the philosophical assumptions, foundations and implications of mathematics. This discipline asks questions about the epistemological foundations of mathematical knowledge, such as: What is the basis for mathematical knowledge? What is the nature of mathematical truth? What is the justification of this assertion? (Ernest, 1994a).

Ernest (1994b) suggested that there is a strong link between mathematics philosophy and mathematics pedagogy. Looking at philosophical issues is important because explicit or implicit philosophical notions can have a significant impact on mathematics teaching and learning practices. These philosophical assumptions can be derived from personal experiences or from established scientific theories. For example, assumptions regarding the nature of mathematics knowledge can have important consequences in the classroom. A question such as: 'Is mathematics knowledge objective, value- and culture- free or is it a result of human activity under the influence of external social and cultural factors?' is linked with other questions related to everyday teaching practice such as: What is the aim of learning mathematics? Are social and cultural factors important in the learning and teaching process, and if so, how they can be accommodated in the classroom?

These questions about the nature of mathematics knowledge have sparked great controversy within the mathematics education field. In this regard, Ernest (1994a) distinguishes between two main philosophical approaches: the absolutist and the fallibilist.

Mathematics is conceived in the absolutist perspective as "an objective, absolute, certain and incorrigible body of knowledge, which rests on the firm foundations of deductive logic ...it is pure, isolated knowledge, which happens to be useful because of universal validity; it is value-free and culture-free" (Ernest, 1994a:9). In recent years, the absolutist perspective has increasingly come under question. First, research has challenged this view of ultimate mathematical systems and showed that mathematics is not as securely fixed as it is often being claimed. Ernest (2007) provides further discussion about this

issue. Second, putting more emphasis on the absolutist theoretical perspective can possibly lead to problematic consequences in mathematics teaching and learning such as:

- Giving more emphasis on routine 'transmission' teaching methods which concentrate on teaching mathematical concepts abstracted from real life contexts, involving the mechanical application of learnt procedures and stressing fixed right answers
- Giving low priority to students' social and cultural experiences in the out-of-school contexts which can affect their school mathematics learning
- Adhering to the educational practices which separate mathematics learning from the real lives of the learners which in turn can lead to a negative image of mathematics (e.g. mathematics as abstract and not related to the needs of the learner and associated with anxiety and failure).

In recent decades, a new wave of fallibilist mathematics philosophy has gained ground. These approaches propose a different perspective which considers mathematics as an outcome of social processes and argues that "social and cultural issues cannot be denied legitimacy in the philosophies of mathematics and must be admitted as playing an essential and constitutive role in the nature of mathematical knowledge" (Ernest, 1994b: 10). Therefore, the fallibilist view of mathematics has brought with it the implication that mathematics is culture- and value- laden and educators should pay more attention to the different contexts of learning and their social and cultural characteristics (Lerman, 1990). Fallibilist philosophies of mathematics have become central to a variety of contemporary mathematics learning theories including radical constructivism, social constructivism and sociocultural theories which in turn can influence classroom teaching practices (Ernest, 1999).

In sum, the absolutist philosophical perspective on the nature of mathematics knowledge (as value- and culture-free) has come under question while the fallibilist perspective (mathematics knowledge as an outcome of social processes) has gained ground. This shift in the philosophical perspectives brings with it the implication that social and cultural factors should be admitted as playing an important role in mathematics learning.

2.3 *Learning theories in a social direction*

Three learning theories will be explored in this section: behaviourism, constructivism and sociocultural theory. The first two theories conceptualise learning as a process which occurs internally in the individual learner while the third theory argues that the social context plays an important role in the learning process. In what follows, I will discuss how the learning theories have moved from a perspective which conceptualises learning as an individual mental process, to another perspective which conceptualises learning as participation in social practices. The presentation of the three theories will focus on the following points: the main features of the theories, commonalities and differences between the theories, and the possible impact of these theories on mathematics teaching and learning.

2.3.1 Behaviourism

Behaviourism is a learning theory which was dominant from the 1930s to the 1970s. The first generations of behaviourist psychologists (e.g. Pavlov, Skinner and Thorndike) challenged the old psychology paradigm which was based on religious ideas and lacked scientific rigour. They proposed a new approach which emphasised experimental methods in studying the observable behaviours of animals and humans and the stimulus conditions which controlled them. These experiments included studying stimulus-response patterns of conditioned behaviours, reinforcement, and behaviour shaping. These studies however seemed to exclude the inner states of the human mind such as values, desires and ideas which cannot be experimentally observed (Mergel, 1998; Smith, 1998).

Behaviourists conceptualised learning as a process of creating connections between stimuli and responses. They assumed that motivation to learn is pushed by external forces such as punishment and rewards. Rewards for example can increase the strength of connections between stimuli and responses. Learning is understood to be the product of this process (Bransford *et al.*, 2000).

Evans (1998) argued that learning according to the behaviourist view tended to be conceptualised as an individualistic process where social and cultural factors are not always explicitly considered as playing a highly significant role in learning. I think that the reinforcement idea proposed by this theory would entail some social aspects. Yet this social dimension seems to be hidden behind the rigorous behaviouristic experimental conditions.

These behaviourist views on learning can be misinterpreted by some educators and lead to teaching practices which emphasise direct knowledge transmission, systematic control and directions of each step of the learning process, and excessive reliance on memorisation, drill and rote practice (Woodward, 2004). Those educators may also tend to teach knowledge in an abstract way, separated from the social context and relatively expected to be transferred with little complexity across contexts such as home, school and everyday situations. These practices can somehow entail an absolutist view of mathematics knowledge (e.g. the belief of mathematics as fixed knowledge which is culture- and value- free) (Condelli *et al.*, 2006).

2.3.2 Cognitive Constructivism

Cognitive constructivism is one of the significant theoretical approaches which challenged the behaviouristic 'atomization' view of knowledge. This theory originated from the work of Jean Piaget (1896-1980) who emphasised the adaptive function of cognition. In this perspective, the learner is viewed as an active knowledge-maker who constructs his or her own concepts (Bloomer, 2001; Lerman, 1994). Human cognition, according to this view, develops through two processes: (a) assimilation: which includes the process of assimilating external actions into thoughts and fitting new mental models into the existing mental structures; and, (b) accommodation: which includes the process of structuring the adopted mental material in the mind. The latter process develops through four major periods of human life: (1) the sensorimotor period; (2) the pre-operational period; (3) the concrete-operational period; and, (4) the formal-operational period (Boudourides, 1998).

Cognitive constructivism had a great influence on contemporary mathematics education as it acknowledged the historical and evolutionary nature of knowledge (Ernest, 1994b). Learners, according to the perspective of cognitive constructivism, are seen as actively making sense of the environment by constructing their understanding through the development of autonomous mental models. Learning occurs through expanding these mental models by incorporating the new learning situations into the previous constructed models (Tuomi-Grohn, 2005). Teachers in this perspective have 'different' knowledge rather than 'more' knowledge (Hughes *et al.*, 2000). The teacher's responsibility, therefore, is to establish rich environments that encourage learners to explore, enquire, and solve problems in order to develop and integrate their mental models. Because learning is seen as an internal process, assessment cannot be achieved through simple tests. Assessment should be done through examining the underlying process of thinking to see how students solve problems or reach certain answers (Wortham, 2003).

Three social models of constructivism

Different models of constructivism were developed from Piaget's original work. In depth discussion of these models is beyond the scope of this literature review. Instead, I will focus primarily on the growing interest of constructivist models in the social dimensions of mathematics learning and teaching. This interest in constructivist learning theory can be associated with the fallibilist epistemology of mathematics knowledge discussed earlier.

The first model is radical constructivism (Von Glasersfeld, 1996) which conceptualises learning as a process of self-organisation where learners "actively construct their mathematical ways of knowing as they strive to be effective by restoring coherence to the worlds of their personal experience" (Cobb, 1994: 13). This model shows more interest in individualistic learning, child-centred learning and reducing the teacher's control. More emphasis is placed on the importance of learning by understanding rather than by mechanical performance. Mathematics education practices based on the radical constructivist perspective seem to move away from the absolutist and behaviouristic directions towards a direction which assumes that all knowledge, including mathematics, is constructed and fallible. However, this approach still

strongly prioritises individual aspects of learning and views social aspects as merely part of, or reducible, to the individual (Ernest, 1994a; Lerman, 1994)

The second model is the interactionist constructivist model (Cobb, 1994) which pays more attention to the social aspects of learning. Here, learning is seen not just as the individual's construction of their own ways of knowing but also as a process of reconstructing knowledge models through implicit and explicit meaning negotiation in social interactions. This model focuses mainly on interactions within classroom settings such as teacher-student interactions and how the two parties constitute and negotiate meanings and the understanding of different mathematical concepts. This approach seems to pay little attention to aspects related to mathematical practices taking place in the wider social settings such as the home and other out-of-school settings.

The third model is the social constructivist model (Ernest, 1994a) which gives more attention to the social aspects of mathematics learning. This approach focuses on the dialogical nature of mathematics learning. In a mathematics lesson, for example, different types of conversation and social participation are considered to be important strategies for developing the mathematical knowledge of the learners. In this view, teachers should provide opportunities for mathematical conversations and engage in a dialogue with learners in order to communicate, test, correct and validate students' mathematical learning.

The three constructivist models share similar ideas. In contrast with behaviouristic approaches, these constructivist perspectives give more recognition to the social aspects of mathematics learning. They move more towards the fallibilist view of mathematical knowledge, which conceptualises mathematics as a social construct and therefore as value laden, culturally determined, and open to revision (Condelli *et al.*, 2006). These three constructivist models also share another common aspect as they view mathematics learning as a process that occurs internally in the individual learner and is facilitated by social interactions in the classroom. These approaches apparently give less attention to the wider 'real' contexts (i.e. children's social and cultural experiences in out-of-school environments which can possibly shape and influence their learning).

In what follows, I will discuss in more detail the sociocultural theoretical position on mathematics learning and teaching. The main argument of this approach is that we cannot understand learning and cognitive development by just focusing on the individual; we need also to examine the external social world in which the individual lives and develops (Tharp & Gallimore, 1988).

2.3.3 Sociocultural theory

Sociocultural theory was inspired by the work of the Russian psychologist Lev Vygotsky (1896-1934) carried out in the late 1920s. Vygotsky developed a new conceptualisation of how people think and act. Human activity, according to this view, is a structured activity in which collective, rather than individual practices, are integrated through social interactions and tool mediation. More ideas of sociocultural theory were proposed by Vygotsky and other sociocultural writers. These ideas can be summarised in the following points:

- Understanding human development requires understanding the extended social world: Vygotsky suggested that cognitive development cannot be understood by just studying the individual; the extended social world must also be examined because focusing mainly on studying the individual can separate human functioning into smaller elements that no longer work as does the larger living unit (Rogoff *et al.*, 2003; Rowe & Wertsch, 2002; Siegler & Alibali, 2005)

- The basic unit of analysis is no longer the properties of the individual; it also includes processes of the sociocultural activity that involves the active participation of people in socially constituted practices (Rogoff, 1990). Human behaviour in this perspective can be viewed as a triad of subject, object and mediating tools. The unit of analysis in this model (see Figure 2.1) consists of an object oriented action mediated by cultural tools (Engestrom, 1987)

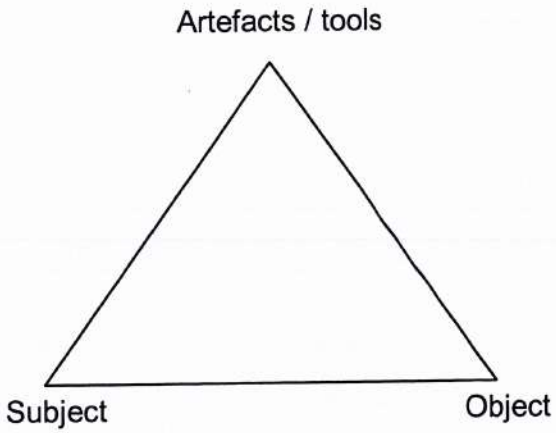


Figure 2.1 Triadic sociocultural model of mediation presented in Engestrom's model (1987)

- *Social interaction mediation and psychological functioning*: Sociocultural theory argues that cognition develops through two processes. First, at the 'inter-mental' level (between people involved in social interactions), and later at the 'intra-mental' level (within the individual). Vygotsky introduced the concept of the zone of proximal development (ZPD) which was used to describe the distance between the independent performance of an individual and his or her performance when guided by an expert. For example, when children are supported by social partners while doing cognitive tasks, these social interactions can help children to gradually internalise higher cognitive functions and eventually allow them to perform the tasks on their own (Rowe & Wertsch, 2002; Tharp & Gallimore, 1988).

- *Tools mediation and psychological functioning*: Sociocultural theory argues that human cognitive development is influenced not just by social interactions but also by cultural tools. These tools include material tools (e.g. calculator, computer) or psychological tools (e.g. signs, symbols, language, and number systems). These tools affect the way people organise, process, and remember information. Language for example, can be used as a means of communication and can also be used as a means to control and regulate thinking (e.g. it can be used to plan

actions, remember information, solve problems and organise behaviour). Cultural tools can be developed by different cultural groups over time.

Learning in the sociocultural perspective is conceived not just as a separate activity undertaken for its own sake, but rather as a process which occurs in a larger context where knowledge has a functional importance for the learner. This process of linking the individual understanding with the wider context can help the learner to achieve a personal goal which is also socially valued within the community (Wells, 1999).

Kozulin (2003) pointed out that Vygotsky's ideas of mediation by cultural tools and social interaction can have significant educational implications and applications. First, Vygotsky's notion of cultural tools can be useful when looking at issues such as cultural diversity. According to this approach, each culture or context can have its own set of cultural tools and situations where these tools can be appropriated. Second, Vygotsky's idea of learning through mediation contributed to the development of a new approach which conceptualised learning as a process of participation in social activities. This approach challenged the acquisition model of learning which viewed learners as containers to be filled with knowledge and skills through teachers' instruction (Sfard, 1998).

Siegler and Alibali (2005) noted that sociocultural theories have many useful ideas which can be used in educational practice:

- Children's knowledge should be assessed in terms of their ability to learn from social interactions, rather than solely on their unaided level of performance
- Certain types of social interactions such as guided participation or scaffolding within the ZPD, can be beneficial for students' learning. Therefore, it may be valuable to design classroom lessons and other types of educational activities which facilitate these types of social interactions
- Teachers should try to learn more about the different cultural tools being used by the learners in out-of-school contexts and they should try to integrate these tools in mathematics lessons.

In this study, I drew on different theoretical concepts developed by sociocultural research in mathematics education. I chose this framework because it is closely relevant to my research interest since it:

1. Shows particular interest in investigating aspects of mathematics learning which take place in different social contexts. This factor would be helpful for understanding more about mathematics learning experiences in home and in school.
2. Emphasises the role of social mediation which is closely related to the issue of parental involvement in mathematics learning.
3. Pays attention to important issues such as power, identity and values which are often overlooked in traditional mathematics education.
4. Supports more recognition and utilisation of children's out-of-school mathematics learning experiences in mathematics classroom.

More details about sociocultural research in mathematics education will be discussed later in section 2.4

2.3.4 Two metaphors that underlie learning theories

Greeno (1997) argued that each of the three learning theories (behaviourism, constructivism and the sociocultural theory) bring different aspects of learning into the foreground as follows:

- Behaviourism focuses on the development of skill
- Constructivism emphasises conceptual understanding and problem solving and reasoning strategies
- Sociocultural theory emphasises the role of mediation through social interactions and cultural tools

Therefore, each of these theories can be seen as providing part of the wider picture of learning.

In relation to this idea, Sfard (1998) identified two metaphors that underlie learning theories: the acquisition metaphor and the participation metaphor. In the acquisition metaphor, learning is seen as a process of acquisition and accumulation of basic units of knowledge in the human mind which is seen as a

knowledge container. Sfard argues that terminology associated with the acquisition metaphor is embedded in the behaviourist, constructivist and sociocultural literature. This terminology involves some kind of ownership of self-sustained entity (e.g. construction, development, internalisation, transmission). Learning in this view is achieved through processes such as delivering, facilitating, or mediating. Knowledge acquired in learning can then be applied in or transferred to different contexts. Sfard suggests that each of these three learning theories offers different mechanisms of learning (passive reception, constructing mental structures and concept transfer from the social to the individual plane respectively). However, they all appear to accept, implicitly or explicitly, the idea of knowledge acquisition (i.e. concepts are accumulated and gained by the learner).

The second metaphor proposed by Sfard is learning through participation. In this perspective, learning is seen as participation in ongoing learning activities situated in social contexts. According to this metaphor, the learner is seen as an integral part of a community of practice. The focus is not just on the individual but on his or her dialectic relations with the community. Research terminology associated with this metaphor includes: learning in community, apprenticeship in thinking (Rogoff, 1990), and legitimate peripheral participation (Lave & Wenger, 1991). These approaches will be discussed further in section 2.4.

An important point raised by Sfard (1998) is that devotion to one metaphor and rejection of the other may lead to problematic consequences in the field of theory and practice. She argued that the two metaphors should be seen as complementing rather than competing with each other. She also highlighted the difficulty of separating the two metaphors or finding a theoretical approach which is exclusively dominated by a single metaphor. The acquisition metaphor is important in conceptualising learning mechanisms. However, depending on it heavily can lead to a narrow view of learning (e.g. as information transmission and receiving). The participation metaphor can have a potential for a new, democratic and broader view of learning, yet it seems insufficient for explaining the details of learning processes.

In sum, three general learning theories have been presented: behaviourism, constructivism and sociocultural theory. The behaviouristic conceptualisation of the learning process seems to entail an absolutist view of mathematics (the

belief in the certainty and truth in mathematics). This approach seems to view learning as an individualistic process where social and cultural elements do not play a very explicit role. Behaviourism and constructivism share a perspective of learning as a process which occurs internally in the individual learner. However, constructivism views the learner as an active knowledge-maker who constructs his or her concepts. New strands of constructivism showed more interest in the social dimensions of mathematics learning and teaching. Although these new strands move toward a more fallibilist perspective of mathematical knowledge (mathematics as value laden, culturally determined and open to revision), they still view mathematics learning as a process that occurs internally in the individual learner which can be facilitated by social interaction in the classroom context. Less attention is given to the wider social contexts such as real life situations outside school. Sociocultural theory brings a different perspective to explain the learning process. In this view, learning cannot be separated from its social context; it occurs through the active participation of the individual in wider social practices mediated by social interactions and cultural tools.

2.4 The social turn in mathematics education research

In the last two decades, there has been a growing interest in investigating the effect of cultural contexts and social factors on mathematics learning. This growing interest, described by Lerman (2000) as the 'social turn' in mathematics education research, was based on theoretical foundations developed by mathematics philosophies and learning theories which emphasise the effect of social factors on mathematics knowledge and the learning processes (as discussed above). This social turn was motivated in many Western countries by calls for more attention to cultural and social factors that can affect children's learning and provide solutions for problems such as the underachievement of children from ethnic minority backgrounds. Educational reform movements in some developing countries also had a similar interest in social and cultural aspects of mathematics education as an attempt to decrease the separation between mathematics education (e.g. an educational curriculum modelled on former colonial systems) and the current needs of the society (Bishop, 1988).

Guida de Abreu (2000) provided a useful idea that can help in categorising the substantial body of sociocultural studies in mathematics education for the

purpose of this literature review. She suggested that these sociocultural studies often focus on two dimensions; the cultural component of the context (tools mediation); and, the social component of the context (social interactions mediation). Abreu added another dimension which focuses on the values and identities attached by learners to particular cultural tools while participating in social activities. Two additional useful approaches - situated cognition and ethnomathematics - are also discussed in this chapter. In sum, five dimensions of sociocultural research in mathematics education were emphasised by the literature: (1) mathematics and cultural practices: the ethnomathematics approach; (2) tools mediation: the everyday cognition approach; (3) social mediation: scaffolding and guided participation; (4) context, transfer and identity: the situated learning approach; and, (5) values and identity.

It is worth noting that the reason for organising studies in this way was to achieve a clear structure which can help for a better presentation of the broad literature. In reality, these studies are often interrelated as they draw on similar sociocultural foundations and also build upon each other. All five areas of research share an agenda which looks beyond the notion of attributing the sources of differences between learners to the presence or absence of capacities. They do not deny that there are universal aspects which exist in all humans. However, they are more interested in issues that appear to be often neglected in educational research. One of these issues is the search for the source of diversity among learners in socioculturally specific experiences. Understanding diversity, in their view, requires attention to the interplay between the individual, society and culture (Abreu, 2002).

2.4.1 Mathematics and cultural practices: the ethno-mathematics approach

The ethnomathematics approach argues that people in different cultural groups can develop different styles of mathematics in order to explain and deal with reality. The ethnomathematics approach draws on Paulo Freire's (1970) epistemology which argued that knowledge "is not fixed permanently in the abstract properties of objects, but is a process where gaining existing knowledge and producing new knowledge are two moments in the same cycle" (Powell & Frankenstein , 2002: 3). Different cultural practices – including social, economic,

historical and political practices – are seen as key factors in the development of mathematical knowledge. Thus, mathematics is conceived as a cultural product which develops in particular ways under certain historical, social and cultural conditions in different cultures. This idea raises questions about why one style of knowledge such as 'Western' formal academic mathematics is largely accepted and adopted as a legitimate type of knowledge in educational systems around the world – especially in developing countries - while other forms of mathematical knowledge related to everyday experiences or associated with ethnic cultural practices are often ignored or marginalised (D'Ambrosio, 1997; Gerdes, 1994). These ethnomathematics notions clearly contrast with absolute views of mathematics knowledge (i.e. mathematics as value-free and culture-free).

One of the leading ethnomathematics writers, Ubiratan D'Ambrosio (1994), defines the term ethnomathematics as follows: "*ethno* stands for culture or cultural roots, *mathema* is the Greek root for explaining, understanding, learning, dealing with reality, *tics* stands for distinct modes of explaining and coping with reality in different cultural and environmental settings" (p. 232).

D'Ambrosio and other ethnomathematics writers - such as Marcia Ascher and Paulus Gerdes - have provided several other definitions. Bush (2002) presented more than ten definitions addressed by those three chief ethnomathematics writers. Many studies (Barton, 1996; Bush, 2002; Presmeg, 2007; Rowlands & Carson, 2002; Vithal & Skovsomse, 1997) have called attention to this issue and discussed contradictions which exist in the ethnomathematics literature especially in the issue of ambiguity in defining ethnomathematics.

Recent studies (Horsthemke, 2006; Rowland and Carson, 2004) continued this debate through questioning certain epistemological, educational and political issues facing the ethnomathematics framework. Contemporary ethnomathematics writers have responded to this critical review (see: Adam *et al.*, 2003; Barton, 1996; 1999). Presenting the full picture of this debate is beyond the scope of this study. What is more important, however, is to look at some of the educational implications of ethnomathematics proposed by contemporary writers. These writers generally advocate the integration of cultural aspects of the students' lives in the learning environment and curriculum.

Adam *et al.* (2003) proposed three possible forms of ethnomathematics curriculum: (1) focusing on mathematical ideas in their meaningful context and investigating how these ideas are culturally produced as a response to human needs; (2) designing a curriculum with particular content which is distinct from conventional mathematics which looks especially at practices associated with cultural groups; and, (3) showing children that mathematics is a living and growing discipline by exploring their experiences and providing them with opportunities to explore a wide range of mathematical ideas in the social and cultural context.

Alan Bishop's work (1988; 1997) has shed more light on possible educational implications that can build on ethnomathematics ideas. Like many other ethnomathematics writers, Bishop challenged the absolutist view of mathematics and argued that mathematical knowledge is cultural knowledge which has been developed in all human cultures. Mathematics education, in his view, is more than just teaching children to do mathematics. Mathematics education should recognise children as active learners who are engaged in developing their cultural knowledge through social interactions with other people within the cultural group who act as carriers of the cultural ideas, norms, and values.

Developing the mathematics curriculum and teaching methods have a central position in Bishop's work. He discussed three areas of concern in mathematics learning. These are:

- *Technique oriented curricula:* A curriculum which portrays mathematics as a 'doing' subject not a 'reflective' subject or a 'way of knowing' by focusing on a constrained type of thinking related to procedures and methods to get correct answers through practising. Mathematics curricula are needed to help students to develop more understanding about 'how, and when, to use these mathematical techniques, why they work, and how they are developed' (p.8)
- *Impersonal learning:* where mathematics is viewed as an impersonal object to be transmitted in a one-way communication. Learning is not linked to the personal meanings of the learner; there is little space for learners' views and opinions, and little opportunity to talk. This curriculum

often overlooks the individuality of the learner and the social and cultural context of education

- *Text teaching:* when teachers depend on a mandatory textbook that controls teaching and learning. These textbooks must be supported by materials and activities which the teacher can provide to help students to learn effectively. These activities and materials should be related to the children's personal needs and problems

Bishop also proposed six fundamental activities that can be found in all human cultures and societies. These activities are: counting, locating, measuring, designing, playing and explaining. These six fundamental activities can be both universal as they are carried out by every cultural group, and also necessary and sufficient for the development of mathematical knowledge. Mathematics as cultural knowledge can be derived from human engagement in these six universal activities. From these basic notions we can link both 'Western' and 'ethnic' mathematics in the classroom. These six activities can give a structure to a curriculum which enables many culturally relevant activities from the wider society to be used in the classroom as well as encouraging the development of more generalised mathematical ideas.

In addition, Bishop was interested in investigating how children from disadvantaged, minority, ethnic, and lower socio-economic backgrounds can experience cultural conflicts in the process of transition and interactions across different social institutions such as home and school. Bishop argued that learning difficulties often associated with children from disadvantaged backgrounds should not be attributed only to the cognitive abilities of the child or to the quality of teaching. Educators also need to look at social and cultural factors which can play an influential role in these learning difficulties. For example, children coming from disadvantaged backgrounds can face cultural differences and conflicts between their cultural background at home and the educational norms and traditions of the school. Bishop argued that analysing these conflicts and exploring the different alienated groups' experiences can provide educators with a better understanding about social factors which can affect children's learning as well as providing new ideas for improving the learning process.

In my research which will be discussed later in the methodology chapter, I draw on some of the ideas which were emphasised by Bishop. These are:

- Children are seen as active learners. More space should be given to them to express their views and opinions and to engage in meaningful and authentic mathematics learning
- Mathematics teachers should avoid reliance on techniques and curricula based on constrained types of thinking (e.g. getting correct answers through routine practice). The curriculum should be supplemented by activities which build upon children's experiences in the social and cultural context
- Mathematics teachers can explore children's out-of-school mathematical experiences by investigating the six universal activities suggested by Bishop and thinking about possible ways of linking such experiences with school mathematics
- Mathematics teachers should look for any conflicts which may occur between school mathematics and the home mathematical experiences of the children and try to think about possible ways to overcome such conflicts

2.4.2 Tools mediation: Everyday cognition

Psychologists who adhere to the everyday cognition approach argue that human thinking is embedded in social and cultural activity. Therefore, depending solely on traditional psychological laboratory studies is inadequate for studying human cognition. This argument – the importance of the influence of contextual factors on human thinking – has been supported by many researchers (e.g. Terezinha Nunes, Sylvia Scribner, Michael Cole, and David Carraher) in different countries (e.g. the United States, Brazil and Liberia). These studies involved rice farmers, dairy workers, tailors, street vendors and school students. The overall results showed that people in different cultures develop everyday procedures to deal with everyday mathematical aspects (e.g. measurement, geometry and arithmetic) which help them to solve problems embodied in real contexts. These studies also showed that traditional school mathematics procedures, when applied in out-of-school contexts, do not necessarily lead to correct answers. In addition, strategies developed to solve real problems in out-of-school contexts

seemed to be more flexible and more related to the meaning of the situation than school strategies (Schliemann, Carraher & Ceci, 1997)

A study carried out by Carraher, Carraher and Schliemann (1985) will be used here as an example to show how children can use different methods (cultural tools) depending on the context of the situation. Carraher *et al.* contrasted young Brazilian street vendors' performance on two sets of mathematical problems that had similar content but different formulations: the informal set (i.e. everyday problems in a selling context) and the formal set (school-type word problems). The study concluded that children use different methods (mathematical tools) depending on the situation. The children tended to use mental manipulation in the informal set, while in the formal set they tried to follow school procedures which were less successful - probably because of the symbolic and abstract nature of the tasks. The study also concluded that both types (formal and informal) are important. The challenge for mathematics education is to focus not solely on one type of formal teaching, but to be more considerate towards learners' experiences related to everyday contexts.

Nunes (1993) illustrated through her research with farmers and builders that mathematical activities which take place in- and out-of-school can be different: mathematics outside school is a tool to solve problems and understand situations while school mathematics involves learning the results of other people's mathematics. Mathematics outside school tends to be more like modelling, in which both the logic of the situation and the mathematics are considered simultaneously by the problem solver. In contrast, school mathematics typically focuses on mathematics *per se*.

Schliemann and Carraher (2002: 263) suggest that the educational implications of everyday cognition research on the design of classroom activities requires:
(a) Taking into account children's previous understanding and intuitive ways of making sense and representing relationships between physical quantities and between mathematical objects
(b) Providing opportunities for children to participate in novel activities that will allow them to explore and to represent mathematical relations they would otherwise not encounter in everyday environments
(c) Exploring multiple, conventional, and non-conventional ways to represent mathematical relations

(d) Constantly exploring the matches and mismatches between rich contexts and the mathematical structures being dealt with

In sum, this approach helps to look beyond psychology based learning theories to a broader perspective on mathematics education (Henning, 2004). For example, cultural context and its related tools can play an important role in understanding and solving mathematical tasks. Children are likely to find correct solutions for problems when they are related to meaningful contexts and real-life problems. Schools should not treat mathematics as an abstract context-free subject, but rather seek ways of incorporating mathematical concepts learned in school with real contexts and meaningful problems. Schools should also provide children with more opportunities to develop their own mathematical strategies without too much imposing of formal conventional systems. These ideas were taken into account during the process of designing the project used by this study and is discussed in detail in Chapter 6.

2.4.3 Social mediation: Scaffolding and guided participation

As mentioned earlier, the idea of learning through social interaction mediation (i.e. the concept of the ZPD) was central in Vygotsky's theory. This idea was further developed by different writers. In what follows, I will present two concepts extended from the ZPD notion: scaffolding and guided participation.

Scaffolding

Scaffolding (Wood, Bruner & Ross, 1976) is one of the important educational concepts underpinned by the ZPD idea. Scaffolding refers to the wide range of activities through which the expert (e.g. adult, parent or peer) helps the learner to achieve a higher level of performance which would otherwise be beyond the learners' ability. The basic idea of scaffolding is to close the gap between the learner's abilities and the task requirements.

Scaffolding strategies at home: Scaffolding can occur through cooperative parent-child interaction during joint problem solving. For example, when a parent supports a child's learning through providing selective intervention, this support can extend the child's skills and allow successful accomplishment of the task which might not be possible when done individually (Greenfield, 1984)

An example of studies which emphasised the role of scaffolding was a study carried out by Mattanah *et al.* (2005) who argued that the use of scaffolding strategies by parents at home can promote children's academic competence in school. Mattanah *et al.* examined the interrelationships between authoritative parenting and parental scaffolding behaviour and the effect of each of these variables on children's academic competence in the fourth grade in the USA. The study sample included 65 mothers and 62 fathers of 10-year-old children from relatively affluent backgrounds. Authoritative parenting was assessed through laboratory-based parent-child interactions. Assessment of parents' scaffolding was conducted during a long-division task in which the parent was instructed to help the child. Measures of children's academic competence included teachers' reports and child-self reports about academic competence and mathematics achievement tests. Relationships between parental scaffolding behaviour and children's subsequent academic outcomes were examined. The study found significant associations between mothers' and fathers' scaffolding behaviour and children's academic performance in the immediate term (i.e. significant correlations between parental scaffolding behaviour and child success at the task). The study also found that mothers' scaffolding behaviour was significantly associated with academic competence in the longer term (links between scaffolding behaviour and teacher- and child- reports of academic abilities). The authors explained these findings by suggesting that scaffolding can boost children's self esteem regarding academic tasks and, in turn, helps the child to remain motivated to succeed at school. The study concluded that parents who use scaffolding strategies when teaching their children appear to have children with higher confidence about their academic abilities and are seen as more academically motivated and competent in the classroom by their teachers.

Scaffolding strategies in the classroom: Tharp and Gallimore (1991) used the term 'assisting performance' which is closely linked with the scaffolding concept. They define assisted performance as "what a child can do with help, with the support of the environment, of others, and of the self" (p.45). They propose that there are three mechanisms for assisting learners:

- Modeling: pupils' imitation of teacher's behaviour
- Contingency management : teachers rewarding or punishing learners' behaviour

- Feedback: allowing learners to compare themselves with some established standard

Tharp and Gallimore argue that while it is quite common for adults to assist children in everyday situations, it less common for this type of assistance to occur in classrooms. For example, it is hard for teachers in large classrooms to provide assisted performance for different reasons such as: the high number of children, limited time for joint teacher-child activity, and insufficient opportunities for dialogue and negotiation with the children.

Similarly, Bliss, Askew and Macrae (1996) highlighted problematic aspects associated with implementing the scaffolding idea. Their study showed that teachers found difficulty in effectively engaging in scaffolding interaction with their pupils: they either used a directive teaching strategy, or gave full initiative to the pupils, leaving them to do the task by themselves, without much help from the teacher.

Guided participation

Another concept inspired by Vygotsky's idea of social mediation was developed by Rogoff (1990). She argued that human cognition is not just an internal function, but rather a process interwoven with the context of the everyday activity. This context includes the physical and conceptual structure of the cognitive activity as well as the social environment. Social interactions are seen as central to the cognitive activity embodied in the social context. Rogoff extended the concept of ZPD by offering a conceptualisation which regarded children's cognitive development as a process of guided participation in social activity with more-expert others. Those experts support and stretch children's understanding and skills in using the cultural tools.

Wood (1998) noted that the general characteristics of guided participation can be summarised in the following points:

1. Tutors provide a bridge between a learners' existing knowledge and skills and the demands of the new task
2. Tutors provide instructions and structure to support the learner's problem solving
3. Learners play an active role in learning and contribute to the successful solution of problems

4. Effective guidance involves the transfer of responsibility from tutor to learner

Rogoff showed in several studies that both the adult's guidance and the child's participation can make a difference in children's learning. For example, Gőncű and Rogoff (1998) have shown that adult support provided to children can positively influence their ability to categorise. They investigated how varying roles of adult and child leadership in decision making yielded differences in children's learning of a categorisation system. In the first study, 64 five-year-old children (with a middle-class background in the US) worked on a categorisation task (sorting photos of 18 household items into six categories). In the post-test, the children worked independently to sort eight of the previously provided set of photos and 12 new photos into the same previous categories. The adult (a female undergraduate student who was unaware of the study purpose) followed scripts designed to adjust the extent of guidance in determining category labels and the extent of children's participation in decision making. Consistent with previous research (Gauvain & Rogoff, 1989; Rogoff & Gauvain, 1986), the findings of the study showed that the learning of a categorization system was better if the children and/or the adult with whom they worked explicitly communicated the system than if such structuring of the task did not occur.

2.4.4 Context, transfer and identity: Situated cognition

The situated cognition approach challenges the idea of separating mind from context. It locates learning in the middle of co-participation rather than the head of the individual (Henning, 2004). Jean Lave (1988) is one of the leading contributors to the study of situated learning. Context and transfer are two central themes in her work. In her early studies, she observed the work of apprentice and master tailors in Liberia where she investigated the impact of schooling and years of tailoring work experience on mathematical skills. She used different mathematical tasks which varied according to their degree of familiarity with tailoring or schooling practice. These tasks were applied to tailors who varied on their level of schooling and tailoring experiences. Findings showed that schooling experience contributed more to the performance in school-type tasks while tailoring experience, similarly, contributed to the tailoring-type tasks. Therefore, Lave concluded that, "it appears that neither

schooling nor tailoring skills generalise very far beyond the circumstances in which they ordinarily applied" (p. 199), which means that they did not provide general skills in numeric operations.

In another study conducted in the US, Lave (1991) investigated the uses and performance of mathematics in a group of adult shoppers in different settings: routine supermarket shopping, best buy simulation experiment, and school mathematics test. Findings indicated that years of schooling were a good predictor of performance in school like tests but had no statistical relationship with performance in the two other situations. These findings suggest that in this case, school learning has little power of generality or learning transfer and therefore success or failure in mathematics might be best understood by looking at the context's actors and activities rather than just looking at cognitive strategies. These studies were a starting point towards challenging the common belief that schooling has general cognitive effects that can transfer and generalise across practices as an automatic process (Abreu, 2002).

Discussion about transfer is a central issue in the areas of everyday cognition and situated cognition. Learning transfer can be defined as, "the ability to utilize one's learning in situations which differ to some extent from those in which learning occurs; or alternatively, transfer may refer to the influence in one situation or context upon learning in another situation or context" (Ausubel & Robinson, 1969 cited in Willington, 2006: 179)

Jeff Evans (1998) examined the concept of transfer of mathematics learning between school and outside school: namely, the application of ideas and knowledge from one context to another, such as the application of knowledge from the school context to outside everyday contexts. He highlighted the controversy which surrounds the issue of transfer. The meaning of the term 'learning transfer' depends on which theory it is based upon.

In the behaviourist learning perspective, for example, a mathematical problem can be taught in an abstracted way separated from context – which appears to be viewed as a physical location that can be controlled. Hence, learning transfer across different contexts (e.g. school and out-of-school) is expected to occur in a relatively unproblematic way. In contrast, the constructivist and sociocultural approaches tend to see the process of learning transfer as more problematic.

The cognitive constructivist view of knowledge application is based on the idea that knowledge can be transferred from the solution of one previously learned task to the solution of another new task. For example, when a student is solving a mathematical problem, s/he needs to find a pattern of relations between the new problem and other problems previously encountered. The context of the problem mainly relates to tasks often separated from the real social world (Tuomi-Grohn, 2005).

In the sociocultural approach there is an increased recognition of the complexity of learning transfer. The situated cognition model provides a different view of learning transfer which focuses on the learning context. The strong form of situated cognition (Lave, 1988) argues that cognition is dependent on the context in which it is acquired. Thus, there is disconnection between doing mathematical problems in school and engaging in everyday mathematical problems. The reason for this disconnection is because these different contexts have different characteristics such as cultural tools, social relationships and activities. Context here refers to the social context that is defined in terms of participation in a social practice. Lave believed that participants' thinking in these settings is joined with the characteristics of the particular context and because these contexts are different, transfer of learning can therefore be difficult. In her later work, Lave (1996) seems to be less concerned with the disjunction between practices and proposed a new approach focusing on studying learning within communities of practice and social relations and identities across them.

Identity formation through participation in a community of practice is another theme in the situated cognition approach. Jean Lave and Etienne Wenger (1991) introduced the concept of legitimate peripheral participation (LPP) which focuses on the individual identity formation and the change in collective identity. Individual identity is gradually created through one's participation as a member in the practices of a community of practice. Through this participation, individuals move from the position of the novice or the periphery to a more expert position in the community of practice. The introduction of new ideas by the new members, the interactions between the individuals and the community and possible emerging conflicts can lead to gradual changes in the collective identity of the community (Henning, 2004). Learning is viewed, according to this

approach, as an ongoing and evolving creation of identity and the production and reproduction of social practice both in and out of school. This process permits social groups and their individuals to maintain joint relations that promote the life of the group.

LPP was not originally developed in the context of, or for the purpose of, informing mathematics education. However, this framework raises challenges to the perspective which assumes that abstract learning of mathematics can simply facilitate transfer and this knowledge may be readily applied in other situations than the one in which it was learned (Presmeg, 2007).

The LPP framework may not translate easily into the classroom teaching and learning of mathematics, e.g. students' participation in the classroom may be non-voluntary, and they are not necessarily aiming to become mathematicians or mathematics teachers. Although using this theoretical perspective may seem problematic in the classroom, it can be useful in terms of looking at learning situations which take place in students' homes and out-of-school activities and finding ways to bridge the gap between the two learning contexts (Presmeg, 2007).

Situated cognition provides ideas that challenge the traditional view which separates cognition from context and views knowledge as independent of individuals. These ideas can be summarised in the following points (Willington, 2006):

- Learning is primarily social and cultural. The focus is not on what is learned but on how it is learned, where and with or through whom
- The community of practice has a major influence on learning
- The focus is on participation style of learning not transmission
- The unit of analysis is the community of practice with its sociocultural settings and not just the individual mind

2.4.5 Values and identity

Abreu (1999) argues that mathematics education informed by sociocultural research has focused mainly on two components of the learning context:

- One line of research - discussed in section (2.4.2) - is concerned with the cultural component of the context (e.g. how cultural tools can mediate cognition)
- Another line of research - discussed in section (2.4.3) - is concerned with the social component of the context (e.g. how social interactions can influence learning)

Abreu (1998; 1999) acknowledges the importance of these two components, but she argues that they still offer only a partial account of the sociocultural aspects of the learning process. She suggests that it is important to take into account the value placed by social groups on specific tools and certain types of social participation. She is interested in finding out about why particular tools – that is, certain skills and strategies - are used to solve mathematical problems in certain contexts (such as the out-of-school context) while not used in other contexts (such as the school context). For example, Abreu showed in her early research on sugar cane farmers in Brazil how specific indigenous mathematical practices such as calculating land areas by using traditional measurement units were valued and shared as a powerful tool among farmers, but in other situations such as the school-like context of new farming regulations it was seen as backward or useless. In this case, indigenous mathematical systems appear to be marked with low status when compared with school mathematics. In another study, Abreu investigated Brazilian children's views about mathematical practices related to school and farming contexts. She found that children considered farming as a situation where little mathematics was used while office jobs are the place where people use mathematics. The children thought that people in the office performed best in mathematics when they were school students while sugar cane farmers had the worst performance when they were school students. The children often did not consider farming practices as including mathematics aspects because these practices were associated with low social status. Abreu suggested that these findings indicate that children have constructed an understanding of the social status of different types of mathematics used by particular social groups of people. The children also seem to associate farming mathematics with low status groups and negative social identity while school mathematics was associated with high status groups and positive social identity.

In her later work, Abreu and Cline (1998) investigated the topic of social representations of mathematics learning in multiethnic primary schools in England. They found that children developed ways of categorising common social activities in terms of the mathematics involved. The research sample included four children (ages 6-11, of south Asian background with different levels of achievement in school mathematics). The study explored children's views about: (a) what they count as situations where mathematics is used; and, (b) their beliefs about more and less successful performance at school and its consequences, in terms of the jobs to which people gain access. Children were asked to sort pictures of situations where people need to use mathematics and to decide whom they thought were the best and the worst pupils in school mathematics when they were in school. These situations were illustrated in pictures which included children involved in school activities and home activities, and adults involved in white or blue collar professions. Findings of the study confirm that children hold some understanding of the social character of mathematics. For example, children tended to link failure in school mathematics with low status jobs and vice versa. They also had ideas about practices in their society which are primarily defined as requiring the use of mathematical knowledge and how mathematics can be associated with social identities as given by their society.

2.5 *Summary*

To summarise, in the last section I presented five dimensions of sociocultural research in mathematics education which inform this study. These studies were more oriented towards a fallibilist philosophical perspective on the nature of mathematics knowledge:

- The ethnomathematics approach (e.g. Bishop, 1988; D'Ambrosio; 1984; 1997, Gerdes, 1994) argues that mathematical knowledge is cultural knowledge which has been developed in all human cultures. This approach raises questions of power and legitimacy as they relate to the dominance of Euro-centrism in mathematics education. Mathematics in this approach is conceived as a cultural product which is developed in particular ways under certain historical, social and cultural conditions in different cultures. This view challenges the traditional view of

mathematics education (i.e. impersonal learning, technique oriented curricula, Eurocentric knowledge) which can alienate certain disadvantaged groups' learning through denying their personal cultural experiences which can conflict with formal mathematics education in schools. Education according to this perspective should seek to develop mathematics as a cultural resource related to learners' experiences.

- Cultural tools mediation is a theme highlighted in studies which fall under the broad title of 'everyday cognition' approach (e.g. Carraher, Carraher & Schliemann, 1985; Nunes, 1993). These studies argue that human thinking is embedded in social and cultural activities. They investigated the mediation role of sociocultural tools, such as different cultural systems of signs and skills, on cognition and how people in different cultures can develop certain mathematical procedures to deal with their everyday mathematical aspects. According to this view, learning mathematics in school and outside-school can involve different procedures (cultural tools). Therefore schools should not teach mathematics as an abstract context-free subject but rather to seek ways of incorporating mathematical concepts learned in school with real contexts and meaningful problems to the learners.

- Social interaction mediation: Various studies have extended Vygotsky's concept of the ZPD and looked at how children learn through interacting with other expert members. Various concepts were developed in these studies such as scaffolding (Wood, Bruner and Ross, 1976), assisted performance (Tharp & Gallimore, 1991), and guided participation (Rogoff, 1990). All these concepts emphasised that an adult's guidance and children's participation in shared activities can make a difference to the child's learning. Therefore, parents' support and interactions with their children in shared learning tasks situated in everyday situations should be valued by school as it can contribute to children's learning.

- The situated cognition model (Lave, 1988; 1991; Lave & Wenger, 1991) argues that knowledge is situated in the context in which it is acquired and proposes that learning is a process of participation in communities of practice. This approach develops an understanding of learning as

emergent and social and discusses issues of identity, context and transfer. The situated cognition perspective challenges the conventional belief which assumes the separation between learning and doing, where mathematical knowledge learned in school is expected to be automatically transferred into other contexts in a straightforward manner. Instead, the situated cognition approach argues that learning and cognition are fundamentally situated. Therefore social and cultural contexts of learning should be taken into account in the mathematics teaching process.

- Values and identity: Abreu (2002; 2005) investigated learners' attachment of certain social values and their construction of social identity when using different forms of mathematical representations in different social settings (e.g. home and school). She argues that it is important to take into account the value placed by social groups on certain cultural tools and certain types of social participation. Mathematics education should take into account students' out-of-school knowledge, including their values, beliefs, and expectations and help students to create their own social and learning identities.

The discussions in the subsequent chapters are framed by many ideas presented in this chapter. Chapter 3 will focus on the topic of home-school relationships. It shows, for example, how the new shift from deficit model to the asset model of parental involvement was influenced and shaped by the shift in learning theories. That is, the shift from the view that considers learning as a process of teacher-to-learner knowledge transmission, to a view which considers learning as a social process which involves individual participation with others in social activities. These new learning conceptualisations have drawn attention to the importance of the parental role in supporting their children's learning and the importance of utilising the social and cultural resources of the out-of-school context in mathematics learning. Chapter 4 will review literature which focuses on the topics of parental involvement in their children's mathematics learning (social mediation), and children's mathematical learning experiences (cultural tools) which take place in and out-of-school. The following chapters will also draw regularly upon the sociocultural framework.

3 Literature review on home-school relationships

3.1 Introduction

In the last decade there has been an increasing number of research studies which have investigated home school relationships. In addition, this issue has been considered as a priority across many educational systems in North America, Australia, continental Europe, Scandinavia and the United Kingdom (Desforges & Abouchaar, 2003). Building strong relationships between home and school was identified in the educational policies in the above regions as playing a significant role in the development of children's learning. Recent policies have also paid great attention to the influence of home and family on numeracy and literacy learning. This issue was also considered as a possible factor which can influence children's achievement, especially for those who come from disadvantaged social and ethnic backgrounds (Goos *et al.*, 2004).

Good relationships between home and school are often viewed as a 'good thing' by researchers, policy makers, teachers, parents and students. Nevertheless, current research indicates that these relationships are often more complicated than they appear. Hence, there is a need to look at these relationships in more depth since they can be interpreted differently by different actors. In order to achieve more in depth understanding about different aspects of home-school relationships I will highlight a number of issues that have been consistently debated in this research field. This chapter is structured mainly around three topics which were identified by Hanafin and Lynch (2002) as major topics discussed in home-school relationships research in the UK and US over the past decades:

- Parental involvement should be seen as a multifaceted and complex business which can be interpreted differently by different parties and used to serve a variety of purposes at different times
- There is a need for critical examination of assumptions related to the rationale and benefits of parental involvement. There is also a need to challenge the unproblematic assertion that parental involvement is always a good thing

- There is a need for more investigation into aspects such as gender, class and race which can play a key role in shaping home-school relationships.

I will begin this chapter by presenting different conceptualisations (definitions, types and models) discussed in the literature concerned with home-school relationships. Then, I will move to discuss the rationale for promoting positive home-school relationships and the barriers which can hinder such relationships. After that I will discuss the current shift in the literature which has tried to move from the deficit model to the asset model of home-school relationships. Then, I will focus on studies which emphasise the need for understanding and acknowledging diversity among different groups of parents. This diversity includes aspects such as cultural capital, social class, gender, ethnicity, and power positions. Finally, I will present studies which highlight the importance of understanding the multiple perspectives of parents.

3.2 Parental involvement is multifaceted and complex

Parental involvement has received increasing attention in the past three decades due to its potential benefits for children's learning. However, the educational community is still struggling to give clear meaning for the term 'parental involvement' which is understood to be multifaceted and complex (Tutwiler, 2005). This section tries to explore this complexity by presenting and discussing some definitions, types and models of parental involvement.

3.2.1 Definitions of parental involvement

Harris and Goodall (2007) note that despite the significant amount of research into home-school relationships, considerable differences and difficulties in defining parental involvement remain. Parental involvement has been defined as corresponding to various types of parental behaviours and activities. Different terms have been used in the literature to describe parents' support to their children, including: involvement, engagement, participation and partnership. Some studies tried to give broad and working definitions for these terms:

For example, Harris and Goodall (2007) have distinguished between parental involvement and parental engagement. They suggest that the first term refers to parental involvement in activities in school under the supervision of school staff. Therefore, parental involvement can encompass a whole range of activities with or within the school. Parental engagement, alternatively, can be used to refer to forms of parental support directly related to learning at home.

In addition, McConchie (2004) noted that using particular terms in the field of parental involvement can reflect the power distribution between parents and school. For example, using the term parental participation can refer to forms of involvement that encompass parents' decision-making roles such as participation in school councils. Other terms such as family-school partnership can imply more power sharing, responsibility and dialogue between home and school.

The studies presented in this chapter often use the term parental involvement which is seen as a 'catch-all' term for many activities (Desforges & Abouchaar, 2003). Joyce Epstein (1995) has developed a classification of six types of parental involvement which has been widely used or mentioned in the literature; these types of parental involvement are:

- *Parenting:* parents' provision of a suitable home environment to support children's learning which includes ensuring children's health and safety, developing parenting skills and child rearing approaches which prepare children for school, and building positive home conditions that support learning and behaviour throughout the school years
- *Communication:* refers to the open and regular two-way communication between parents and schools
- *Volunteering:* refers to parents' volunteering in school activities with the guidance of school staff
- *Learning at home:* refers to parents' assistance to children in learning activities at home
- *Decision-making:* refers to parental engagement in decision making processes in schools relating to parents' own children or in school governance
- *Collaborating with the community:* refers to the two-way mutual support between parents, school and community

Harkness *et al.* (2005) acknowledged that Epstein's model has offered a comprehensive structure which included various home-school linkages. Nevertheless Harkness *et al.* note that this model is motivated by immediate practical and policy considerations which sometimes overlook the complexities of home-school relationships. In addition, Goos *et al.* (2004) argue that this model seems to represent the typical view of parental involvement which is more consonant with the school agenda. Therefore, this model can be understood as more oriented toward the 'school-centred' view since most of the parental involvement activities in the model are either taking place at school or related to aspects of school work. Similarly, Graue (1998) notes that Epstein's model was conceptualised in terms of what parents can do to support their children's learning under the direction and control of the school. The term partnership in this model was intended to emphasise the school, families and communities sharing of responsibilities. However, the model seemed to be silent regarding issues of power and status which often play a significant role in shaping home-school relationships.

Goos *et al.* (2004) reviewed current literature in parental involvement research in order to find 'family-centred' activities which can parallel the above 'school-centred' activities. Their literature review focused particularly on the topic of parental involvement in mathematics learning. Some of the family-centred dimensions of parental involvement can be presented as follows:

- Creating supportive learning environments at home: this includes parental supervision and support for children's education both on academic aspects (such as providing help with homework and revision) and on emotional aspects (such as parents' expression of aspirations and expectations regarding the child). Parents also can serve as role models for their children when they discuss together the importance of education and share experiences that reinforce the value of education
- Engaging children in home practices that support numeracy development: this aspect refers to activities where parents and children carry out everyday activities at home. These activities include real life problem-solving tasks, shared reading, games and other activities which remain largely unrecognised in school

- Providing parent-directed activities which connect children to out-of-school opportunities for further numeracy development: these activities may involve private tutoring, enrolment in after school programmes and visits to museum and libraries
- Encouraging parent-child discussions and interactions about their learning experiences

The studies discussed above generally indicate that parental involvement can have different definitions and meanings. Consequently, I will try to clarify the terms which I use in this study. The terms parental involvement and home-school relationships will be used in this study in a synonymous and open way. The working definition views parental involvement as help or support provided by any family member to the child with any aspects or activities connected directly or indirectly to the child's learning. This action can take place in school, home or any other context.

3.2.2 Changing models of parental involvement in educational policy

Ravn (2003) describes different models of home-school relationships which have been developed through various research and policies during the past half century. She suggests that these changing models of home-school relationships were shaped and influenced by changing concepts of learning. In the previous chapter I discussed the shift in learning theories from the view that considers learning as a process of teacher-to-student knowledge transmission, to a view which considers learning as a social process which involves individual participation with others in social activities and is influenced by such aspects as context, power, values and identities. These new learning conceptualisations have drawn attention to the importance of paying more recognition to: (1) parents' influential role in supporting children's learning; and, (2) the social and cultural environment of children's homes. In addition, Vincent and Tomlinson (1997) argue that political trends have also influenced the development of home-school relationships models and concepts. For example, political trends can re-shape the relationship between citizens and public institutions and subsequently may influence the relationships between families and schools.

Townsend and Walker (1998) have organised various categories of home-school relationships into four main models with a focus on literacy learning which is quite relevant to my study although it focuses on mathematics learning. These models are:

Model 1: Discouragement of parental involvement in children's learning: In this model, the parent-teacher relationship rests on either an active discouragement or a lack of acknowledgment of parents' role in their children's learning. Here, parents are marginalised in terms of their involvement because it is assumed that once the child starts school, teachers should take over the responsibility for his or her learning.

This model is associated with the compensation model which emphasises the school's responsibility for compensating inadequate parenting skills. This model is motivated by the concern that some children were performing less well in school because their parents were less interested in education. Therefore, schools were urged to seek the involvement of such families. The school's responsibility is to offer information and support to parents rather than creating genuine partnership between the two parties (Cairney, 2000; Hughes *et al.*, 1993; Vincent & Tomlinson, 1997).

Model 2: Parents as consumers / clients: This model considers school as an educational producer and parents as educational consumers or clients. This model emphasises ideas of accountability and marketability. Parents, according to this model, are seen as consumers who should be assured that teachers are satisfying their children's educational needs. But at the same time, parents are not considered to play a participatory role in the development of their children's learning. Vincent and Tomlinson (1997) argue that parents in the consumerism model are given the power of choice but only a limited opportunity for the exercise of more powerful roles.

Model 3: Parents as supporters of school learning: parents are seen in this model as having a clear participatory role. Their role is to support their children's learning under the guidance of school and on the school's terms. Although this model often uses the partnership term, it tends to favour the school's views of learning and the school's agenda of parental involvement. Vincent and Tomlinson (1997) note that the partnership term used in such models suggests that parents and teachers are equal partners involved in a mutually supportive

dialogue. They argue, however, that such a conceptualisation often overlooks the fact that teachers tend to have a higher level of power, resulting from their position in the school and their professional knowledge, in their relationship with parents. This model can be associated with a consensus model which encourages teachers to communicate with parents to get more information a to what might help in fulfilling school goals and transmitting information about schooling to parents. However, in this process teachers tend to overlook the significance of homes as foundations for learning (Cairney, 2000).

Model 4: Parents as collaborators in children's learning: this model tries to achieve more equal and mutual partnership between parents and teachers in the development of children's learning. In this model, the parental authentic views of learning and their natural contributions to children's development are accepted by schools.

3.3 Rationale for parental involvement

Parental involvement in children's education has existed for generations and has become an important issue in many educational systems. In what follows, I will discuss three main aspects which have been often addressed in the literature to justify the growing interest of parental involvement in children's learning.

3.3.1 Parents are the primary educators of children

One of the reasons for the growing recognition of the importance of parental involvement is parents and families are seen as the primary educators of their children. Parents are seen as responsible for providing early socialisation activities and building social and intellectual foundations for their children's learning and development. Therefore, the improvement of children's learning experiences cannot be accomplished without building strong relationships between home and school. The call for more collaboration between home and school is supported by research evidence as well as common wisdom that parental involvement is essential for better schooling (Goos *et al.*, 2004). For example, Bastiani (1997) stated that parents can play a key role in shaping their child's attitude, behaviour and achievement. According to Bastiani, children

spend less than 15% of their lives (between birth and age 16) in school, while parents and family members are responsible for the remaining 85% of children's waking time. In addition, Tizard and Hughes (1984) noted that children's learning develops greatly in the early years of life before entering school. For example, children acquire many of the major cognitive competencies (e.g. language skills, aspects of space and time, concepts of causality, knowledge about age and gender roles) in the first five years of their life. Children's development in these years occurs through the support of their parents: the primary educators of the child. Parents also have vital information and insights about the child and they are often interested in the welfare and happiness of their child. Such information can help teachers to support children's learning more effectively.

In the next chapter, I will return to this topic when I discuss in more detail some studies which investigate the mathematics learning experiences of preschool children at home.

3.3.2 Improving children's learning and school achievement

Another reason for the wide recognition of the importance of parental involvement is the common assumption that such involvement can have a positive effect on the achievement of students. Harris and Goodall (2007) state that research concerning the impact of parental involvement on students' achievement is complex due to many factors. Early research on this topic seemed to reveal inconsistent findings about the effects of parental involvement on achievement because of the variation of definitions and problems related to research techniques in certain studies. However, more systematic studies which were conducted more recently indicate that there is relationship between some types of parental involvement and school achievement. These studies are presented next.

In the United States, Henderson and Mapp (2002) reviewed 51 studies published from 1995 to 2002 and argue that there is growing evidence that family connections with schools can make a difference in student achievement and success. General findings of their literature review indicate that parental involvement is beneficial for the students in terms of higher grades and test

scores, better school attendance, and better social skills. The study concluded that families of all income and education levels, and from all ethnic and cultural groups, are engaged in supporting their children's learning at home. White, middle-class families, however, tend to be more involved at school.

A recent literature review carried out by Desforges and Abouchaar (2003) in the United Kingdom has also looked at issues related to the relationship between parental involvement and achievement. The most significant finding was that an 'at home good parenting' (such as providing a good foundation of skills, values, attitudes and self concept) appeared to be the most significant factor likely to have a positive effect on children's learning and adjustment. The effect of this form of parental involvement on achievement seems to be indirect and works mainly through a positive parenting style which positively influences self-perception and motivation, and subsequently shapes children's achievement and adjustment.

Also in the UK, a literature review carried out by Harris and Goodall (2007) reached a similar conclusion that the 'learning at home' type of parental involvement seems to have more impact on children's learning. They said that "parental involvement, especially in the form of parental values and aspirations modelled at home, is a major positive force shaping students' achievement and adjustment" (p.28).

Furthermore, Fan and Chen (2001) carried out a meta-analysis to synthesize the quantitative literature which investigated the relationship between parental involvement and students' academic achievement. Their findings showed a small to moderate, and practically meaningful, relationship between parental involvement and academic achievement. It was revealed that 'parental aspiration/expectation' for children's education achievement has a significant relationship with students' academic achievement, whereas parental home supervision has the weakest relationship.

3.3.3 Parental involvement as democratic action

Another reason for the growing advocacy for parental involvement is the democratic, individualistic stakeholder, consumer, and 'economic /market'

discourse (Daniel, 2005). For example, the consumerist approach to home-school relationships argues that parental involvement is a political right. Parents, according to this view, are citizens who have the democratic right to have a greater say as to how their children's school is run and managed (Ball, 1988). Schools and educational systems in this approach are committed to empowering parents as consumers of education. This empowerment implies "redistributing control and influence in favour of the disadvantaged and deprived" (Vincent, 1996: 3).

Many studies have raised questions about the above simplistic view of power relationships (e.g. empowerment) and emphasised the imbalance of power which influences home-school relationships. For example, Edwards and Warin (1999) argued that rationales for parental involvement operate at a level of generality and use soft rhetoric (using terms such as partnerships, collaboration and empowerment) while it is often in reality the case that this soft rhetoric would lead to the 'colonisation' of the home by the school. This occurs, for instance, when teachers use parents as a possible source to assist in the delivery of the over-loaded curriculum, instead of drawing on and utilising understandings of what parents do have to offer to school.

Similarly, in their discussion concerning home-school contracts, Vincent and Tomlinson (1997) argue that the 'soft rhetoric' of partnership can be used as a way to justify actions which can lead to more school control over the behaviour of parents and their children. For example, home-school contracts can become a strategy to enforce school discipline instead of supporting home-school dialogue.

Cairney (2000) also notes that since schools have often been responsible for initiating most parental involvement programmes, it is no wonder that many of these programmes have been dominated by school agendas and interests. What is needed is more equal mutual understanding, open dialogue between parents and teachers, and serious efforts to value and support genuine relationships.

I will return to this topic later when I discuss in more detail a number of studies which investigated power relations between parents and schools.

3.4 Barriers to home and school relationships

There are different barriers to home-school relationships. Some of them are related to the circumstances of families while others are related to the system of school.

3.4.1 Barriers related to families

Harris and Goodall (2007) carried out a project funded by DfES in the UK which attempted to explore the relationship between different forms of parental engagement (i.e. parental support of children's learning at home) and achievement. Part of the study looked at barriers to such engagement. The project focused on 'hard to reach' parents in more than 100 secondary schools across England. Data collection methods included interviews and focus groups with 81 parents, 95 school staff and 124 children. The study highlighted a number of barriers which hinder families from engaging in their children's learning. Findings show that negative parental experiences of education can function as a main barrier to their engagement with their children's learning. For example, some parents saw schools as places where they experienced failure or conflict and therefore they felt reluctant to engage in supporting school efforts to involve them. The second most common barrier was related to parental lack of skills such as lack of schooling, unfamiliarity with school regulations and difficulty with using the right language in discussions with teachers. Another common barrier was related to practical issues such as lack of time, child care, dealing with children of different ages in different schools and difficulties in transportation. The issue of parental lack of time seems to be part of more complex social and economic conditions which include socioeconomic status, gender, educational level, ethnicity, personal experiences, role definitions and values and expectations. Additional barriers identified included parents' negative perceptions about teachers and the negative attitudes of children toward the involvement of parents.

3.4.2 Barriers related to school

Warren and Young (2002) have pointed out that building genuine relationships between home and school, based on a mutual understanding of the different but important roles of the other, is not an easy task. They noted that school culture can act as a barrier to parental involvement, for example:

- When school staff do not favour parents' inclusion in school matters especially in aspects such as teaching methods, curriculum design and decision making. Instead, the preference is that parents work with their children at home on particular tasks such as helping with homework or revision
- Limited resources in school, such as the increasing demands on teachers and the lack of material resources, can hinder the formation of strong relationships with parents
- The communication style between teachers and parents can reflect unequal relationships between the two parties. Some parental involvement initiatives tend to emphasise the one-way process (schools to parents), communication consists primarily of providing information about schooling matters or offering training programmes to parents. In this type of communication, schools are considered as the holder of knowledge while parents are considered as the receivers. This type of communication gives priority to school learning and school agendas whilst giving less attention to parents' perspectives, home social resources and how parents can make a real input to school or children's learning

In addition, Rhoda (1986) suggested that teachers may feel reluctant to involve parents because teachers:

- May be unsure about how to balance their concerns with the children as a group against a more personalised concern for each individual child. They assume that if parents increase their involvement then they may demand more individual attention be paid to their child
- May be concerned about the demands of parental involvement activities. These activities can be seen as taking a long time to plan, turning responsibility for teaching over to parents and can have negative effects because parents may not know the 'right' way when working with children.

Moles (1999) noted that a lack of external support for home-school relationships such as financial support for training, and a lack of clearly defined and articulated policies can also act as a barrier to parental involvement.

Daniel (2005) suggests that issues of class, ethnicity, gender, and culture can be key factors which hinder the involvement of families from minority, marginalised and disadvantaged backgrounds. Schools can discourage the involvement of parents with these backgrounds while providing more opportunities for the involvement of middle-class parents who have the social, cultural and economic capital that enables them to fit well with school discourse and expectations. These issues will be the main focus of the next section.

3.5 The shift from the deficit model to the asset model of parental involvement

Hanafin and Lynch (2002) argued that parents from working-class or ethnic backgrounds are often be considered by schools as lacking the intellectual or linguistic knowledge which enables them to participate actively in school decision-making activities and educational debate. These groups of parents were also judged as lacking interest in education and thus they were seen as a key factor having a negative impact on their children's schooling. Hanafin and Lynch claimed that such deficit beliefs should be rejected because they are not based on valid evidence and seem to be biased towards middle-class culture. In this perspective, families from working-class or minority ethnic cultures are seen not as deficient but different.

Hyde *et al.*'s (2006) study is an example of how some studies viewed some parents as deficient. They examined interactions between mothers and their 5th Grade children (158 children from a variety of ethnic backgrounds in the US) as they worked on pre-algebra problems in a task designed to serve as analogue to naturally occurring homework situations. The analysis of the video-taped sessions of mother-child interactions indicated that the mothers varied considerably in the quality of the mathematics content which they conveyed while teaching mathematics and in the quality of their scaffolding of the material for the child. The study suggested that mothers who themselves had more

mathematics preparation performed better in conveying mathematical content and in scaffolding. Mothers with more mathematics self-confidence also performed better. The results concluded that children face inequalities connected with the deficiency and weakness in the parental resources available to them concerning mathematics learning; these deficiencies can be remedied by school-family partnership programs.

However, research constantly shows that most parents – regardless of their cultural, educational and social background - care about their children and have important perspectives on their education (e.g. Peressini, 1998; West *et al.*, 1998). Therefore, it is important for schools to create supportive learning environments which acknowledge and build on the different cultural and social resources of families from different backgrounds.

According to Cairney (2000), many schools and teachers seem to have a limited view about the significance of home as a natural and important foundation for later learning. This limited view tends to attribute low school achievement of children to weakness in the learner, the parent or the teacher. For example, variation in children's school achievement is often explained in these ways:

- Children lack certain abilities
- Families lack the specific skills essential for supporting their children's learning
- Failure of the school system in developing children's abilities.

Cairney (2000) argues that these deficit explanations pay little attention to the possibility that much of the variability of student achievement in school can be a reflection not of the deficiencies, but rather of the differences of cultural and social resources of different homes and backgrounds. McConchie (2004) similarly noted that the deficit view can lead to paternalistic practices which make limited effort to seek or value parents' and children's views. In addition, parents may be classified as 'good' or 'bad' based on unjustified generalisations. Goos *et al.* (2004) noted that there has been a notable shift in parental involvement research and policies in an attempt to move beyond the traditional 'deficit' perspectives of parental involvement – which is more oriented towards

the typical, middle-class or mono-cultural families - to those which are more inclusive of more social and cultural heterogeneity.

One of the early and notable studies which took a rather different position from the deficit view was carried out by Barbara Tizard and Martin Hughes (1984). The general tendency in educational research in the 1980s appeared to undervalue learning experiences which occur in working-class homes and suggested, for example, that children from these backgrounds suffer verbal deprivation. Tizard and Hughes took a different position and argued that working-class mothers can contribute positively to the intellectual growth of children. Data of the study was based on tape-recordings of the conversations of four-year-old girls in two contexts: nursery school in the morning and at home with their mothers in the afternoon. 30 girls (15 from middle-class families and 15 from working-class families) were observed in the two contexts. Their teachers and mothers were also interviewed. The study found that working-class homes were fruitful learning environments with rich linguistic and intellectual resources the same as middle-class homes. The study also showed how children's learning can be influenced by the move between home and nursery school. Children from the working-class backgrounds were active learners and seemed to be more articulate and received more cognitive challenges at home than they did in nursery schools.

3.5.1 Funds of knowledge concept

The work of Luis Moll and his colleagues (Moll *et al.*, 1992; Moll & Greenberg, 1990) can be seen as influential in challenging the deficit view of certain disadvantaged backgrounds. Their work focused on children's participation in labour activities in Hispanic working-class homes in the U.S. In line with Vygotsky's ideas (e.g. zone of proximal development and the role of mediation in learning) Moll *et al.* regarded every household as an educational setting with important educational potential. The term 'funds of knowledge' was used to describe forms of knowledge and skills which can be found in local households and "these historically accumulated and culturally developed bodies of knowledge and skills essential for households or individual functioning and well being" (Moll *et al.*, 1992: 133). This knowledge and skills are connected with authentic activities such as farming, construction, trade, and business. Their

approach also focuses on how families develop social networks which can facilitate the development and exchange of resources including knowledge, skills and labour.

An example of applying the concept of 'funds of knowledge' in the classroom is presented in Moll and Greenberg's study (1990) about a project that was carried out in a primary school in a Hispanic American community. The study used ethnographic research to explore the funds of knowledge available in the children's households and communities. To illustrate the general approach of the project I will highlight one of the case studies which took place in two primary classrooms (fourth and fifth year) with a majority of bilingual children. The teacher and the researchers worked together in identifying different forms of funds of knowledge available in the households of the children and tried to find ways to use them for the development of children's writing skills. The children discussed topics of special interest related to their households' funds of knowledge with the mediation of adults. The impact of the new teaching approach was illustrated through the writings of Elena, one of the participant children, who self-initiated the development of a video about her town to be sent to students in Puerto Rico. The child interviewed some of her family members, searched an encyclopaedia and wrote narratives about her visit to the museum. The new teaching approach seemed to provide opportunities for the children to have more control over their own learning and to display better competence and confidence in their writing. It also helped the teachers to tap rich social and material resources which may not have been similarly recognised by standard teaching practices.

3.6 Understanding and acknowledging diversity

Building parental involvement programmes is depicted in educational policies and studies sometimes as a simple process largely based on knowing, for example, the 'right' way to communicate with parents or the 'right' way of organising parents' evenings. These studies and policies seem to pay little attention to the 'micro-politics' and other complex issues, such as power relations, gender, social class and ethnicity, which often raise challenging dilemmas in home-school relationships (Vincent & Tomlinson, 1997).

Cairney (2000) noted that new perspectives on home-school relationships have been more concerned with building a genuine relationship between home and school. In this approach, parents are not just seen as 'agents of teachers at home' (Brown, 1993) and parental involvement is not considered as just simple knowledge transmission from schools to parents. Instead, more attention is paid to acknowledging and responding to the richness and diversity of cultural and social resources of children and their families.

In the next few pages, I will present a number of studies which advocate the 'asset' view of parents and challenge the traditional taken-for-granted view of home-school relationships. These studies try to move beyond the simple conceptualisation (e.g. deficit explanations, one-way communication and prioritising school agendas) and emphasise that in order to build stronger home-school relationships we need to gain a better understanding of the complex aspects that often underpin relationships between parents and schools. In the discussion that follows, these complex aspects, which include social class, gender, ethnicity and power relations, will be discussed.

3.6.1 Bourdieu's model

The French sociologist Bourdieu has investigated the relationship between social class and educational opportunity with a particular focus on the reproduction and perpetuation of social inequality through education (Dimmock and Walker, 2005). Bourdieu's work highlighted the under-representation of certain groups of children (e.g. from working-class backgrounds) in school and how this process can lead to more exclusion and reproduction of social inequality (Murphy, 1989). I will briefly highlight some of the key concepts of Bourdieu's model which can be useful in understanding certain aspects of home-school relationships. My intention here is to provide a broad understanding of this model which informs various studies discussed later in this chapter. In what follows, I will present three fundamental concepts in Bourdieu's model which inform later studies: capital, Habitus and field.

Capital Lareau (2001) applied Bourdieu's ideas to study the relationship between social class and home-school relationships. According to this view, the individuals' social position and family background can provide them with social

and cultural resources that can be dynamically advanced to produce more social profits. Lamont and Lareau (1988) summarised Bourdieu's argument as follows: Schools are not socially neutral institutions as they often reflect the "dominant class" experiences (e.g. the middle-class). Children from this dominant class come into school with important social and cultural skills and experiences which can fit well with school expectations. Children from working-class backgrounds come to school with different experiences which do not always conform to tacit and overt school expectations. Those children need to acquire the knowledge and skills in order to become familiar with school educational experiences. Although these working-class children can gain some social, linguistic, and cultural competencies associated with the middle-class, it is difficult for them to achieve the natural familiarity of those born in the middle-class. Therefore, children from working-class families may be placed at an academic disadvantage.

One of the important aspects of Bourdieu's model is that it proposes an alternative explanation for children's academic success or failure in school which goes beyond the traditional explanation. According to Bourdieu's model, academic success or failure in school is not just influenced by children's cognitive abilities, but is also affected by the methods of production and investment of different types of cultural capitals (Bourdieu, 1986; Reay, 2004). The cultural capital concept has been used by many researchers as a tool for understanding how school systems can contribute to inequalities among different social groups of students and their families. Lamont and Lareau (1988) focused on cultural and social exclusion in their definition of cultural capital which is seen as "widely shared, legitimate culture made up of high status signals [e.g. attitudes, preferences, and behaviours] used in direct or indirect social and cultural exclusion" (p. 164).

Bourdieu's model also offers other concepts such as: economic capital which refers to material wealth; social capital: where social position can be transformed into social advantage through social networks, relations and contacts; linguistic or symbolic capital: where language is a cultural product that can be monopolised through linguistic competence by some people who can access the legitimate discourse (e.g. academic jargon related to school discourse; see: Zevenbergen, 1998).

Habitus: refers to the cultural structures that exist in people's bodies and minds and consists of dispositions, schemes, forms of know-how and competence (e.g. patterns of dispositions toward child rearing) (Lareau, 2001:84). The concept of habitus is used to exemplify how social and cultural messages and subjective understanding influence individuals' thoughts and actions (O'Brien & O Fathaigh, 2004)

Field: this concept relates to a "structured space of forces and struggles, consisting of an ordered system and an identifiable network of relationships that impact upon the habitus of individuals" (O'Brien & O Fathaigh, 2005: 9). Education, for example, can be seen as a field with particular roles which regulate the behaviour of its members, while home is another field which uses different roles.

3.6.2 Social class

Lareau and Shumar (1996) acknowledged that educational policies in the US targeting the promotion of home-school relationships have generated growing enthusiasm and support. However, they argued that these policies lack enough attention to the impact of subtle factors such as social class on parental involvement. These policies often presumed home-school relationships as being characterised by harmony and consensus while in reality there are many conflicts in such relationships. Lareau and Shumar suggested that home-school relationships can be influenced by many factors such as: (1) differences among parents in terms of social resources, such as educational skills, economic resources and social networks); (2) differences in parents' perspectives about learning and their roles in supporting children's schooling; and, (3) differences in parents' level of power and social status which can influence their relationship with school. Lareau and Shumar argued that policies which emphasise particular activities (such as parents helping their children with school work) can sometimes disadvantage certain groups of parents (e.g. parents with little education or parents who face difficulties in complying with school expectations). Alternatively, these parental involvement activities can give more power and privilege to other groups of parents (e.g. those who are more educated and more familiar with school culture) who are likely to be "in sync" with school. Lareau and Shumar emphasised that identifying and acknowledging these

possible differences between parental groups is a key issue which should be considered in parental involvement policies. Overlooking these differences between parents, such as educational, social and cultural differences, can create unreasonable expectations of parents by the school which can lead to the exclusion of some disadvantaged groups of parents and a widening gap in academic achievement between children who belong to disadvantaged or privileged backgrounds.

Lareau and Shumar (1996) supported their argument about the impact of the social factors on home-school relationships with empirical evidence. They carried out a study which drew on Bourdieu's ideas and used ethnographic methods to explore family-school relationships of White and African American children from middle-class, working-class and lower-class backgrounds in a small city in the United States. Data collection methods included classroom observations of 72 elementary school children in three public schools. These observations were supplemented by interviews with the children's parents, class teacher and school principal. Intensive observations were conducted in the homes of 12 of the families. Findings of their study indicate that there were various differences among parents with different social circumstances in terms of their interactions with schools and their involvement in their children's education. Findings of the study include the following points:

- *Educational level*: The relatively low educational level of some parents impeded their ability to help their children in school work. At the same time, college-educated parents had little difficulty and showed more competence in helping their children. Policies do not recognise or offer ways to overcome these differences
- *Economic flexibility:* Middle-class parents were more able to change their job schedules to adjust to school requests. It was more difficult for working-class parents to change their work schedules in order to attend school events. These work constraints can affect the way of participation of certain groups in school events
- *Social resources:* Educational policies often overlook variation in parents' access to social networks. For example, middle-class parents can have powerful social networks which strengthen their communication with school staff and other parents. Parents from working- or lower-classes,

because of their difficult or different life circumstances, may have less opportunity to build strong social networks with other parents or staff in the school. The lack or inadequacy of social resources can influence the way different groups of parents interact or communicate with school

- *Positions of power:* Parents' perceptions of how they can be helpful vary according to their social positions and social resources. Working-class parents seem to believe that they can be most helpful by turning over the responsibility of education to teachers. Middle-class parents tend to see their role as supervising and intervening in their children's schooling. Moreover, there were also differences in parents' perceptions about the power they have in their relationship with school. For example, unlike middle-class mothers, lower- and working-class mothers feared that school can report them to welfare agencies if they fail to meet educational standards (e.g. attendance, hygiene or discipline)
- *Negative consequences of parental involvement for families:* Heavy levels of parental involvement can produce emotional conflict at home. Middle-class parents tend to experience these conflicts when helping their children with homework and school work. Working- and lower-class parents did not seem to have such conflicts probably because they were not always directly involved in helping their children with homework and school work

In a study which focused on mathematics learning and social class, Zevenbergen (2001) argued that it is important to recognise the influence of social backgrounds on children's mathematical performance in the classroom. She drew on Bourdieu's notions which suggest that children who come from middle-class backgrounds have different life experiences from those who come from working-class backgrounds. Zevenbergen suggests that families from these two backgrounds can be different in terms of their values about schooling, economic capital, cultural capital and linguistic capital which explained as follows:

- Values about schooling: Most parents are willing to support their children with mathematics. However, working-class families appear to be providing less support to their children probably because of their lack of

education or feelings of inadequacy. In contrast, middle-class parents appear to give more collaborative support.

- Economic capital: Middle-class parents can afford to provide their children with resources (e.g. computers, books, materials) which possibly can not be afforded by working-class families.
- Cultural capital: Some families may lack economic capital (i.e. financial resources), but they have cultural capital (i.e. positive attitudes and values towards education). In spite of their financial constraints, these families try their best to ensure that their children can gain access to better educational opportunities. For example, if they cannot afford an internet subscription at home, they try to find other resources such as using public library computers. According to Zevenbergen, there is often a relationship between cultural and economical capital. For instance, although the provision of cultural capital (e.g. going to libraries) is often free; such activities can be less common amongst less affluent families.
- Linguistic capital: Zevenbergen also drew on Bernstein's (1971) work in her investigation of the role of language in mathematics learning. She argued that the particularity of the language of mathematics can disadvantage some students and favour others. Because the linguistic form used and valued in school is often that of the middle class, the form of language the students use can be favoured or disfavoured depending on the accord between home and school languages. Working-class children can encounter forms of language in their homes that can be different from what they encounter in the school. Zevenbergen argued that these differences between home-school languages can affect children's academic attainment which is not necessarily caused by low cognitive abilities

Diane Reay (1999) also drew on Bourdieu's theory to explore the impact of cultural and linguistic capital on home-school relationships. Reay interviewed 33 mothers (who belong to varied ethnic groups, middle-class and working-class) and attended school events at two primary schools in London. She investigated how maternal involvement can be mediated by power relations and found that social class differences among mothers can influence their way of approaching and communicating with teachers. Middle-class mothers tended to take a position of more authority, were more critical, showed more sense of certainty

and entitlement which was missing from working-class mothers' accounts. Middle-class mothers' confidence when dealing with school issues can be seen as a component of their cultural capital connected to their own educational histories. Their linguistic capital (e.g. showing confidence when talking with teachers) gave them more power and authority and therefore they were more able to convince teachers of their entitlement to extra resources. Working-class mothers lacked this confidence and tended to represent teachers as experts who knew better. They seemed to bring with their interactions with teachers a habitus often shaped by educational failure or negative experiences and therefore they were much more hesitant and apologetic in their interactions with school staff. Reay concluded that reliance on soft rhetoric terms such as 'partnership' often featured in home-school relationships literature seemed to dismiss the tensions, conflicts and inequalities which might underlay such relationships. She believed that the discourse of parental involvement should take into account the impact of gender, sexuality, ethnicity, marital status and social positions of parents in the educational field.

Gill Crozier (2001) argues that parents are not a homogenous group of people. Parents belong to different cultural and social groups, they are living and working in diverse situations and have different family structures. This diversity among parents can shape their relationships with school. Crozier criticised the 'one size fits all' approach which often can be widespread in parental involvement policies and discourse. This approach is criticised for overlooking the complexity of home-school relationships and assuming that all parents have the same characteristics, needs and that their children can be treated in the same way. Crozier raised concerns about parental involvement policies which seem to pay limited recognition to cultural diversity, racism and anti-racism and the implications of these issues on schools and parents. These policies, according to Crozier, tend to view parents from ethnic minority groups as one homogenous group who lack interest in their children's education. This deficit view of ethnic parents in the policies can lead to the additional disadvantaging of those parents and their children. Instead of building upon the experiences and skills of ethnic families, schools are often pushing those parents to adopt practices and behaviours which correspond to the norm (e.g. white, middle-class parents who have the social and cultural capital and material resources to make their voices heard). This failure to recognise the differences between parents can lead to less recognition of parents' role in the education of their children and

can also contribute to increased marginalisation and discrimination of ethnic minority parents and their children.

Crozier (2000) carried out a study which focuses on parent-teacher relationships and how parents from middle- or working-class can be involved differently in their children's education. Three schools participated in the study: one with a middle-class intake and two with working-class intakes in two cities in the UK. A questionnaire was sent to all parents in the first two schools. A follow up interview was conducted with mothers and school staff to discuss parental involvement issues in school. The study found that gender and social class can be significant factors in understanding parent-school relationships. For example, the study showed that those two groups of parents often had different perspectives, educational experiences, social and economic circumstances and expectations of school. However, the schools seemed to have little awareness of these differences. Working-class 'inappropriate' responses to school were often attributed to the parents' supposed lack of interest and not to the school's practices. The study showed that working-class parents were very supportive of their children, but this support was rarely visible to the school. Their support was much less overt than the majority of middle-class parents who were more visible and obviously interventionist. This behaviour of working-class parents was interpreted by teachers as indifference and lack of support while the study argues that in reality it is not the case.

3.6.3 Gender

Ann West and her colleagues (1998) explored the ways in which both parents – fathers and mothers – are involved in their children's education in- and out-of-school. The data of the study were drawn from interviews with families of 107 children (aged 10-11 years) from 19 schools in the UK (16 public and 3 private schools). The findings indicate that mothers generally assume prime responsibility for their children's education. Mothers with higher levels of education were more likely to use workbooks and employ private tutors to support their children's learning than mothers with lower levels of educational qualifications. Fathers shared the responsibility of contacting the school and attending school evenings. Fathers were also often involved in helping with mathematics homework. The study found that the mothers' level of educational

qualifications was associated with presence in school events and informal discussions with teachers.

3.6.4 Power relations

Power and powerlessness

Todd and Higgins (1998) argued that power issues can play a significant part in home-school relationships. They looked at the notion of powerlessness as a way of understanding certain aspects of home-school relationships. They challenged the easy dichotomy which perceives parents as powerless and educators as powerful and suggest that governmental reforms and educational policies can affect the power and powerlessness of both parents and teachers. The paper draws on evidence from two studies which aimed to evaluate a school improvement project. This project was designed to promote parental involvement practices as a means of improving children's attainment. The project involved 21 primary and nursery schools and ran for three years in England. Parents and teachers were interviewed in order to explore their perceptions about home-school relationships as part of the project evaluation.

Todd and Higgins argued that the notion of power is either absent or under-theorised in home-school relationships literature. The notion of powerlessness is expressed by the literature mainly in two ways: (1) parents are powerless when home-school issues are being seen only from a school perspective with little recognition of parents' characteristics, needs, experiences and social and cultural backgrounds; and, (2) attributing some kind of deficit on the part of the parent. Todd and Higgins challenged the discourse of parent/powerless and professional/powerful and suggest that parents and teachers can be powerful and powerless in different situations.

Todd and Higgins noted that parents and teachers occupy different positions in relationship to the children. Parents have a longer term commitment and much greater affective involvement in their love and aspirations for their children. Teachers have more professional duties; they are responsible for a greater number of children, have different types of knowledge to teach and have different ways of dealing with children in the school context. Consequently,

parents and teachers have different perspectives about their roles and responsibilities as well as having different power positions. It is often said that professionals have more power status than parents especially if parents come from disadvantaged backgrounds. This assumption was found to be true to some extent. The teachers who participated in Todd and Higgins's study viewed their relationship with parents from their own perspective. For example, they emphasised the one-way school-to-home relationship which primarily considers how parents can assist the school. They did not take into account the need to make meaningful links with children's experiences at home so those experiences can be used in developing pupils' knowledge and understanding in the context of school learning. Parents' power in such one-sided relationships received less recognition due to their lack of appropriate cultural capital. Parents' interests and views were less visible in school because of teachers' understanding of parental involvement and their construction of parents as powerless. However, teachers are not always in the powerful position. Parents and teachers can experience power and powerlessness in different ways. For example, Todd and Higgins also showed, through the use of examples associated with the assessment procedures of children with learning difficulties in school, how teachers can be powerless (e.g. when facing educational hierarchies and legislative changes that hinder their power) and how parents can be powerful (e.g. when they have the cultural capital which can help them to rise to a more powerful position or when there is legislation that gives more power to the parents).

Regimes of truth

Dominic Peressini (1998) examined the discourse of parental involvement in mathematics education reform literature in the United States. He examined how parents were positioned and represented in 70 documents and publications related to school mathematics reform. Peressini stressed that the literature has used 'slogan systems' when addressing issues of parental involvement in mathematics education reforms (i.e. using vague terms open to various interpretations and a lack of consensus concerning parental roles).

Peressini highlighted the need for more understanding of the roots, tensions and complexities concerning parental involvement in mathematics education. Power is considered to be one of the key issues in understanding the parental role in

mathematics education reforms. Peressini uses Foucault's concept of 'regimes of truth' (1980). This concept suggests that power and knowledge interact together to create a regime of truth (e.g. types of discourse which is accepted as true in particular societies, the mechanisms which enable one to distinguish between true and false statements). This regime of truth serves as the proper discourse for particular societies. Individuals who are more knowledgeable of the true discourse have more opportunity to exercise power, engage in discourse, and influence the regime of truth in the society. Using the 'regime of truth' concept, looking at the portrayal of parents in mathematics education reform literature suggests that the reform literature operates as a 'general politics of truth' where it positioned parents at the margins of the reform efforts.

In the documents, parents were either assigned passive roles or characterised as obstacles to the overall efforts of improving schools. For example, in some reports certain groups of parents were portrayed as using adverse educational practices. Parents were not recognised as significant contributors to the mathematics education of their children. The mathematics educators and teachers were portrayed as having the authority and right to direct the reform of mathematics education. Their professionalism (i.e. their knowledge about the new discourse of reform) gave them more power and authority to direct and assign roles to parents. Parents use different discourses as they rely on their old experiences which have been acquired under a different regime of truth (e.g. traditional classroom characterised by drill and practice skills) or they have negative experiences of mathematics. Because parents often have limited knowledge about certain school discourses, their role is to receive directions from the school and to support mathematics teachers by following those directions. Peressini concludes that school mathematics reform should extend more consideration to parents as significant contributors to their children's learning. Schools should do more to incorporate the interests and values of the different groups of parents and to give them the opportunity to voice their interests and concerns.

Empowerment

Carol Vincent (1996) examined and contrasted parental perspectives about the concept of 'empowerment' which is often used in home-school relationships literature and policies. The study explored parents' perceptions of, and reactions

to, the teacher shortage situation which was having a negative impact on their children's education. Vincent tried to explain why some parents remain unaffected by current discourses which claim to 'empower' them. The study investigated parents' and teachers' perspectives (50 parents, racially mixed, working-class and 16 teachers in one primary school in England) about home-school relationships and about particular aspects of school organisation. Vincent criticised the narrow use and interpretation of the term empowerment in some educational policies. In these policies, parents are considered to be empowered but in reality they are just receiving information from school which can be used to make choices between competing products. This narrow definition also seems to overlook the impact of social inequalities on parental choices and participation.

Vincent's study showed that different groups of parents (according to three dimensions: ethnicity, gender and social class) generally felt there were few possibilities for them to engage in the school and experienced exclusion from decision-making processes. Teachers thought that the appropriate role for parents is to support the teacher or the learner of school knowledge. Parents were often kept at a distance from school. Some parents thought that they lacked the knowledge to interfere with their children's education. Many parents felt disempowered because of the teacher shortage problem, but only few parents took action. The study concluded that parental empowerment discourses seem to overlook the position, beliefs and attitudes of many parents. Vincent suggested that parental involvement policies and rhetoric should be broadened to take account of parents' experiences and realities.

3.7 Understanding the multiple perspectives of parents

Several studies have highlighted the importance of investigating parents' perceptions about their relationships with the school which can provide useful insights about their needs, beliefs, attitudes, expectations and difficulties. Taking these perceptions into account can possibly lead to more successful home-school relationships.

Lawson (2003) argued that much research and policy regarding parental involvement is school-centric which considers parents as a helping resource for

school and teachers on aspects connected with school tasks. Little attention is paid in this perspective to analysing and clarifying the unarticulated assumptions of the different stakeholders: teachers and different groups of parents (e.g. low-income, low educational qualifications, different cultural backgrounds). These actors develop particular relationships and discourses embedded in unique settings and circumstances which can often differ from the generic definitions and conceptualisations found in the literature and policies. Understanding these different assumptions is important for practice and research in order to reach better relationships between home and school. Therefore, Lawson investigated parents' and teachers' perceptions of the meanings and functions of parental involvement in one low-income urban community. 12 teachers and 13 parents from diverse ethnic backgrounds and with different levels of involvement were interviewed. Findings of the study showed that parents and teachers can hold different perceptions, diverse assumptions, differential power and competing purposes regarding parental involvement issues. At the same time, an overlap can exist between parents' and teachers' views on some aspects. Teachers' perceptions were generally shaped by a deficit view of parents. Teachers spoke from the position of the experts who are charged with identifying the educational needs of children and parents. Teachers seemed to possess the power to uphold their views and values as legitimate. Nevertheless, parents had beliefs about the importance of their knowledge and experiences, but lacked the power and capital to make their voices and opinions heard. Consequently, when parents disagree with school practices they are left with little alternative but to become confrontational or stay uninvolved in their children's schooling.

Hanafin and Lynch (2002) have criticised parental involvement initiatives which are proposed, accepted and acted on without consultation with parents (especially disadvantaged working-class parents) who are most affected by its influence. Their study aimed to give voice to working-class parents "who are perceived to be on the periphery" to school (p. 35) in a primary school located in a disadvantaged low socio-economic area in the Republic of Ireland. The study included 21 parents who attended informal group interviews and talked about their views about their involvement in school. Findings of the study suggest that all participant parents acknowledged and emphasised the importance of education. The participant parents were interested in becoming involved in their children's schooling. However, they felt that their involvement was restricted by school staff to certain types of activities such as fund raising and other support

activities. Real involvement in decisions about important matters such as curriculum, discipline and school organisation was prohibited. The study suggested that if schools want to overcome the educational disadvantages of some social groups they should give more voice to people from these marginalised groups by including them in decision-making processes regarding school management, and discussing matters that affect them personally and financially and which affect their children's progress and school life.

Warren and Young (2002) carried out a study which focused on home and school roles in fostering children's literacy and numeracy development in four elementary schools in low and medium socio-economic areas in Australia. The study draws on data from a parent survey (95 parents of eight-year-old children) and semi-structured interviews (two parents, two teachers and one administrator). Warren and Young tried to find out more about how parents' and teachers' perceptions about learning can influence their relationships. For instance, if parents and teachers view learning as occurring within the confines of school hours, then they will set up structures and processes that support this belief. By contrast, if they see learning as taking place both inside and outside school, then it is possible that more work will be done to make these connections more visible. Their findings showed that parents and teachers seem to have different conceptions both about learning and relationships. Parents saw their role as mainly to nurture children and to encourage them to attend school. Parents perceive teachers' role as to follow the curriculum and to teach properly. Teachers, however, thought that schools should inform parents about what is happening in school and inform parents about how they were expected to help. Teachers seem to focus more on parents' role as supporting school learning. Parents and teachers had similar views as they both focused on 'school-like' mathematics learning. They paid little attention to the fact that learning can also occur outside school and that parents could make a valuable contribution to children's learning. The study suggests that the type of activities which school requests parents to do with their children often seems to reinforce parents' traditional beliefs about how children should learn mathematics and rarely acknowledges and encourages sharing ideas and practices with parents.

Drummond and Stipek (2004) have focused on parents' perceptions regarding parental involvement issues. They noted that low-income parents often value education because they believed that it can lead to a better economic future and

social progress, but at the same time, schools often consider those parents as lacking an interest in school matters. The study tried to obtain information about low-income parents' beliefs about their role in their children's education in different subjects and how much they value their involvement, what factors are associated with their beliefs about involvement, and how they perceive their roles in helping their children to be academically successful. Data was collected through individual telephone interviews with parents from diverse backgrounds (234 African-American, Caucasian and Latino parents who have children in Year 2 or 3 and come from low-income backgrounds in a city in the United States). The study found that most parents from all three groups thought that their involvement in their children's learning was important. Drummond and Stipek found that parents thought that helping with reading was more important than helping with mathematics, perhaps because of the nature of the mathematics subject which is perceived as requiring more understanding of basic mathematical concepts and therefore mathematics learning appears to be a less spontaneous activity when compared with reading. Parents with low educational levels can feel inadequate, which can also influence their level of support for their children's mathematics learning. When the parents were asked to talk about their other involvement practices (e.g. other than helping with homework or reading) they gave vague responses. Instead, many parents tended to emphasise aspects such as maintaining good relationships between their children and others and were concerned about the safety and wellbeing of their children. The study concludes that parents have certain beliefs about how they should be involved in their children's learning. Teachers should ask parents about their home practices and reinforce parents' interest in supporting their children's learning. Schools should find ways of integrating parents' views and know what factors may inhibit some parents from being involved in their children's learning.

3.8 Summary

Parental involvement in their children's learning is an educational topic which has received growing attention in the last few decades. Studies have argued that parental support for children in the home environment can significantly contribute to children's learning in the early childhood years. For example some studies (e.g. Aubrey *et al.*, 2003; Tizard & Hughes, 1984) have shown that

children's learning and skills can develop significantly in their early years before starting formal schooling. Other studies (e.g. Desforges & Abouchaar, 2003) indicated that the 'at home good parenting' form of parental involvement - such as providing a good foundation of skills, values, attitudes and self concept – is more likely to have a positive effect on children's learning and adjustment.

The traditional stance of home-school relationships tends to be oriented toward the 'one size fits all' approach which tends to privilege the typical (middle-class and mono-cultural) family and often marginalises other families (e.g. low socioeconomic level, low education and minority groups). Recent parental involvement studies and initiatives have tried to move beyond the traditional stance which favours school-centred parental involvement activities. On the one hand, these traditional stances seem to place certain groups of parents in a more advantaged position (e.g. middle-class parents who are more likely to share cultural and social characteristics with school staff). On the other hand, these traditional parental involvement activities tend to consider families from disadvantaged backgrounds (e.g. from working-class, ethnic minorities, or low income backgrounds) as deficient. The new perspectives in home-school relationships reject this deficit view and move towards promoting more acknowledgment and utilisation of the cultural and social resources (e.g. funds of knowledge, cultural and social capital) available in children's homes and everyday life experiences and encourage building upon families' expertise and skills. In this view, every family, regardless of their economic circumstances, social class or cultural background, can provide valuable learning opportunities for their children. School should identify these 'funds of knowledge' and try to utilise them and build upon them in the classroom.

4 Literature review on parental involvement in children's mathematics learning

4.1 Introduction

The two previous chapters discussed the new shifts in the fields of mathematics learning and home-school relationships. Studies reviewed in this chapter frequently refer to and build upon concepts discussed in the two previous chapters. Here, I will focus mainly on the area of parental involvement in children's mathematics learning and look into numerous projects and studies in this area of study which generally aim to:

- Investigate the parental role in their children's mathematics learning
- Explore children's mathematical learning experiences in out-of-school settings and identify home resources that can enrich children's learning
- Search for innovative ways for promoting parental involvement and utilising out-of-school resources to support children's mathematics learning

The literature review is organised around the following dimensions:

- Children's pre-school mathematics learning in the home environment
- Involving parents in their children's mathematics learning through shared homework
- Investigating parents' perspectives about their children's mathematics learning
- Promoting two-way dialogue about mathematics education between parents and teachers
- Utilising home mathematics resources for school mathematics teaching
- Investigating numeracy practices at home and school
- Promoting knowledge exchange between home and school

4.2 Investigating children's pre-school mathematics learning at home

There is a common assumption among some educators which considers children as empty vessels to be filled with knowledge in school. This section presents some examples of studies which oppose this assumption and argue instead that children often come to school with mathematical skills, knowledge and experiences which they acquire at home through their daily interactions with parents and other family members in informal everyday activities. These activities can provide a context for meaningful and real learning experiences.

Aubrey (1993; 1994) has examined and identified a number of mathematical concepts, strategies and representations held by young children at the beginning of their first year in school. 16 four-year-old children participated in the in the pilot phase of the study and another 48 children (with similar ages) in the main phase. The children were from diverse social and ethnic backgrounds in England. The children were interviewed and observed while working on a set of mathematical tasks designed to assess their mathematical knowledge. These interviews were conducted in the first weeks from the time when the children began their formal schooling. Aubrey identified a number of competencies related to different mathematical concepts such as counting, recognition of numerals, written representations of numerical quantity, simple addition, subtraction and other skills which children possessed at the pre-school stage. In addition, interviews with the children's teachers suggested that these existing competencies were often not taken into account in the planning and organisation of the curriculum. Aubrey concluded by emphasising the importance of building upon and extending children's pre-school mathematical knowledge and experiences in the curriculum and classroom lessons.

Similarly, Anderson (1997) has reviewed literature involved with children's mathematics development prior to school. The literature generally indicated that:

- Preschool children can have considerable knowledge of counting and related number sense
- Parents often support their children's mathematics learning. Home context can influence the instructional strategies they use
- Young children can understand fairly sophisticated ideas and concepts embodied in the home context

- Parents from different social and cultural backgrounds provide different types of support to children's mathematics learning through involving them in everyday activities and games (e.g. using money, Lego, and everyday activities)

Further, Anderson (1997) has explored verbal interactions between parents and children as they engaged in activities that had the potential to support children's mathematics learning at home. The study included a group of 21 middle-class parents and their four-year-old children. Each family worked with their child at home on a set of tasks which used certain materials (a bag of multilink blocks, children's book entitled "One Snowy Night", six blank sheets of paper, and two consecutive pages of a preschool mathematics workbook) over four separate sessions. The tasks were left for the parents and the children to construct in an open way. However, the parents were aware that the research was focused on mathematics learning. The participant parents were interviewed afterwards to talk about the activities. The study found that 15 mathematical events (e.g. counting, estimating, adding, comparing sizes, grouping, using fractions etc.) were evident in these parent-child interactions. Number and operations concepts appeared more frequently in these sessions. These findings mirror other research (Aubrey, 1994) which suggests that children may enter school with a variety of mathematical experiences and that parents talk with their children about various mathematical concepts during playing and reading activities.

In a recent study, Anderson *et al.* (2005) have explored how parents and their young children attended to mathematical concepts as they engaged in shared reading. The study included 39 parents and their four-year-old children from diverse cultural and socioeconomic backgrounds in Canada. The study included a task which required parents to share a book with their child. All the participant parents used the same book in the reading sessions. These sessions were videotaped and analysed. The results of the study indicated that parents talked about various mathematical concepts with their children (especially number, shape and size) during the book reading time. However, there were some variations among the families in terms of interaction rate and type. The findings suggested that shared book reading can hold considerable potential for parents to draw their children's attention to mathematical vocabulary and concepts.

The above studies support the notion that parents can play a significant mediation role in developing their children's mathematics learning through shared interactions in everyday activities. These interactions can include different procedures such as asking questions and pointing to aspects of the activity in ways that encourage children to extend their level of understanding. We can also infer from these studies, and from other studies mentioned previously in the theoretical framework chapter (e.g. Gőncű and Rogoff,1998; Mattanah *et al.*, 2005), that mathematics learning is not restricted to school lessons. Social interactions in the home environment can play a significant role in children's learning and development.

4.3 *Involving parents in their children's mathematics learning through shared homework*

The IMPACT project (Inventing Maths for Parents, Children and Teachers) was implemented in many schools across England and other countries. The project took place from 1985 to 2004 under the direction of Ruth Merttens and others (e.g. Merttens & Vass, 1990). IMPACT was a curriculum-based parental involvement scheme which aimed to foster parental involvement in the school mathematics curriculum through sending parents and children shared tasks to do together at home. The project was framed by different theoretical notions which emphasised the role that the social context can play in mathematics learning. These notions include: mediation, cooperative learning, scaffolding and peer tutoring. In this perspective, children's homes were seen as important learning environments which can provide rich support for school mathematics learning. Schools were encouraged to link formal mathematics learning with children's everyday activities with the families' help.

The design of IMPACT activities was usually guided by these steps:

- Planning and preparation: each week or fortnight the teacher prepares with the children a task which aims to provide opportunities for parent and child to interact with each other in order to solve mathematical problems at home (e.g. angle search at home, drawing a map, furniture count, etc.)

- The children would then take the activity sheet to their homes, talk about it and complete it with their parents in a collaborative way using resources available at home
- Home feed-back sheets: parents and children were asked to write their comments about the activity on a feedback sheet (e.g. How easy or hard the activity was; how much did they enjoy it; whether they felt that the child learned anything)
- Follow up work: children's work at home would feed into the classroom mathematics lessons. The activity would be returned back to the classroom where the children and the teacher would talk about it

Merttens (1996) suggested that IMPACT activities were different from traditional homework in three aspects:

(1) IMPACT activities are designed to be shared and require assistance from others.
(2) Parents are required to support their child's learning and at the same time they are not required to act as a substitute teacher.
(3) The results of the home activity can be brought back into the classroom and used in subsequent class work

Merttens (1996) tried to avoid the deficit view which seems to be common among parental involvement programmes which viewed some groups of parents as deficit and therefore had a tendency, for example, to teach working-class parents to behave like middle-class parents (as discussed earlier in Chapter 3). Instead, Merttens considered the majority of parents as interested in helping their children and therefore schools should provide opportunities for them to utilise those learning resources available in the children's home environment. She also acknowledged that this type of parental involvement initiative can have problematic aspects such as creating conflicts between teachers and parents. Teachers can face difficult situations when parents' comments challenge their strongly hold pedagogical assumptions or objectives. Parents can also find difficulties in understanding the purpose of some activities and recognising the mathematical concepts embedded in everyday mathematics tasks.

Brown (2000) acknowledged the attempt of the IMPACT project to avoid the deficit view; yet he raised concerns about how particular groups of parents can still be advantaged or disadvantaged by such initiatives. Brown has analysed the IMPACT diaries which included parents' and teachers' comments about the mathematical activities. Findings of Brown's study showed that these diaries seemed to address the diverse groups of parents in a unified way and present a similar image of home practices. In the activities, school mathematics was presented to the home in a way which seemed to overlook the pre-existing social and pedagogic relations between home and school. Findings from the interviews indicated that teachers and parents (from both working- and middle-classes) had different experiences and therefore they used different discursive and pedagogical resources when engaging with school mathematics tasks presented in the IMPACT activities. Middle-class parents were more familiar with school culture and seemed to be best placed to take advantage of the opportunities offered by IMPACT as they were more likely to identify the mathematical aspects and to understand the purpose of the task. In contrast, working-class parents who had less knowledge of school culture were less likely to identify the mathematical content in the IMPACT tasks and to understand the tasks in the way favoured by the teacher.

In addition, Winter *et al.* (2004) argued that it is still not very clear how initiatives like IMPACT can actually engage children in authentic home mathematical practices or whether these activities are just school practices carried out in the home site. Further, there is limited evidence of the effect of approaches such as IMPACT on children's mathematics attainment.

Despite the above mentioned limitations, the IMPACT project was considered to be a pioneering project which tried to raise more awareness in many schools about the importance of parental involvement and tried to bring home activities and school mathematics closer together. In the data collection process of this study, I drew on some ideas of the IMPACT project (e.g. the weekly shared activity and the feedback sheets), which will be discussed in more detail in Chapter 6.

4.4 *Investigating parents' perspectives on their children's mathematics learning*

Guida de Abreu and her colleagues have worked on a series of studies which investigated parents' perspectives regarding aspects of home and school mathematics learning. In one of these studies, O'Toole and Abreu (2003) investigated the possible influence of parents' cultural backgrounds and social experiences on their mediation of their children's mathematical learning. They also investigated parents' perceptions about what they count as mathematics through the discussion of explicit and implicit aspects of home numeracy practices[1]. The first stage of the study drew upon interviews with four parents of primary school children from different ethnic backgrounds and at different levels of achievement. The participant parents identified four main activities which reflect explicit home numeracy practices: school homework, mimicking school based activities (e.g. commercially marketed workbooks), pocket money and shopping, and games.

In the second stage of the study, O'Toole and Abreu (2003) revisited interviews conducted in a previous study with 24 parents (Abreu, Cline & Shamsi, 2002) which focused on parents' perceptions about games - the fourth home numeracy practice identified in the first part of the study. The interviews included 24 parents (12 white – 12 Pakistani), of children aged 6-11, again with different levels of achievement. The study showed that parents varied in their understanding and recognition about 'games that involve mathematics'. These variations can be summarised in the following three views: (1) no use of mathematics games at home; (2) use of mathematics games, but benefit not recognised; and, (3) use of mathematics games with benefits recognised. The findings showed that there were some variations related to the visibility of numeracy practices embedded in the use of games. This variation can have some links with parents' cultural models. For example, most of the Pakistani parents did not seem to consider board games as relevant to their children's home learning of numeracy and some of them even thought that these games would have a negative impact on children's engagement with school learning (e.g. playing activities might be considered as a waste of the children's time and distracting them from studying).

[1] O'Toole and Abreu draw on the numeracy practices concept proposed by Street, Baker and Tomlin (2001). This concept will be discussed in more detail in the final section of this chapter.

In addition, Abreu and Cline (2005) were interested in learning more about the possible impact of children's home culture on school mathematics learning with a particular focus on the parents' representations[2] of school mathematics. Their study included interviews with 24 school children and their parents who were from Pakistani and White British backgrounds. The interviews focused on different aspects of the parents' representations, such as their knowledge about their child's mathematics learning, their experiences in assisting their child with mathematics learning, and their personal experiences in learning mathematics. Findings of the study showed that most parents encountered differences between their own understanding of mathematics and what their children were learning in school. For example, differences between parents from White and Pakistani backgrounds were as follows:

(1) Differences in teaching methods and tools used in the mathematics classroom: Parents from White backgrounds talked about historical changes in mathematics education and how their mathematics learning experiences in the past differed from their children's current experiences. The Pakistani parents added another explanation which involves cultural differences between educational systems in Pakistan and England (e.g. parents who studied in these two different educational systems can have different experiences regarding teaching methods, using calculators, as well as the social and emotional experiences related to schooling).

(2) Both groups of parents pointed out differences in computation strategies used in home and school (i.e. cultural tools in everyday cognition terminology). For example, parents tended to use vertical columns in writing addition algorithms while schools used the horizontal one. They also tended to use subtraction procedures such as 'paying back to the bottom' or 'equal addition' while it is more common in school to use procedures which involve 'decomposition' or 'borrowing from the tens'

(3) Pakistani parents also highlighted differences between home and school related language use (e.g. mathematics vocabulary).

[2] The term 'representation' refers to meanings and identities which a community attaches to particular uses of cultural tools or social roles.

The study concluded by emphasising that these differences should be taken into consideration when planning initiatives which aim to involve parents in their children's mathematics learning.

O'Toole and Abreu (2005) carried out a study which tried to answer the following two questions: how parents do draw on their past experiences in order to understand their child's mathematics school learning, and how do these past experiences influence parents' expectations about the future of the child. The study included interviews with 22 parents (11 from minority ethnic and 11 from white backgrounds) of children in Years 2 and 6 with different achievement levels in three multiethnic primary schools in England. Findings of the study showed that parents can use their past experiences intentionally or unintentionally as a way to understand their children's current school mathematics learning and to inform their practices in this regard. Analysis of the interviews revealed that parents, at times, tended either reproduce their past experiences with their children or use their past experiences to promote changes. In these processes, parents projected the future expected for their child which was either similar or different from their own past. For example, some parents who disliked mathematics in the past tried to prevent these negative experiences from being reproduced in their child's experience in order to change his or her experiences in the desired direction. In addition, parents with ethnic minority backgrounds were more likely to encounter differences between their past mathematics education and their children's present schooling. Some parents were aware of these differences and tried to provide their children with experiences which were different from their own and that could possibly provide a better future for their child. This process is quite complex as there were other factors that can influence a child's progress such as his or her low level of achievement in school.

Jones (1998) has explored aspects of cultural conflicts in mathematics learning between home and school for young Somali children living in Britain. Data for the study were gathered through the observation of five children (Reception or Year 1) in school and in home and through interviews which focused on parents' and teachers' views about the home and school numeracy experiences of the children. Findings of the study indicated that the mathematics learning experiences of Somali children can differ notably between home and school contexts. These differences can be presented in the following aspects:

(1) Parents and teachers had different views about the educational role of parents. The Somali parents seemed to have confidence and respect for the teachers and tended to view teaching as the responsibility of the teacher. The Somali parents rarely talked with the teachers due to their language difficulties. The teachers sometimes interpreted this infrequent interaction as little interest by the parents in school and expected the parents to be involved more.

(2) Learning experiences of the Somali children in the home context were more formal than expected. It appears that more explicit formal teaching and learning situations were being emphasised by parents at home, while there was little evidence of informal mathematical activities taking place there. Elder siblings often helped the young children in reciting tables with a method similar to that used in learning Qur'an (e.g. memorising the text section by section). The home style of learning seems to have some contrasts with the atmosphere of primary classrooms which emphasise learning through experience and play. The study concluded that it is essential for teachers to have more knowledge about children's home learning environments in order to get better understanding about how to resolve cultural differences faced by children through transition between home and school.

The above studies generally show that parents' personal perceptions and experiences in learning and teaching mathematics can be different from those held by teachers or by other parents with different social and cultural backgrounds. These differences can influence children's learning and hence they should be taken into account by mathematics educators when teaching the subject or when initiating schemes which are intended to encourage parental involvement in mathematics education. In accordance with these studies, I tried in my study to investigate parents' perceptions about mathematics knowledge, mathematics learning and teaching, and how they conceptualise their roles and the teachers' role in their child's education. I also tried to utilise parents' ideas and expertise to develop new teaching ideas which possibly can enrich children's learning. More about this will be presented in Chapter 6.

4.5 *Promoting dialogue between parents and teachers about mathematics education*

In the United States, Marta Civil and her colleagues have worked on several projects which attempted to involve parents from low income and ethnic minority (i.e. Hispanic) backgrounds in mathematics education. Their work was framed by primarily sociocultural theory as well as other related conceptualisations such as cultural and social capital, funds of knowledge and ethnomathematics. Their approach tried to move beyond the common deficit view associated with working-class and ethnic minority parents. Instead, they tried to build upon the experiences and funds of knowledge of these families in order to support children's mathematics learning.

The MAPPS project (Math and Parent Partnerships in the Southwest) was a four-year project carried out in four different areas in the U.S. (Civil, Quintos & Bernier, 2003). The project was based on the assumption that parents of diverse educational and linguistic backgrounds can learn mathematics to support their children's learning and also can collaborate with teachers and administrators in teaching other parents. The participant parents had engaged as adult learners in mathematics activities and eventually became facilitators of workshops with other parents in the community. The purpose of these workshops was not just to teach parents the school mathematics curriculum, but also to increase their knowledge of what to expect from their children and to raise their confidence to engage with their children in school mathematics work.

In addition, the MAPPS project also sought to promote parents' leadership in mathematics activities at home and at school through three types of activities (Civil, Guevara & Allexsaht, 2002):

1. Mathematics Awareness Workshops: parents were invited to discuss and analyse children's learning of different topics in mathematics.
2. Leadership development sessions: parents, teachers, and administrators discussed in these sessions how to facilitate workshops for the larger parents' community and provide opportunities for collaborative activities among the three groups. After the first year in the program, parents and teachers worked together in the workshops to facilitate mathematics learning for other parents.

3. Math for Parents: where the leadership teams (parents who acted as facilitators and teachers) had an opportunity to explore and discuss mathematical topics and concepts in more depth.

The findings of the project indicated that the activities had helped the researchers to learn more about parents' perceptions and experiences regarding mathematics teaching and learning. The project also encouraged the teachers to challenge their dominant pedagogies and to reflect upon their assumptions about parental involvement. The project helped the parents to construct their own understanding of mathematics concepts and this factor, in turn, influenced their support for their children's learning.

In a similar approach, Shumow (1998) argued that parents, when helping their children with mathematics, often use strategies incompatible with strategies favoured by the new mathematics reform in the U.S. One possible explanation for this incompatibility is that parents construct their teaching models by drawing on traditional methods experienced in their previous learning experiences. For example, parents tended to use directive-controlling strategies which clashed with strategies such as reasoning and conceptual understanding stressed by the mathematical reform. As a result, Shumow developed a programme which aimed to promote parental involvement in children's mathematics learning through providing parents with verbal and written information related to the new reforms in mathematics education. This programme was framed by sociocultural concepts which emphasised social mediation such as ZPD and scaffolding. 35 parents of Year 2 children participated in the programme which tried to utilise the potential of informal family-situated problem solving through designing homework tasks related to everyday family activities such as food preparation, shopping, games and family stories. These homework tasks were accompanied by newsletters which provided research-based information to the parents about children's mathematical development with special emphasis on reasoning skills. Half of the participant parents took part in phone conversations with a researcher. These conversations focused on the child's individual mathematics development, discussing parents' questions, exchanging observations about the child's strategies, and forecasting upcoming development. The participant parents were videotaped while assisting their children with homework mathematical problems both before and after the programme. Findings of the study indicated that before joining the programme parents were highly directive

and controlling of their children's solutions. After the programme, all parents decreased their directive control and showed increased collaborative guidance between the pre and post homework sessions. Parents who participated in the conversations showed more collaborative guidance and displayed more knowledge about their children's mathematics reasoning in comparison to parents who learned solely from text (newsletters). The study concluded that conscious efforts should be made to involve parents in children's learning in order to promote parents' understanding of the reforms which can have a significant effect on children's education.

These two examples projects, carried out by Civil and Shumow, aimed to create links between home and school through: (1) investigating and building upon parents' perceptions and experiences; and, (2) 'teaching' parents about school mathematics which in turn can help them in supporting their children's mathematics learning. However, these projects seemed to emphasise more school mathematics and school-to-home traffic flow of information. Exploring authentic mathematics experiences and practices of the children and their families at home is an important aspect which seems to receive limited attention in these projects. In the next sections I will present some studies which gave more consideration to mathematical practices taking place in the children's homes and out-of-school settings.

4.6 Utilising home mathematics resources in school mathematics teaching

Fleer and Raban (2006) have examined ways of enhancing the formation of literacy and numeracy concepts of young children (five years and under) in Australia. They investigated teachers' perceptions about the formation of and complex relationship between scientific concepts and everyday concepts proposed by Vygotsky. Panofsky, John-Steiner and Blackwell (1990) have provided a detailed discussion about these two concepts which can be briefly described as follows:

- Scientific concepts: are concepts adopted by the child in the domain of academic thinking and often not located within meaningful and concrete situations.

- Everyday concepts: are concepts embedded in the day-to-day life experiences which have the potential for more development through formal instruction. These concepts are often used by the child without conscious realisation about the underlying structure.

For example, in the acquisition of language, learning a second language in school can be seen as the formation of scientific concepts while native language development at home can be seen as formation of everyday concepts. Vygotsky argued that integrating everyday thinking and scientific thinking in the learning process can lead to better and more meaningful understanding. Fleer and Raban tried to examine teachers' awareness of the value of connecting both everyday and scientific thinking. They filmed children and teachers in eight classrooms in an early childhood centre in Australia. The films and photographs were used as a stimulus for discussion with teachers about the process of concept formation. The findings of the study suggested that Vygotsky's theory of connecting everyday and scientific concepts was very new for the teachers. Teachers' assumptions about learning seemed to be aligned with Piagetian theoretical concepts. For example, they emphasised providing rich environments where learning opportunities are embedded. Teaching, in their view, should be non-directive and aim to facilitate learning. They did not give much consideration to the active role of adults in mediating thinking and rather viewed learning as an individualistic internal activity. The study concluded that although sociocultural theory can be potentially useful for teaching practices, it seems less well understood within early childhood education.

In another study, Fleer and Raban (2007) examined families' and early childhood professionals' views about a set of materials which drew upon Vygotsky's notion of scientific and everyday concept formation. These materials aimed to bring together literacy and numeracy concepts with children's personal everyday knowledge and practices. These materials included:

- Videotapes and photographs of everyday practices of families in out-of-school settings which were produced as a set of 'Clever Cards' distributed to early childhood professionals and parents
- Booklets designed to provide early childhood professionals with more knowledge about the sociocultural theory and notions of scientific and everyday concept formations

Findings of the study indicated that staff and families (349 individuals surveyed on-line or interviewed) responded positively to the cards and booklets. For example, the cards helped the families to see the links between everyday experiences and academic learning and the booklets helped the teachers to think about everyday experiences that can support learning for children.

Fleer and her colleagues (Fleer *et al.*, 2006) have also carried out a project called 'Catch the Future' which sought to improve literacy and numeracy outcomes for children living in low-socioeconomic circumstances in Melbourne. The project was concerned with mapping children's literacy and numeracy experiences at home and at early childhood centres in an attempt to understand more about how literacy and numeracy were being constructed in the two contexts. The study also sought to investigate how families and educators conceptualise and enact literacy and numeracy in their contexts. Four preschools and one childcare centre representing 120 children and 57 families participated in the study.

The project consisted of three stages. In the first stage, families were invited to take home disposable cameras to take photographs of their child while participating in everyday activities. Then, parents met together to share and discuss children's literacy and numeracy experiences demonstrated in the photographs. In the next stage, the project team members worked with the teachers in workshops that were designed to encourage teachers to talk about their perceptions about children's learning experiences at home. After that, the teachers were shown the photographs taken by families. The teachers were invited to give their comments about the photographs and to think about ways to incorporate these home learning experiences in their classroom teaching. New teaching strategies and learning materials were developed later by teachers through these discussions. The final stage of the project focused on measuring the impact of the intervention on the children's literacy and numeracy development.

Findings of the study showed that at the beginning of the project teachers often held a deficit view of families' learning experiences at home. Their assumption was that children from low socioeconomic circumstances do not have enough resources or experiences of literacy and numeracy at home. The study discussed how teachers' deficit views about families can lead to more emphasis

on a singular view of numeracy and literacy which prioritises school discourse and practices, and pays less attention to home literacy and numeracy experiences. This gulf between home learning experiences and school learning can create difficulties for the children in terms of 'activating' formal abstract concepts taught in school and utilising them as functional tools in their everyday life. At the end of the project, most teachers acknowledged that they had previously underestimated the families and they had become more aware of the learning experiences that were occurring at home. In addition, the project contributed to improving children's outcomes in literacy and numeracy (assessed through pre- and post-testing) and subsequently helped in the development of an innovative programme for preschool literacy and numeracy supported by technology education.

4.7 *Investigating numeracy practices at home and at school*

Brian Street, Dave Baker and Alison Tomlin (2001; 2003; 2005) worked on the 'School and Community Numeracies Project' which was part of the larger scale 'Leverhulme Numeracy Programme'. Their work was based on the assumption that the traditional 'autonomous' model of numeracy which conceptualises mathematics as abstract, value- and culture-free, and decontextualised coupled with the conventional pedagogy and curriculum can all contribute to the deficit view. This deficit view tends to ascribe children's underachievement in numeracy either to the teacher (e.g. not using efficient teaching practices or lacking subject knowledge), or the family (e.g. lacking knowledge or interest to support children's learning), or the child (e.g. lacking intellectual abilities or interest). Instead, Street *et al.* proposed a different model which tried to move beyond the deficit view and argued that research concerned with explaining children's underachievement in mathematics has often considered school as the main context for mathematics learning. Therefore, attempts to understand children's underachievement were usually focused on issues associated with school mathematics. In such studies, children's social and cultural backgrounds and their out-of-school life experiences were often given insufficient consideration. As a result, Street *et al.* paid more attention to investigating the nature and possible influence of social factors on children's attainment. They tried to find possible explanations for the underachievement of children by

looking at differences and multiple numeracy practices in both contexts of home and school. Their work was based on an 'ideological model of numeracy' which extended the social view of numeracy (Baker *et al.*, 2003). Their broad interpretation of the term 'social' here emphasised the influence of context, values, beliefs and relationships in numeracy learning.

In addition, Street *et al.* have developed some theoretical concepts based on previous work developed within the literacy field. These concepts (numeracy events, numeracy practices, site and domain) can serve as helpful tools for looking into mathematics learning at home and at school and are defined as follows:

- *Numeracy events* are occasions which involve numerical activity and "in which a numeracy activity is integral to the nature of the participants' interactions and their interpretative processes" (Baker, 1998 cited in Street *et al.*, 2005: 21)
- *Numeracy practices* are "broad notions about the ways numeracy is dealt with in different contexts and settings" (Street *et al.*, 2005: 21). These practices are not conceptualised as just numerical activities, but rather as actions which are located and shaped by the context and its related discourses, values, beliefs and social relationships

Street *et al.* used these concepts as a way to understand and explore the relationships between numeracy learning at home and at school. For example, school numeracy practices are often designed to achieve particular formal objectives. Social relationships and knowledge content in the mathematics classroom are often controlled by the teacher. Numeracy practices at home can be different from school in terms of their domestic purposes and informal relationships between the learner and other family members.

In reality, however, numeracy practices of home and school act as mutually constituted and not separate entities as they often overlap. This overlapping can make classifying and describing the numeracy practices in the two contexts a difficult process. Therefore, Street *et al.* made a distinction between *sites* (the actual places where activities take place) and *domains* (as areas of activity not located in specific places). In this way, for example, mathematics homework is related to the domain of schooled numeracy practices, but can be found in the

site of home. Whereas setting the video timer to record a favourite TV programme can be seen as a home numeracy practice taking place at the home site. More examples can be found in Table (4.1).

Street *et al.* noted that numeracy practices related to the school's domain are often paid more attention in the mathematics classroom whereas it is often not easy to find examples of numeracy practices related to out-of-school domain in the classroom. This point was similarly raised by other writers (e.g. Moll *et al.*, 1992) who observed that classrooms often give insufficient attention to children's out-of-school experiences and funds of knowledge in classroom teaching. According to Street *et al.*, this separation between school learning and the social life of children in their out-of-school contexts can play a significant role in causing children's underachievement in mathematics. For example, some children may find difficulty in the process of 'switching' between the different practices in the two contexts of home and school. This process of switching, which can be highly important, appears to be under emphasised in the classroom and the curriculum.

The data collection process of Street *et al.*'s project involved longitudinal case studies of groups of four children in three schools in the United Kingdom. The children were tracked for three years from reception to Year 2. Data were collected through school visits, home visits, and interviewing parents and teachers.

Findings of the project showed that parents often talked about various home numeracy practices such as using catalogues for shopping and pigeon racing which were located in natural contexts and involved social relations. Despite their engagement in these home numeracy practices, parents tended to associate numeracy mainly with school type practices and they seemed to lack awareness about ways of using out-of-school numeracy practices to support children's learning. In schools, classroom teaching practices seemed to be 'disembodied' from real life experiences. Schooling was seen by teachers as fundamental and therefore learning was centred around the school curriculum and appeared to have little connection with learning experiences taking place outside school. In addition, home-school relationships seemed to lack effective communication and sharing of practices. Teachers viewed some groups of

parents as lacking cultural resources or personal skills which enable them to negotiate and communicate effectively with school.

In addition, Street *et al.* have identified a number of components related to cultural resources at home which can have an impact on children's schooling, they are:

- Values and beliefs
- Knowledge about school numeracy
- Physical resources
- Domestic practices
- Attitudes of parents and carers to school subjects and to schooling

These home cultural resources can sometimes fit or clash with the pedagogic approach adopted by school. The analysis of numeracy practices in the four contexts (school domain practices at school site, home domain practices at home site, school domain practices at home site, and home domain practices at school site) has yielded several features which potentially can influence children's achievement in numeracy. These features are:

- Significant differences between home and school numeracy practices
- Issues about home-school communication
- Areas of substantial conflicts between home and school, such as homework
- Unexpected differences in resources and funds of knowledge at home and at school
- Disjunction between home and school can have an impact on the 'disengagement' of some children from school numeracy. The analysis highlights the disparities between what parents imagined school wanted them to do (i.e. formal schooled mathematics at home) and what teachers really wanted (i.e. different, informal mathematics that the school did not have time or resources to provide)
- Children may seem disengaged in numeracy learning in the classroom not because they lack abilities but perhaps because they reject the new school experiences which may conflict with their everyday experiences (e.g. unlike learning experiences at home, learning in the classroom is more controlled and offers less choices). Children can also face difficulties because they found it hard to switch between the two types of practices and their discourses at home and school

In summary, Street *et al.*'s work has provided more evidence about the possible influence of out-of-school social factors on children's achievement in school mathematics. It has also offered useful conceptual tools which can help in categorising numeracy practices depending on their characteristics (domains) or location (sites). This means of categorisation can be useful to disentangle the various overlapping numeracy practices which take place in different contexts. In addition, concepts such as 'engagement' in out-of-school practices and 'disengagement' in school practices and the difficulty faced by some children in 'switching' between these two different practices can offer different explanations about the children's underachievement in mathematics which goes beyond the deficit view. This work can have implications for the school curriculum and pedagogy in terms of rethinking home-school relationships and paying more attention to the social life and 'funds of knowledge' of the children and their families and how these can be utilised to support and promote mathematics learning. Some of these theoretical ideas proposed by Street *et al.* along with other concepts offered by other writers were further developed and put into practical practice in the Home School Knowledge Exchange which will be discussed next.

	Domain: Schooled Numeracy Practices	**Domain: Out-of-School Numeracy Practices**
School site	Working on number bonds, counting, calculating numbers of children away and in class	Dates, birthdays, aspects of data and measuring, Pokemon cards, money, playground games.
Home site	Homework, commercially marketed texts, counting up and down the stairs, patterns on car number plates, door numbers.	Pocket money, time, laying the table, shopping, setting the video, home discipline, 'symbolic uses of number systems, 'finger counting', door numbers, jigsaws and calendars.
Emergent qualities	Global Top down Targets and teacher/school driven. Formal educational purposes Talk as school routines Extrinsic motivation Learning through practice Teacher has authority, selects and frames practices; insider Child outsider	Local Bottom up Home purposes, problem/life organisation driven Talk as dialogue and negotiated Intrinsic motivation Learning in practice Home selected activity Child selects approach Child insider

Table 4.1 Classification of sites and domains of numeracy practices: examples and qualities (Street, Baker and Tomlin, 2005: 33)

4.8 *Promoting knowledge exchange between home and school*

Martin Hughes and his colleagues (Greenhough *et al.*, 2004; Hughes & Greenhough, 2007; Hughes *et al.*, in press; Winter *et al.*, 2004) carried out a project called 'Home-School Knowledge Exchange" (HSKE) between 2001 and 2005. The project tried to enhance children's literacy and numeracy learning thorough developing activities which promote two-way communication and mutual knowledge exchange between home and school. The project also looked into the impact of these activities on children, teachers and parents.

The project consisted of three strands: the literacy strand (Key Stage 1 - ages 5-6 (at the start)), the numeracy strand (Key Stage 2 - ages 8-9 (at the start)) and the primary/secondary transfer strand (Key Stage 2-3). In what follows, I will focus mainly on the numeracy strand of the HSKE project[3] .

The numeracy strand was based in eight primary schools (four action schools and four comparison schools) in two cities in the UK. One classroom was chosen from each school to participate in the project. The diversity of children's ethnic backgrounds and economic conditions were taken into account when selecting the sample. A teacher researcher worked with the class teachers on developing the project activities.

The research methodology was based on multi-site action research which combined qualitative case studies - where a variety of techniques were used in the data collection process such as interviews, photographs, videos, and diaries - and a quasi-experimental structure used to make quantitative comparisons between the performance of children who participated and those who did not take part in the project. Standardised attainment tests and attitude measures were used for the quantitative comparisons of children's performance before and after the project implementation. Further qualitative data was collected from six children from each classroom along with one in-depth case study from each school. This process included interviews with the children, their parents and their

[3] For more information about the project see the special issue of Educational Review Vol. 58, No. 4, November 2006 / for full details about the numeracy strand see (Hughes and Greenhough, 2007; Hughes *et al.*, in press; Winter *et al.*, 2004)

teachers as well as classroom observation and video recording of home mathematics activities.

I would like to begin by looking into some theoretical aspects which framed the project before presenting details about HSKE activities. Hughes *et al.* (in press) argued that connecting home and school mathematics learning is important, however, teachers and parents often lack knowledge about mathematics learning which takes place beyond their territories or know little about efficient ways of making these connections. Schools often give priority to teaching mathematics as a set of ideas and skills which are mainly acquired and assessed within the classroom setting under the teacher's direction. Little attention is paid to the mathematical experiences which take place in children's out-of-school settings and the role of families in the development of their children's learning. In addition, parents can depend on their previous schooling experiences when helping their children with school mathematics. Parents' strategies are not always up-to-date or compatible with school approaches. Parents can also have different understanding about what counts as mathematics in comparison to teachers. Some parents may also lack confidence or feel inhibited by school because of their lack of understanding of school ways. In addition, Hughes and Greenhough (2006) highlighted some common characteristics in communication practices between the two sites of home and school: (1) communication often takes the form of a 'one way' flow of information from schools to parents; and, (2) communication is usually controlled by schools, and parents have a limited role in deciding the quantity or content of such communication. Thus, they proposed the concept of knowledge exchange as a possible resolution for this separation between home and school learning. According to this idea, knowledge can flow in two directions: (home-to-school) and (school-to-home).

The development of the knowledge exchange concept was informed by different theoretical concepts mentioned earlier in this chapter and previous chapters. For example, Hughes and Greenhough drew on Street *et al.*'s (2005) concepts (domain, site, home and school numeracy practices), Moll *et al.*'s (1992) notion of funds of knowledge, Lave's (1988) ideas about situated learning and Wenger's (1998) account of communities of practice.

The project members (e.g. Winter *et al.*, 2004) were interested in adopting the central idea of the concept of funds of knowledge (i.e. building on children's and families experiences and knowledge). Yet, they had some concerns about the financial or banking metaphor (Freire, 1970) which seems to underlie the 'funds of knowledge' concept as well as other concepts such as 'capital' (Bourdieu, 1986) and 'resources' (Baker *et al.*, 2003). The problem with the financial metaphor is that it can unintentionally lead to a deficit discourse which compares families with different life situations according to how much funds they do – or do not – have. The knowledge exchange concept proposed by the HSKE project tried to avoid the deficit discourse by suggesting that families – from different backgrounds and circumstances – and teachers have different kinds of knowledge which are often separated and there is a need to identify, build on and exchange such knowledge in a mutual manner in order to bring home and school closer together.

Several papers have described and discussed issues related to the numeracy strand of the project. In one of these papers, Hughes *et al.* (in press) found that children engaged in many activities which included different mathematical aspects at home. These activities can be categorised in the following three ways:

- Play and games: many popular games played at home involve a great deal of mathematics such as Monopoly, Dominos and card games. Children can construct sport activities and role-playing games which involve many mathematical aspects (e.g. a boy in the project developed a game with his friends which was based on scoring points for aiming a ball at a kerb across the road, a girl role-played as estate agent).
- Authentic household activities: many children engaged with other family members in everyday activities which took place at home and involved different mathematical ideas such as cooking, using money and planning a journey. These activities were termed 'authentic' because they are essential for the family's day-to-day life and therefore it is important that they are done correctly. Using Street *et al.*'s terminology, these activities (playing games and authentic household activities) would belong to the 'home domain' and take place in the 'home site'.
- School-like mathematics activities: these activities are strongly related to school mathematics as they can include for example: homework, support

from private tutors, maths problems set by parents or siblings, teacher-pupil play, and using commercial maths schemes and software packages. These activities belong to the 'school domain' but are taking place in the 'home site'.

Hughes *et al.* noted that in the first two types of home numeracy practices (play and games, and authentic household activities) mathematics learning is not considered as the main purpose of the activity, whereas in school-like activities developing or rehearsing mathematical skills is at the heart of the activity. In addition, the 'boundaries' between these three types of mathematics practices are not clear cut as, for example, school-like mathematics can sometimes be intentionally introduced in games or household activities.

Researchers, teacher researchers and teachers worked collaboratively in the HSKE project on developing and evaluating a number of 'knowledge exchange' activities between home and school which tried to identify and build on different types of knowledge available in the two settings. The project included: (1) 'school-to-home' activities such as: videos of mathematics lessons for parents, booklets, newsletters, exhibitions of materials; and, (2) 'home-to-school' activities such as: home visits and taking out-of-school numeracy photographs. Some of the activities carried out in the numeracy strand will be described next.

School-to-home activities

The main aim of these activities was to give more information to the children's families about school mathematics (e.g. teaching strategies and curriculum). The four schools used different methods to facilitate the flow of information from school to home which included the development of regular classroom newsletters, providing parents with published materials about parental support for their children's mathematics learning, home-school books, inviting parents to visit classrooms, parents' evenings, maths clubs and workshops, and distributing videos demonstrating mathematics teaching in the classroom.

Home-to-school activities

A range of home-to-school activities were introduced by the project team in the four schools. One school introduced the idea of pupil's profile sheets where parents provide information about their child's activities and interests out-of-school as well as children's attitudes towards school and mathematics learning. In another school, children brought into the classroom their favourite mathematics games. The idea of a 'maths trail' was developed in third school. Children were encouraged in this activity to explore and identify mathematical ideas at home and other out-of-school settings which involved for example calculating the average age of family members or the distance between children's homes and the nearest shops (for more details see Winter *et al.*, 2004)

The camera activity was one of the more interesting activities which fell in the home-to-school category (see e.g. Feiler *et al.*, 2006; Winter *et al.*, 2004). In this activity, photographs were used as a way of bringing aspects of children's out-of-school mathematics experiences into school. Here, the children were asked to take photos about everyday mathematical activities that they engaged with during the summer holiday. The focus of the photos was centred on everyday activities rather than school-type mathematics. The children were also given a diary to record information about each photograph. The photos included a wide range of events including cooking, shopping, playing board and card games, and setting timers on the microwave. Some of the photographs selected by children were displayed in the classroom. Since interpreting the mathematical content of the images was not always easy for the teacher, the children were encouraged to talk about the meaning of their pictures or provide written explanations. Many parents and children enjoyed the activity. Nevertheless, the activity seemed relatively difficult as the rate of camera return was lower in comparison with the literacy strand. The activity raised awareness among teachers about mathematics which the children engaged with out-of-school and provided them with detailed and varied information about the children, their abilities and their backgrounds. Games and play was one of the frequent home-based mathematics activities shown in the children's photographs. As a result, children were encouraged to bring in mathematical games and play with them in school.

Some of the findings and issues which emerge from the project can be presented in the following points:

1. It is important to find ways to connect mathematics learning in- and out-of-school. However, there are different reasons which can inhibit such connections such as the lack of awareness of teachers about the existence of useful mathematical ideas and activities at home. Some teachers may consider such activities as having little value or even to be against school mathematics strategies. Other teachers recognise home mathematics practices, but at the same time they do not necessarily know how to incorporate these ideas in classroom teaching. These difficulties can be caused by insufficient training, lack or time and resources and variation of families' circumstances and backgrounds. Teachers can encourage building connections between school and home mathematics through utilising children's out-of-school knowledge as a resource to support classroom learning. They can also utilise children's out-of-school contexts as sites where the more abstract or 'disembodied' knowledge acquired in schools can be applied. Parents can also help teachers in this aspect by playing the role of mediators who try to connect concepts learned in school with everyday activities encountered at home (Hughes *et al.*, in press).

2. Conflicts between teaching strategies used at home and those used in school can cause different reactions among teachers and parents. For example, some parents may feel inhibited about supporting their children's mathematics learning at home because they think that their intervention may backfire as it may cause confusion to the child. Other parents may feel disliked or alienated by school as a result of their lack of knowledge about school mathematics strategies. This factor may also contribute to an increased lack of confidence about their mathematical abilities rooted in their past learning experiences. In addition, it is important to provide sufficient information to parents about current strategies used in school as well as helping them to recognise that there are many ways to solve the same mathematical problem and there is not necessarily one single correct method. Teachers should welcome parents' strategies which can be discussed and compared in the classroom in order to show the children the richness and diversity of mathematical knowledge (Hughes *et al.*, in press).

3. Depending solely on decontextualised calculations in school can inhibit children's ability to utilise their mathematical knowledge in real life situations. Therefore, encouraging children to work on different mathematical tasks located in different contexts can help them to bring these separated experiences closer together and to utilise their mathematical knowledge in a meaningful way (e.g. working with different individuals such as teachers, parents and peers on different activities such as games and playing, authentic household activities and school-like activities). These activities can also help the teachers and the parents in getting a better understanding about the abilities of the children

4. Hughes and Greenhough (2007) drew on Wenger's (1998) account of communities of practice[4] in their investigation of the relationships between home and school mathematics practices and identity. They analysed a video which included interactions between a nine-year-old boy and his mother while engaging in a homework task (a set of two-digit subtraction problems). The homework task was seen as an interesting opportunity to gain insights about home and school mathematics learning as it required moving across boundaries of different communities of practices (i.e. home and school). The study showed that mother's assistance to her child on his homework can raise tensions and conflicts between home and school practices. This process also involved negotiating power positions and different identities between the mother and the child. These tensions emerged from the differences between strategies taught to the child in school and strategies based on the mother's previous school experiences. The study concluded by suggesting that when designing mathematics homework teachers should take into account different aspects such as:
    - Providing sufficient information to parents about the homework topic and its required strategies

[4] This concept extends early concepts of situated learning which somehow hold a 'static or a singular view' of practice into a new concept which emphasises the multiplicity of communities of practice which can be linked with each other in different ways. Individuals can have multiple memberships in different communities of practice (e.g. home, school and other settings). Individuals can face tensions and conflicts because of the change of their identities while moving from one community to another.

- Giving more recognition to the role of parents and utilising their knowledge and expertise. Schools should provide parents with opportunities which allow them to work collaboratively with their children on shared authentic mathematical tasks
- Connecting children's authentic home resources and everyday experiences in meaningful way with school mathematics learning

5. There were some ethical concerns that emerged during the implementation of the HSKE activities. The project team highlighted the ethical dilemma of whether researchers and schools have the right to attempt to remove the barriers between home and school. Some children, for instance, may have felt reluctant about presenting some of their photographs to other children in the classroom as they brought particular aspects of their home lives into school that can make public private aspects of their life. In addition, Andrews and Yee (2006) have reflected on their personal experiences and highlighted some unexpected ethical and methodological issues which emerged through their work with the children's families in the project. For instance, they encountered some ethical dilemmas resulting from the conflicting requirements between the role of the professional researcher and the role of the 'good guest' when carrying out research in home settings.

6. Findings regarding the effects of HSKE activities on children's attainment and learning disposition showed that children in the action schools made better progress in mathematics between the pre and post tests compared to the comparison schools. Nevertheless, these differences were not statistically significant. In addition, there were no significant differences between the two groups of children on most of the JELLI learning attitude subscales (see Hughes *et al.*, 2006).

4.9 Summary

In this chapter I have presented and discussed some studies which shared similar interests and at the same time looked into different aspects of parental involvement in their children's mathematics education. Studies which investigated children's pre-school mathematics learning in the home

environment (e.g. Anderson, 1997; Aubrey, 1994) indicated that parents can play a significant mediation role in supporting their children's mathematics learning through shared interactions in everyday activities. Other studies (e.g. Merttens & Vass, 1990) tried to involve parents in their children's mathematics learning through shared homework. These ideas were further developed and extended by other researchers (e.g. O'Toole and Abreu, 2003) who used the sociocultural framework to investigate parents' perspectives about their children's mathematics learning and tried to learn more about the relationship between children's home culture and school mathematics learning. Abreu's studies found that parents' perceptions and experiences in learning and teaching mathematics can be different from those held by teachers or held by other parents with different social and cultural backgrounds. Civil and her colleagues (e.g. Civil, Bernier & Quintos, 2003) tried to promote two-way dialogue about mathematics education between parents and teachers. They tried to create links between home and school through investigating and building upon parents' perceptions and experiences and 'teaching' parents about school mathematics which in turn can help them in supporting their children's mathematics learning. However, these projects seemed to emphasise school mathematics and school-to-home traffic flow of information.

Recent projects attempted to move beyond the school-centred view which often characterised previous studies and parental involvement initiatives and tried to find ways of creating more balance in the process of investigating and utilising home and school mathematics. For instance, Fleer *et al.* (2006) tried to raise teacher awareness about children's learning experiences at home and tried to find ways for utilising home mathematics resources for school mathematics teaching. Further, Street *et al.* (2005) have developed numerous concepts through their investigation of numeracy practices at home and school. They focused particularly on how the separation of learning between home and school can have an impact on children's knowledge and development. Their concepts were particularly useful in disentangling the various overlapping numeracy practices which take place in different contexts. Finally, the HSKE project researchers have moved one stage further as they put some of the previous conceptual ideas into practice. They developed a new approach which emphasises mutual knowledge exchange between home and school.

The next chapter will describe the research problem and its significance and presents the main questions of this study.

5 Research rationale and questions

5.1 Introduction

This chapter describes the research problem and its significance and presents the research questions addressed. Due to space constraints, background information and the context against which the research was conducted is included in Appendix A. General information about me, my country, the main features of the educational system, and the current challenges facing education in Bahrain is also included in Appendix A. My suggestion to the reader is to begin first with Appendix A and then return back to Chapter 5.

5.2 Research problem and significance

In Appendix A, I tried to illustrate a general picture of the research context and some of the major educational concerns in Bahrain. Exploring these broad challenging issues in any depth is definitely beyond the scope of this study. This study focuses primarily on exploring two issues through a small scale research project: (1) investigating the area of home-school relationships and thinking about possible ways of facilitating it; and, (2) acknowledging the social and cultural dimensions of mathematics and thinking about possible ways of connecting them to school mathematics. In the earlier literature review, these two areas have often been considered by many educational researchers as potentially key for the progress of primary school education. I also believe that focusing on these two issues can be beneficial as these areas seem to be overlooked in the policies, research and practices of the educational system in Bahrain. Hopefully, this research may shed new theoretical light on those two issues, change some aspects of teaching practices in the case school, and yield useful recommendations for the policy-makers, teacher training and teachers in Bahrain.

5.2.1 Investigating home-school relationships and thinking about possible ways of facilitating them

This research aims to contribute to the general effort of building better home-school relationships in Bahrain through: (1) investigating stakeholders' experiences and perceptions about home-school relationships; and, (2) introducing new ideas which can instigate or facilitate home-school relationships. In the discussion that follows, I will present the rationale and expected contribution of this study.

Educational practices should reflect wider political reforms

After many years of waiting, the new political reforms in Bahrain have raised hopes for a more democratic society. However, these reforms seem to be more visible in the top level of social organisations and are less reflected in the lower levels of social institutions such as home, school and work. Therefore, one of the major challenges for today's schools in Bahrain is to move in accordance with the wider democratic reforms in the country. On the one hand, schools should open their doors and build stronger relationships with the families. On the other hand, families should be encouraged to take a more active role in their children's education and have a powerful voice in school. In my opinion, as an individual who wishes to contribute to the wider society, and as an educational researcher who aims to understand and to instigate changes in the educational field, I focused on the topic of home-school relationships because I believed that investigating these relationships and looking for possible ways of facilitating them would be a worthwhile task as it tries to move a small step forward toward more democratic social practices.

Lack of parental involvement research and policies

In Chapter 3, I highlighted the growing interest in, and the rapid development of, policies, research and projects regarding parental involvement in many countries around the world. This issue, however, seems not to be a priority in the educational field in Bahrain. I think that there is general awareness of the importance of strong home-school relationships in the country. Yet, this general awareness seems not well developed or reflected in real educational practices. There seems to be lack of detailed research, policies and projects that focuses

primarily on this area. While reviewing literature, I did not find any relevant publications either in the University of Bahrain library or in the publications catalogue of the Ministry of Education. Therefore, I intend to translate and publish parts of this study into Arabic in order to introduce new ideas of home-school relationships to the wider educational field in Bahrain and to inform the decision-making process there. I also intend to use parts of the research as teaching materials in my future teacher training courses in the University of Bahrain. Through this effort, I hope that this study will contribute to the development of the home-school relationship literature both in Bahrain and elsewhere.

My previous experience

Another motive which encouraged me to focus on home-school relationships is related to my previous teaching experience. During my teaching years in primary school, I always considered parents as important elements in their children's education. However, this belief was neglected in my practice. My relationship with parents seemed to be quite traditional as they were provided with very limited opportunity for active involvement in their children's education. My communication with parents was usually one-way, of the school-to-home type. I had a deficit view about particular groups of parents. This contradiction between my values and my practice was problematic. It raised the question of why I believed in something but at the same time did something else. Therefore, carrying out this research would be a good opportunity to: (1) improve my understanding and skills regarding this issue; (2) experiment with possible ways of instigating changes in teaching practices; and, (3) think about possible ways of incorporating this understanding in my future work in teacher training.

The need for change and innovation

Studies reviewed in Chapter 3 identified three main topics on the area of home-school relationships: (1) parental involvement is a multifaceted and complex issue, and there are different definitions and models of parental involvement; (2) the rationale, assumptions and benefits of parental involvement need to be critically examined and not taken for granted; and, (3) it is important to acknowledge the social and cultural diversity of parents in terms of social class, gender, power and the importance of understanding the multiple perspectives of those diverse parents.

My understanding about the topic of home-school relationships was changed during the course of my PhD study. I think that using the above mentioned ideas for the critical examination of home-school relationships in Bahrain would potentially lead to a new approach which differs from, contrasts with, or challenges the widespread traditional approach. I hope that this study will inform educational practices and policies about these matters. In what follows, I will give a brief illustration of using such ideas to critique one parental involvement project that has been recently introduced in Bahrain.

The 'Parents' Councils Project' (hereafter will be called the PCP) was launched in 2000 and aimed "to encourage the school to open up to its environment and to activate its role in educational activities and social services" (Ministry of Education, 2004: 97) and to "strengthen and boost reaction between home and school so that the parents may in turn support and complement the role of the school and its objectives of the formation of an integrated personality of the student" (Al-Sulaiti & Abdul Ghani, 2001: 21).

It is fair to say that the PCP can be seen as one positive step toward acknowledging parents' important role in their children's education. It is an example of the growing awareness on the part of the Ministry of Education regarding the importance of facilitating home-school relationships. However, more effort needs to be made in this respect since other types of parental involvement activities should also be encouraged and activated.

Some research argues that 'top-down' parental involvement programmes such as the PCP can often be controlled and designed to serve the purposes of school. For example, the PCP aims stated above seem to regard parents as school agents (Brown, 1993) who should "support and complement the role of school". The literature suggests that building successful home-school relationships may not be achieved when imposed by the school on parents. Instead, school should begin with investigating and building upon the views and experiences of parents, children and teachers in order to understand their needs and expectations. In addition, drawing on the views and experiences of the stakeholders can lead to a greater sense of ownership and probably would lead to more success in parental involvement initiatives. My research tried to use a bottom-up design which begins by understanding the situation through the

stakeholders' descriptions and then imagining possible ways for facilitating home-school relationships. I aimed to learn more about how parents and teachers conceptualise their relationships, how they conceptualise their roles and responsibilities, how they communicate, what their needs are, what the needs of different groups of parents are, especially those who are probably being marginalised, whether there are any conflicts between parents and teachers standpoints, and to what extent the two parties are aware of each other's standpoints.

The above mentioned aims of the PCP also seem to talk about parents as one homogenous group. In reality, however, parents have different circumstances and belong to different social, educational and economic levels. I think that certain groups of parents (e.g. professional and educated fathers) may be more able to participate in the PCP and therefore likely to be more advantaged. Other parents (e.g. females, fathers with lower educational level or lower socio-economic status) may feel reluctant to participate in the PCP, albeit for different reasons, and probably be more marginalised. Therefore, in my project I took into account that parents are not necessarily one homogenous group. I tried to provide broader opportunities for different groups of parents to participate in different ways.

The PCP, on one hand, can be beneficial for a school's administration purposes. On the other hand, it does not necessarily make a direct contribution to children's learning or achievement (Desforges & Abouchaar, 2003). In my project, I tried to look for new ideas where children can share learning experiences with their parents at home. The literature suggests that this type of parental involvement is more likely to have a positive influence on children's learning.

I could not find any references which provide detailed information about the design, strategies and outcomes of the PCP. Therefore I decided to investigate parents' and teachers' views about this project in my study. These data will be presented in findings chapters when I discuss the general features of home-school relationships in the case school.

5.2.2 Looking at the social and cultural dimensions of mathematics learning and thinking about possible ways of meaningfully connecting them to school mathematics

In the 13th and 14th centuries, Arab and Muslim scholars made seminal contributions to many scientific fields, especially mathematics. The development of mathematical ideas was often associated with social, cultural and economic needs such as solving problems related to navigation, astronomy and architecture. Islamic religious activities also involve mathematical aspects such as:

- the laws of inheritance which involve the arithmetic of fractions
- the Islamic calendar which is based on lunar visibility
- the design and architecture of mosques
- fixing the time for prayers according to the position of the sun
- locating the direction of Mecca which is necessary for the direction of praying
- the calculation of Za'kat (annual charity)

In the past, scientific knowledge originating in India, China and Greece was sought out by Muslim scholars and then translated, refined and advanced at different centres of learning starting in Persia and then moving to Baghdad and finally to Spain where this knowledge spread and developed further in Europe (Joseph, 1997). Grant (1996) noted that the 17th century scientific revolution in Europe had benefited from the Arabic translation of Greek science. The European medieval universities used the Latin translations of Greco-Arabic work as the curriculum of science and natural philosophies. Peter Lu, a researcher from Harvard University, noted that Medieval Islamic art used complex mathematical ideas which presage 20th century mathematics (Baron, 2007). Nasr (1968) introduced the Western reader to some of the Muslim scientists such as:

Ibn Sina (Avicena) (died in 1036) who wrote 250 works including 'The Canon of Medicine' which became the most frequently printed scientific book of the Renaissance and remains the foundation of the modern medicine.

Al-Khwarazmi (died in 1079) a notable mathematician who wrote two books about algebra and algorithms (algorism is the Latin name of Al-Khwarazmi)

which were of crucial importance to the mathematics field. Through his work, the West came to know the 'Arabic numerals' which were based on Indian numerals. This system is based on the idea of angles as shown in Figure (5.1): zero angles for the digit zero, one angle for the digit 1, two angles for the digit 2, and so on.

Ibn Al-Haitham (died in 1040) who was a mathematician, physicist and astronomer. He transformed the study of optics and made it into a new science. His work included theoretical and experimental physics such as the motion of light, the properties of shadows, the use of lenses and other optical phenomena. He studied the physiology of the eye and the problem of vision. His work was translated and made an important contribution to optical science in the West.

Bahrain shares this Islamic history and culture. In the past, Bahraini people used different types of mathematics in their daily life activities, for example, in trading, traditional crafts, measuring pearl sizes, goldsmithing and jewellery design, ship building, games and architecture. Traditional crafts such as basket weaving, textile making and ornamenting are still practised in some villages in Bahrain.

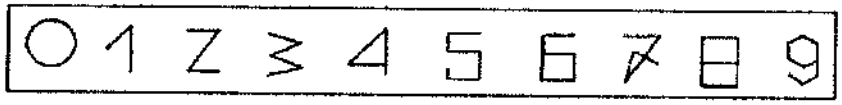


Figure 5.1 western Arabic numerals based on the idea of angles (Deen, 2007:76)

An interesting example of the use of mathematics in ancient Bahrain was highlighted by Serjeant (1968) who illustrated a star-calendar system used by Bahraini fishermen. This calendar consisted of 28 stars associated with different periods of the year. Certain species of fish can be found at a certain star time where some wind or current is to be expected. Thus, it is possible to establish with considerable precision when, for example, prawns are likely to be plentiful in the fish-traps.

The previous broad illustration indicates that mathematics has its deep roots in the history and culture of Bahrain. D'Ambrosio (1997) uses the term ethnomathematics to refer to such types of mathematical ideas found in the everyday practices among certain cultural groups. This mathematics is

embedded in real contexts and was developed for meaningful purposes. I think that this rich mathematical heritage and interesting ideas are still untapped in the Bahraini mathematics classroom. Recognising and utilising such ideas in the classroom can possibly help students to see the social and cultural dimension of mathematics and make them more aware that mathematics is useful, interesting and essential.

Jurdak (1993), a well-known Arabic educator and mathematics curriculum developer, provides a useful outline of the main features of mathematics education in the Arab world. He noted that mathematics has always enjoyed a special status in the Arab countries for two reasons: (1) mathematics is viewed as a "*universal culture-free* subject that does not *threaten* the Arabic-Islamic culture" (p.36, emphasis mine); and, (2) mathematics is viewed as the basis of science and technology. Talking about the conception of the nature of mathematics, Jurdak argues: "in the Arab countries, the prevailing conception of mathematics is that it is a neutral and external body of knowledge that has an inherent hierarchical structure ... the content of mathematics consists of labels and symbols, facts, principle, and algorithms. Assessment observes and measures the recall and recognition of labels, symbols, and facts; skills in performing algorithms; and, solving 'typical problems' "(p. 36).

The above quote gives a general idea about the epistemological assumptions which seem to underlie mathematics education in the Arab countries. It appears that these assumptions are associated with the absolutist position of mathematics (e.g. universal, culture free, inherent hierarchical structure) and also framed by a behaviouristic conceptualisation of learning (e.g. the focus on recall and recognition).

Personal experience and anecdotal evidence suggests that practices associated with 'banking education' and 'narrative education' (Freire, 1970) are common in many classrooms in Bahrain, where "the teachers' task is to 'fill' students brains with the content of his narration which is often detached from reality, disconnected from the totality that engendered them and could give them significance" (p. 45).

In contrast to the dominant perspective in Bahrain, in this study I tried to look at mathematics education from a different perspective which puts social and

cultural aspects in front position. I discussed earlier in Chapter 2, the notable move in current mathematics education research is towards the fallibilist standpoint which provides an alternative conceptualisation (e.g. emphasises the influence of social factors on the process of mathematics knowledge construction and learning). This emphasis on the social dimension of mathematical knowledge proposed by the fallibilist view has been paralleled by a similar emphasis on the social and cultural dimension of mathematics learning proposed by the sociocultural theory and its related literature.

The studies reviewed in Chapter 2 highlighted the importance of taking into account the influence of cultural mathematical systems or ideas on formal mathematics learning (e.g. the notion of cultural tools mediation suggested by Nunes *et al.* and the ethnomathematics notions suggested by D'Ambrosio *et al.*). Although this approach has been widely recognised and yielded promising results, I could not find any Arabic mathematics education studies which follow similar frameworks. Therefore, I think that introducing such theoretical 'social' notions to mathematics education in Bahrain can be important as it may instigate some changes in teaching practices, e.g. more acknowledgment and utilisation of children's social and cultural experiences.

Research suggests (Street *et al.*, 2005) that one possible way of improving the quality of mathematics education is linked with decreasing the gap between school learning and the social life of children. The influence of the social factor on children's education seems to be disregarded in current Bahraini education. Making learning more related to the life and experiences of children appears to be a challenging path worth pursuing. Therefore it was my intention to trial ideas such as finding ways of building strong relationships between home and school and making meaningful connections between in- and out-of-school mathematics learning. These ideas are supported by research evidence from different countries and can have potential significance for developing some aspects of mathematics education.

A number of studies presented in the literature review (Chapters 2, 3 and 4) emphasise the importance of social mediation in learning (e.g. scaffolding) which leads to more recognition of the role of parents in facilitating children's learning. These studies showed that: (1) children learn many mathematical ideas at home before entering school; (2) the home environment can provide

authentic experiences and rich resources for mathematics learning (e.g. funds of knowledge); and, (3) parental attitudes and previous experiences in mathematics learning can have some influence on children's learning. Various projects aimed at encouraging parental involvement in their children's mathematics learning and utilise home resources and out-of-school learning experiences in mathematics learning.

Drawing from literature to reflect on my previous experience in primary schools in Bahrain, I can argue with some certainty that the general approach of parental involvement activities (e.g. open days, parents' visits to school, and teachers' communication with parents) seemed to: (1) be dominated by concerns with school learning; (2) have a limited view about the significance of the home as a rich learning environment; and, (3) focus on one-way (school to home) type of communication. I think that it is important to develop parental involvement programmes which try to identify, use, develop and exchange different resources and funds of knowledge available in the children's homes. Teachers and parents should also have a better understanding about the needs, views and experiences of each other. In this research, accordingly, I attempted to move away from the narrow view of learning and tried to encourage parents and teachers to see their children not just as knowledge receivers, but also to understand and appreciate the wonderful ideas of the children and the rich resources of their cultural and social environment.

5.2.3 Framework for analysis

In what follows I will briefly define some of the key terms which I used throughout the data analysis and findings chapters.

- The term 'perceptions' is used in this study as a catch-all term which generally refers to how the participants comprehend issues under investigation. For example, during the interviews I asked the participant parents and teachers various questions which focused on their views, beliefs, attitudes, ideas, experiences and understanding of different aspects related to home-school relationships and mathematics learning. These broad terms were brought together into one signal term: perceptions.

- The term 'mathematics' is used in this study in a way which reflect the meaning of the term 'numeracy' used by the report of the Numeracy Education Strategy Development Conference (1997) in Australia which stated that: "In school education, numeracy is a fundamental component of learning ... across all areas of the curriculum. It involves the disposition to use, in context, a combination of:underpinning mathematical concepts and skills from across the discipline (numerical, spatial, graphical, statistical and algebraic); mathematical thinking and strategies; general thinking skills; and grounded appreciation of context" (p. 15) According to this view, I tired to move beyond the traditional view which focuses mainly in numbers and operations to a more broad view of mathematics which involves developing children's skills and knowledge in other mathematical areas such as problem-solving, estimation, collecting and analysing data and the application of mathematical knowledge in everyday tasks. An example which can clarify how mathematics was conceptualised in the project is in activity 8 (Appendix D) where the children children worked on designing small rugs made of paper strips which have the same pattern found in the traditional weaving of palm tree leaves.
- Home-school communication is a term used in this study to refer to open and regular two-way communication between parents and school (Epstein, 1995). These communication practices include telephone calls, letters and reports, open day, parents' visits to school, and parents' committee. The process of communication is influenced by power relationship, gender and socio-economic factors. This process is more than just a transmission of information as it includes exchanging knowledge between home and school. For example the project's activities tried to provide opportunities for home-school knowledge exchange and two directions of communication between home and school as it helped in finding out more about funds of knowledge and numeracy practices available in the children's homes and also provided information to parents about mathematics teaching in school.
- Brown and Duguid (1989) give a general definition of authentic activities as "the ordinary practices of the culture" (p.34). The term 'authentic' is used in this study in a similar way as it refers to learning experiences which involve real-world, problem-solving, contextualised and open-ended solutions.

5.3 Research questions

The research questions were reformulated several times during the different stages of this research. The research questions proposed in the early stages of the data collection were quite broad and vague. Subsequent stages of data collection and analysis have helped to reach more defined and pointed research questions. The outcomes of each stage led to more focus on emerging issues which were not taken into account in the prior research questions.

All the different versions of research questions were concerned with two broad topics: understanding and facilitating home-school relationships and in- and out-of-school mathematics learning. The pilot study helped in revealing some problematic aspects of the first set of questions. For example, I found that the idea of using pre- and post tests to evaluate the project outcomes was difficult to implement because of the informal nature of the project activities. Instead, I decided to evaluate the project through investigating children's accounts about what they think they learned from the project activities. Other questions in later stages were broad and caused uncertainty during the data analysis procedure. Sometimes I found that the available data was incomplete or too limited to answer some questions. The process of refining the research questions continued until I reached the final version presented as follows:

The main research questions which guided the study are:

- How do the participant teachers and parents perceive home-school relationships?
- How do parents and teachers perceive children's in- and out-of-school mathematics learning?
- How did the participants (the classroom children, their parents or caregivers and the class teacher) respond to the mathematical activities introduced during the project?

Through the different stages of the data analysis process these broad questions were divided into groups of sub-questions. The general questions and their sub-questions will be discussed further in the finding chapters.

5.4 Summary

To sum up, I intended that this study would:

- Learn more about the perceptions of parents, children and teachers about the topics of home-school relationships and learning mathematics in and out-of-school in Bahrain
- Introduce new ideas proposed by the educational literature, which emphasise the social and cultural dimension of mathematics and mathematics learning in one Bahraini classroom
- Experiment with and utilise these new ideas to design and implement novel mathematical learning activities in one classroom. These activities would encourage social interaction between parents and their children and utilise home resources to enrich school learning

6 Research methods and methodological issues

6.1 Introduction

The best way to start this chapter is to give a brief description of the project which organised the data collection process. I carried out a project with the help of one class teacher in a Year 2 classroom in a primary school located in a Bahraini rural village. The project drew on methodological ideas from action research and case study. The project consisted of three interconnected phases. Throughout these phases I worked on two tasks. The first task was concerned with interviewing the participant parents, teachers and children in order to elicit their perceptions about the topics under investigation and to find ideas which could be utilised in further classroom work. The second task was concerned with planning and implementing novel mathematics learning activities carried out by the children at home (with the help of their parents and other family members) and in the classroom (with the help of the teacher and other children). In these activities, the children took photographs of mathematical events located in out-of-school context, worked on shared homework activities with their families at home, shared their experiences with other students, and worked on classroom activities which extended ideas that emerged from the homework activity. In the following pages I will provide more details about the project. But first I would like to present the structure of Chapter 6.

The first section of this chapter presents the general methodological issues of this study. The research is based on a qualitative design which draws on ideas from case study and action research. The first section also presents the rationale for using this research approach and discusses how methods for data collection were determined.

The second section of this chapter presents the small scale project which was carried out by me and a class teacher in one (Year 2) classroom in Bahrain. The project comprised three stages: piloting, preparation and implementation. The project's overall aims were: (1) to understand and facilitate the connection between children's mathematics learning experiences between home and school; and, (2) to understand and facilitate home-school relationships. The project included these activities:

1. The data collection process: which included semi-structured interviews with parents and teachers, focus groups with children, visual data (photographs taken by children), short questionnaires and documents (activity sheets and textbook).

2. The Mathematical activities which included:

- The camera activity whereby the children took photographs in out-of-school contexts of everyday situations which represented some mathematical aspects
- The shared homework activities which encouraged more parental involvement in their children's mathematics learning through sharing work embedded in everyday mathematical situations
- The classroom activities which extended ideas from the shared homework activities, tried to utilise everyday resources in mathematics lessons and encouraged children to engage in group work and discussions

The final part of this chapter highlights various ethical and methodological considerations encountered throughout the research process. It also presents the data analysis process.

6.2 General methodological issues

This research is based on a qualitative design which draws on ideas from case study and action research. In what follows I will briefly explain this statement by sketching the position of this study on the broad map of research paradigms, methodologies and methods.

6.2.1 Qualitative research

Research is a systematic process of enquiry which has a certain amount of rigour and is governed by certain guidelines. This process seeks to make known something about a field of practice or activity which is currently unknown to the

researcher (Brown & Dowling, 1998; Hitchcock & Hughes,1989). This inquiry can also inform decisions in order to improve action (Bassey, 1999).

The positivist and interpretive paradigms are two broad philosophical positions which have critical implications on the research design. Each is defined in turn:

- The positivist paradigm views human behaviour as essentially rule governed; and human behaviour should be investigated by the methods of natural sciences. Studies based on this approach are often carried out in a controlled environment, rely on statistical data and aim to answer questions which look at, for example, issues of cause and effect
- The interpretive paradigm rejects the positivists' view of the regulation of human behaviour because it overlooks the complexity of social interactions. The interpretive paradigm tries to look to the multifaceted dimension of human behaviour and tries to seek explanations of social actions through understanding the individuals' perspectives that are part of these ongoing actions and the situations and contexts that are holding them (Cohen *et al.*, 2000)

Research methodology aims to establish what are the justifiable methods and procedures appropriate for the generation and testing of valid knowledge (Clough & Nutbrown, 2002). The methodology of the positivist paradigm is often described as 'quantitative' while the methodology of the interpretive paradigm is called 'qualitative'. These methodologies provide basic plans for the research activity which is closely related with aspects such as the type of research problem, the formulation of research questions, the methodological concerns, the type of data gathered, and the method of data analysis (Cohen *et al.*, 2000).

6.2.2 Justification for using a qualitative methodology

This research is based on an interpretive paradigm and a qualitative methodology which aim to describe the social realities and social process (e.g. aspects about home-school relations and in- and out-of-school mathematics learning) from the point view of the real actors (parents, teachers and children).

The qualitative approach has been adopted in this study for several reasons.

(1) According to Flick *et al.* (2004), the qualitative approach has a strong orientation to everyday events and/or the everyday knowledge of those under investigation. The main focus of my research questions is to explore the perceptions of the participants and to achieve in-depth understanding of processes of home-school relationships and learning mathematics in different contexts. The qualitative approach seems well-matched with the research questions as I tried to study individuals in their natural settings.

(2) The underlying philosophical assumptions of the qualitative approach seem to fit well with the other theoretical concepts which frame this study. As mentioned earlier, the fallibilist philosophical assumptions conceptualise mathematics knowledge as an outcome of social process. The sociocultural theory emphasises that knowledge is constructed through mediation processes in social settings. The interpretive approach, which tries to understand the subjective world of the human experience, seems to match with these two more 'socially' orientated approaches.

(3) Many of the studies reviewed earlier in the literature chapters pointed towards the usefulness of the qualitative approach for studying issues relevant to my study. For example, Moll *et al.* (1991) used an ethnographic research strategy to investigate funds of knowledge in children's households. Qualitative strategies were also used by Abreu, the HSKE project and Street *et al.* in studying children's mathematics learning in different contexts. This encouraged me to follow a similar route.

(4) I'm personally interested in using and learning more about qualitative research. One reason for this interest is because of the dominance of quantitative design in the educational research in Bahrain. There is much emphasis on quantitative research in research training in the university, educational publication and dissertations. I used a similar approach in my masters' dissertation - where I investigated issues related to IQ testing of children with special needs – and I remember the various problems that emerged from depending solely on statistical data which overlook the characteristics of the real actors and their social context.

For example, I did not take into account the possibility that the low performance of some children might not have been be due to a lack of mental ability, but rather their unfamiliarity with the test items which have been derived from a very different Western culture.

After sketching the research paradigm I would like to describe the research design of this study which draws on ideas from case study research and action research.

6.2.3 Case study

The primary goal of case study is to obtain an in-depth understanding of a complex phenomenon, both in and of itself and in relation to its broader context (Iorio, 2003). Yin (1994) defined the case study as "an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (p. 13).

My study draws on ideas from the interpretive case study design. It is mainly exploratory and largely confined to a single-case (one classroom which includes the children, their parents, their teacher plus other teachers in the same school). The main reason for choosing the case study for this study's design is because it fits with the research purpose: to access the participants' perspectives and to understand how things happen and why in natural settings (Anderson, 1998; Stark and Torrance, 2005). Yin (1989) noted that this strategy is considered helpful when a 'how' or 'why' (or exploratory 'what') question is being asked about the events over which the researcher has little or no control. Answering some of my research questions required a detailed explanation, based on the perceptions of parents, teachers and children, about issues regarding home-school relationships and mathematics learning in the two social contexts.

Cohen *et al.* (2000) highlighted several strength points for case study design. They argue that case study can be 'strong in reality' and has the potential to recognise the complexity of social actions. It can provide insights about the discrepancies or conflicts between participants' viewpoints. In addition, case study is capable of serving multiple audiences as the language and form of

presentation is less dependent on specialised interpretation. It can also catch the unique features that may be otherwise lost in larger scale data. Case study research can also provide insights which assist the interpretation of other similar cases. They can be undertaken by a single researcher without the need of a full research team.

Although I do not intend to draw any generalisations from my study, I think it is important to look at how qualitative researchers responded to the question of generalisations of case study. Yin (2003) proposed that we need to distinguish between two types of generalisations: statistical and analytical generalisation. Statistical generalisation is more associated with quantitative research (e.g. survey) where inferences about the population are made through empirical data collected from the sample. This type of generalisation cannot be used to generalise the results of a given case study because the case is not a sampling unit. Yin suggests that generalising from case study is not a matter of statistical generalisation but a matter of analytic generalisation. In analytic generalisation, previously developed theory is used as a template with which to compare the empirical results of the case study. Yin argues that most scientific inquiries have to be replicated by multiple examples of the experiments to achieve a certain level of generalisation, and case studies too can achieve a certain level of analytic generalisation when the enquiry is based upon multiple cases of the same issue or phenomena. Case study in this way can help to test, support or challenge certain theoretical propositions. Therefore, my aim is to see how the findings of my single-case study fits with ideas which have already been established in the field.

The second problematic issue in case study was raised by Stark and Torrance (2005) regarding the difficulty of drawing boundaries around phenomena and how this may involve crucial decisions: e.g. When and why this case was studied? For how long? Why? How many people participated? Who are they? Why?. Van Lier (2005) noted that it is important for the researcher to tell the story of the case by providing descriptive and narrative information to clarify the case boundaries for the reader. Therefore I will provide sufficient details about the circumstances and the decisions of the research throughout the chapters.

6.2.4 Action research

I also drew in my study on some ideas from the action research design. Reason and Bradbury (2001) define action research as "a participatory, democratic process concerned with developing practical knowledge in the pursuit of worthwhile human purposes, grounded in a participatory worldview which we believe is emerging at this historical moment. It seeks to bring together action and reflection, theory and practice, in participation with others, in the pursuit of practical solutions to issues of pressing concern to people, and more generally the flourishing of individual persons and their communities" (p. 1). There are several broad characteristics associated with action research (Coghlan & Brannick, 2005):

- Research in action rather than research about action. It tries to study important issues together with those who experience these issues directly
- A collaborative partnership. Members of the system which is being studied participate actively in the research process
- A sequence of events which Introduce change and evaluate the new situation. It works through a cyclical process which includes: planning, taking action, evaluating the action, leading to further planning and so on

I drew on the above ideas in my research in the following way:

Research in action:

Doing something about it is a feature of action research that often does not apply to other kinds of research (McNiff, Lomax & Whitehead, 1996). In my research I am concerned with two things: first, to improve my understanding through investigating participants' perspectives about issues presented in the research questions. This aspect may inform my understanding on the theoretical level. Second, I wanted to move from the theoretical level to the practical level. I wished to build upon the theoretical ideas (found in the literature) and ideas of others (from interviews with the participants) to develop new ideas which can

introduce positive changes in classroom teaching practices. Finally, I wanted to see whether this intervention has any impact on classroom practice and children's learning.

Collaborative partnership

Action research can be seen as 'situated learning' for the teacher-researcher. It is learning in the workplace about the workplace. Action research is not research done on other people; it is research done by particular people on their own work to help them to improve what they do, including how they work with others (Cohen *et al.*, 2000).

While working on this research project I moved between three identities: the researcher, the teacher and the teacher-trainer. As a researcher, this study stems from my personal interest which is essentially to improve my knowledge, skills and academic status. My identity as a researcher was more visible in some points such as when I interviewed the participants and during formal discussions with the teachers. However, most of the time while carrying out the project, my teacher identity was more visible to the teachers, parents and children. It was perhaps due to my previous teaching experience that they saw me as a teacher more than a researcher. I also often felt like a member of the school. This circumstance further encouraged me to work alongside the teacher on other teaching duties which are not directly related to the project. On several occasions the teacher had some other commitments and asked me to take the class on his behalf. Other school teachers also showed much hospitality and respect for me and always offered their help. In every school visit I was invited by the teachers to have tea or a snack with them in the staff room. In addition, I was invited to a school social event and lunch at the end of the academic year. My teacher-trainer identity was not very visible. However, I always thought about how this research would illuminate my future practice and how I could utilise ideas from this research in my teacher training courses.

Many participants were interested in giving some time to help me with aspects related to the project. As I will describe later in more detail, throughout the project I tried to adopt the role of the 'facilitator' or the 'initiator' rather than acting as an outsider researcher. Teachers, parents and children were considered not

just as research subjects, but also as valuable resources who have valuable ideas and rich experiences which I can build upon in the learning activities of the project. I also thought that more acknowledgment of the participants' ideas might lead to a greater sense of ownership and involvement from the participants. Working with other people in this project has opened the door for more sharing of experiences, thoughts, and strategies. However, it is fair to say that, overall, I had more control of the project activities. I encouraged other people to participate and at the same time I had realistic expectations about their circumstances – e.g. time, interest and commitment –and did not attempt to impose my opinions or interests on them.

6.3 The project

I will begin this section by discussing some theoretical aspects concerning the data collection methods and then I will present the three stages of the project.

6.3.1 Data collection methods used in the project

The data collection methods used in this study comprise:

- Semi-structured interviews with teachers and parents
- Focus groups with children
- Visual data: photographs taken by children
- Documents: activity sheets, feedback sheets and the textbook

Semi structured interviews

Interviewing is one of the major tools of social and educational research. It can be roughly defined as 'talk with some purpose' (Hitchcock & Hughes, 1989). Kvale (1996) noted that the use of interviews in research marks a move from seeing human subjects as simply subject to manipulation and data as somehow external to individuals towards regarding knowledge as something generated between humans, often through conversation. Kvale viewed the qualitative research interview as "a construction site for knowledge. An interview is literally an *inter view*, an inter-change of views between two persons conversing about a theme of mutual interest" (p. 14).

There are different types of interviews, mainly unstructured, semi-structured and open interview. I will focus mainly of the second type of interviews which I used in my study. Semi-structured interview is defined as "an interview whose purpose is to obtain descriptions of the life world of the interviewee with respect to interpreting the meaning of the described phenomena" (Kvale, 1996: 5-6). Here, the interviewer will be guided by the interview schedule rather than dictated by it.

Smith (1995) notes that researchers use semi-structured interviews in order to gain a detailed picture of the interviewees' beliefs or perceptions regarding a particular topic. This method gives the interviewer and interviewee more flexibility than the more conventional structured interview or questionnaire. This method can enable the interviewer to follow up particularly interesting ideas that emerge in the interview and help the interviewee to give a fuller picture. Cohen *et al.* (2000) write that this method allows the interviewer to achieve some depth by providing the opportunity to expand the interviewee responses and to discuss their interpretations of the world in which they live, and to express how they regard situations from their own point of view. The cost side of this type of interviewing is that it can reduce the control of the interviewer, takes longer to carry out, and is harder to analyse (Smith, 1995).

Hitchcock and Hughes (1989) highlighted that an interview is a complex piece of social interaction. The personal and biographical characteristics of the interviewer and the interviewee can influence and affect the interviewing process. The interviewer needs to recognise the influence of a variety of social, cultural, institutional and linguistic factors. Characteristics such as values, attitudes, opinions, class, gender, and ethnicity can be potential sources of influence and conflict.

Power and gender

Individuals in the research project are not just passive objects. The researcher / researched relationship is inherently unequal. The researcher will unavoidably have some power over the research process. The researcher is placed in a powerful position to define other people's realities and to present his or her interpretations to a different audience (e.g. senior academics) who can be more powerful than the researcher. Therefore, the researcher must take responsibility

for this power in the context of the interview and research. There are no easy answers for complex questions in relation to power imbalance. However, the researcher must be aware and sensitive of the implications of these power issues on the interview process. S/he should try to face them in an honest and explicit way especially when dealing with vulnerable people (Bhopal, 2000; Ribbens, 1989).

The researcher should also be critically aware of gender relations which can play an important role in shaping the interview and significantly influence the data (Herod, 1993). Siedman (1991) noted that there is evidence that interviewers and participants of different genders can get different results than those of same gender. Williams and Heikes (1993) argued that there is a preference in some research for using 'same-sex' interviews (i.e. the interviewer and the interviewee of the same gender) because of the intuitive idea that rapport can be achieved more in this context. Fontana and Frey (1994) noted that one of the common problems related to the gender issue is the problem of entry and trust which may be heightened by the sex of the interviewer especially in highly sex-segregated societies such as Bahrain. Herod (1993) talked about another problematic issue when gender is used to make unfounded stereotypical or sexist assumptions about presumed differences in competence and knowledgeability of women and men. These assumptions can lead researchers to decide that a particular interviewee's explanation of events is more or less valid simply because of his or her gender.

I will discuss later how these two aspects (gender and power) have consistently emerged and influenced the data collection process of this study.

Focus group interviews with children

Hennessy and Heary (2005) define a focus group as "a discussion involving small number of participants, led by a moderator, which seeks to gain an insight into the participants' experiences, attitudes and/or conceptions" (p.236). Hennessy and Heary suggest that this data collection technique can be particularly suitable for research interested in gathering information about children's views or experiences, because:

- Children can be more familiar with the small-group settings similar to classroom work in this type of interviewing.
- Peer support provided in the small group settings may also help in reducing the power imbalance between child and adult which can exist in one-to-one interviews.
- Children may feel encouraged to talk about their views when they hear other children do so and their memory may be jogged by the contribution of other participants.
- It acknowledges the children as experts. Thus the participating child should not feel that he or she is being questioned by an adult but rather that he or she is sharing experiences with a group of peers.

There are some limitations which should be considered when using focus groups which include the possibility that intimidation and negative interactions can inhibit some individuals from making contributions. There is also a possibility that an individual's expressed idea may be influenced by the desire to fit in with other group members.

The project and action research

As I mentioned earlier (in Section 6.2.4), this study drew on broad ideas of action research. It is important to say that while ideas from action research have informed my thinking, this study is not a piece of action research in itself. In order to clarify this point, I will present the two following examples. The first example is connected with the concept of cycles. Some researchers have suggested that the action research cycles – planning, acting, observing, reflecting, and re-planning – can be transformed into spirals of actions to make the research more dynamic and adaptable to new influences (McNiff, 1988; McNiff, Lomax, & Whitehead, 1996; McNiff & Whitehead, 2002). In line with this idea, this study has gone through three stages (Figure 6.1): piloting, planning and preparation, and implementing the project. In the actual implementation of the project, however, the different phases of the project were carried out as individual stages rather than as interlinked cycles - as such those suggested by the action research design. The second example is about the concept of participation that underlays action research design e.g. that action research should be done *with* participants rather than *on* them. In accordance with this

idea, I tried through this project to explore ways of implementing changes through collaborative work with parents and teachers. The class teacher J and I worked together, for example, in designing and carrying out the mathematical activities with the children in the classroom. Nevertheless, it is fair to say that I had more direct role and control on the project activities while the class teacher and parents had a secondary role. Therefore this study has involved the use of some action research techniques, but it is not inherently a piece of action research.

6.3.2 The early beginnings of the project

The early beginning of this research goes back to 2002 when I began thinking about a suitable research topic to be pursued in my prospective PhD studies. I asked some colleagues in my university for their suggestions about worthwhile research topics. One of the issues highlighted was the need for developing new ideas which encourage school practices to echo the wider political reforms in Bahrain. I searched different web databases to find out more about current research of potential relevance. I found that there is growing interest on the topic of parental involvement in children's schooling. Through discussions with my supervisors, reading more literature and working on assignments during the first year of my PhD studies, I began to learn more and more about the topic of parental involvement and decided to focus my thesis on this area.

By the second year in the PhD programme, I carried out a small-scale project in Bahrain which drew mainly on ideas from the IMPACT project (Merttens & Vass, 1990; 1993) and the HSKE project (e.g. Winter *et al.*, 2004). The general aims of the project were:

1. To explore home-school relationships
2. To find ways of facilitating home-school relationships
3. To explore aspects of children's mathematics learning in- and out-of-school
4. To find ways of making meaningful connections between children's mathematics learning in- and out-of-school

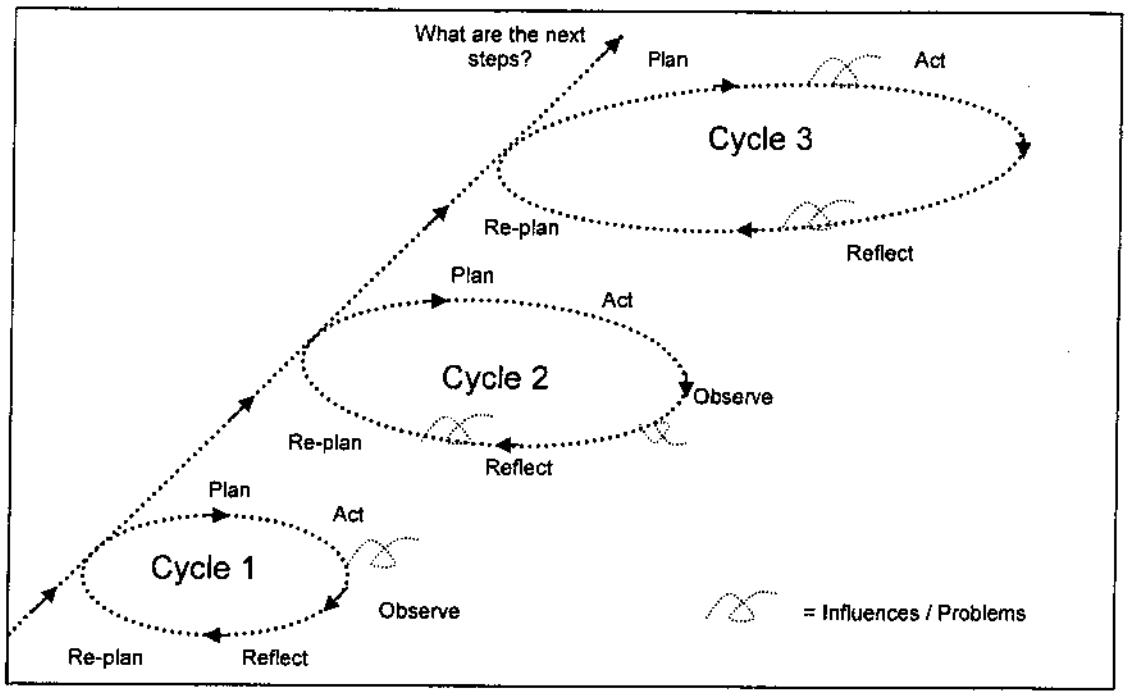


Figure 6.1 The cyclical process of action research

6.3.3 The first stage: Piloting

In the first stage of the project (August 2004), I carried out the pilot study in Bahrain which investigated the perspectives of three teachers (two males and one female) about two issues: parental involvement and children's mathematics learning in- and out-of-school.

The interview questions were derived from the literature as well as from my own experiences. The first section of the interview drew mainly on Epstein's (1995) six types of parental involvement activities in order to investigate existing parental involvement activities in school. The interviews were exploratory and included broad issues such as sources of information about the children, the educational skills of parents, means of communication, characteristics of the relationships between teachers and parents, how teachers think about the roles and responsibilities of parents and teachers, and parents' council.

The second section of the interview was shorter and focused on issues related to mathematics learning in and out-of-school and parental involvement in their children's mathematics learning. I drew on ideas from the literature (e.g. ethnomathematics; funds of knowledge and social mediation; scaffolding and

guided participation) as well as ideas from my own experiences. I investigated teachers' perceptions about mathematics as a subject, their past experiences when they were learners and their present experiences as teachers, how they teach mathematics and how they thought parents teach it, their views regarding children's out-of-school experiences, and whether they are aware of the possible influence of the social and cultural aspects on children's mathematics learning. In the last part of the interview I presented the idea of the project and sought the participants' views about it.

6.3.3.1 Interviews with teachers

As mentioned earlier, in the pilot study I interviewed two male teachers and one female teacher. The male teachers were class teachers working in the school where I intended to carry out the project. I had a close relationship with both teachers since we were previously students in same college. I went out with them and visited their houses on many occasions. They showed interest when I asked them if they would like to be interviewed. The interviews were conducted separately in a café. The interviews were audiotaped. After the interviews, teacher K demonstrated some enthusiasm about the project ideas and agreed to work with me in implementing the project in his classroom. Teacher A was promoted and moved to another school (see Table 6.3).

Interviewing female participants was a problematic issue right from the beginning of the research. People in rural societies in Bahrain are generally religious and conservative. Females being interviewed by a male researcher can cause some sensitivity. Therefore I thought that I might find possible solutions by discussing this issue with one of my close female relatives, Mother E, who worked as a teacher in a school close to the village (see Table 6.2). I interviewed E in her house and focused on similar issues to those in the male teachers' interviews. I also asked her about possible ways to overcome the difficulty of interviewing females. Most of the time E talked from her position as a mother and gave examples from her experiences with her children. Therefore I thought that her interview should be included in the mothers group. Part of this interview was used for an assignment for a qualitative PhD research course.

After transcribing the audio-tapes and working on the initial analysis of the data I realised that most of the interview time was spent on talking about parental involvement issues and relatively less attention was paid to issues related to mathematics learning. The interview schedule was exploratory since my aim was to find interesting themes worth pursuing for the next stages of the research. I trialled many questions to see which ones would yield something of interest. The interviews were quite lengthy and broad but they helped in achieving general understanding of parental involvement practices and raised some interesting issues. These pilot interviews also improved my interviewing skills.

One of the themes which emerged from those interviews was how teachers' experiences as parents can influence their teaching practices and their relationships with other parents. Another theme was how the educational level of the parent can shape the relationship between teachers and parents. Therefore, I refined the interview questions in order to: (1) focus more on questions which seem to tackle interesting issues; and to give more space for discussing mathematical issues; and, (2) change the wording of some questions especially those which seemed to be vague or yielded short answers. I also found that I should use less jargon in the questions in order to make the conversation more natural and smooth.

One of the issues worth highlighting is the issue of interviewing people who have a close relationship with the researcher. Interviewing friends or relatives can have both positive and negative aspects. The main positive aspect is that the interviewer and the interviewee know each other well which can make the conversation more casual. One problematic aspect is that the interviewee is more likely to know what you want and probably would give answers which he or she thinks would match your understanding or wish. Another possible difficulty is when the interviewee hides some aspects which would jeopardise his or her image or status in the eyes of the interviewer. For example, some interviewees were reluctant to let the interviewer know more about their inaccuracy or lack of understanding about certain issues or to let the researcher know about aspects of teaching practice which may contrast with the research agenda. Teacher K, for example, asked me to turn off the audiotape several time to rephrase his answers to match a professional tone of the questions and at other times to have more time to think. This process probably made some of his answers less

spontaneous. Teacher A and mother E were promoted at that time to 'coordinating teachers'. They seemed to position themselves with a higher professional status and seemed to be keen to show 'ideal' aspects of their practice and hide some aspects which could negatively affect their image.

As I mentioned earlier, interviewing female participants was a concern from the beginning of this research. The interviews highlighted that mothers often are more involved than fathers with their children's education especially in activities such as helping with homework and revision. Excluding mothers from the research sample and depending solely on fathers would probably give a distorted picture of the situation. Mother E suggested that one possible way to overcome this difficulty would be to ask a female teacher to help with the interviews. This issue will be revisited in the discussion of the final stage of the research.

6.3.4 The second stage: Planning and preparation

This stage of research was carried out on December 2004 and January 2005. The planning of this stage occurred through informal discussions with Teacher K (who was interviewed in the first stage and showed interest in participating in the project). Ideas emerged from the first stage of the project and readings of the literature also provided valuable ideas for this stage.

Teacher K and I had discussed various ideas which might be implemented in his classroom in order to: (1) encourage two-way communication between home and school; (2) introduce new ideas which encourage parental involvement in mathematics education that go beyond current traditional ways; and, (3) learn more about children's mathematical practices and experiences in- and out-of-school and think about possible ways of linking them in an authentic way.

However, Teacher K was subsequently assigned to a non-teaching position. His classroom was merged with another classroom. So I needed to find another teacher. To solve this issue, Teacher K introduced me to Teacher J who was teaching Year 2. I talked with Teacher J about the project and he was happy to work with me. There were some difficulties which emerged from this change of plans: first, the new classroom was very crowded (34 children while the average

number of children in other classrooms was 28); second, Teacher J agreed to help mainly in carrying out the activities in his classroom, but seemed less keen to become involved in the activities planning or designing process. I should disclose here that while this reluctance was the case at the early stage of the project, in the later stages the teacher showed more interest and shared more work with me. This reluctance was because Teacher J had some administrative duties which required him to go out regularly (e.g. to the Ministry and other places) in addition to regular teaching duties. He did not always have the time to meet outside school and to engage in informal discussions about the project as did Teacher K. There was also little opportunity to have enough discussions during the day as he spent most of the day in the classroom (the school day consists of six lessons - 50 minutes each - with a half an hour mid day break. The class teacher spent four or five lessons everyday in the classroom). Finally, I would have preferred to work with Teacher K because he was teaching Year 3. In Year 3, children are likely to be more mature, articulate and have higher reading and writing skills. I expected to have more difficulties in dealing with younger children in Teacher J's class (Year 2) as they probably would be less articulate, more dependent on the teacher and lack general reading and writing skills.

After discussing the project's initial plan with Teachers J and K, I visited the school and presented my ideas to the principal (who is also a distant relative-in-law). The principal was very kind, friendly and treated me like a new teacher in his school. He asked me to obtain a permission letter from the Ministry of Education before carrying out the study. I was already aware of this aspect. My seniors in the University of Bahrain offered useful help in this issue. It is worth mentioning that one of the requirements of obtaining the Ministry's permission letter was to provide a copy of the questionnaire used in the study. This requirement somehow indicates the dominance of quantitative studies in the educational field there. As I did not depend on questionnaires in my studies, I explained to them in detail what I intended to do in the school, the qualitative approach which would be used, the purposes, and the procedures of the research.

Once the school principal had received the permission letter I began my work in the school. Letters were sent to all parents of the classroom children in order to provide them with general information about myself and the project. Parents

were asked for their initial permission for their children's participation in the research activities. Parents were also asked to contact me or the class teacher if they had any questions or needed any more information about aspects mentioned in the letter. One of the parents thought that I was a teacher and called me at the beginning of the holiday asking about the first semester results.

6.3.4.1 School settings

The research was carried out in one classroom in a small boys' primary school located in a rural village on the west coast of Bahrain. One side of the village merges with the biggest housing project in the country which was built in the early 1980s. Date palm trees, vegetable farms and the sea surround other sides of the village. While driving through the village you can see a blend of the past and present: new villas and old houses, internet cafes and spice shops, children playing football on the sand, horses and shiny cars, mosques, ma'tams (buildings allocated for social, religious and cultural activities), sport clubs, large pictures of ayatollahs, and graffiti: political slogans which oppose the government and others with Bob Marley lyrics.

The school had 18 classrooms and around 500 students (Years 1 to 6). The project was carried out in one Year 2 classroom (34 boys aged 7-8 years). Most of the children came from low income families (more information about the children and their families will be presented later). Teacher J is 30 years old, holds a Bachelor's degree in primary education and has been teaching for seven years in the same school (see Table 6.2). The teacher's wife is also a class teacher. They have two children and live near the school.

I chose this school for several reasons: I felt that the environment of that village was interesting. It preserved the characteristics, traditions and life style of the Bahraini people. At the same time, it is rapidly moving towards modernity. Another reason is that I worked in a neighbouring village for nearly six years and became acquainted with the people from that area as well as with teachers in that school. I also felt that people in such areas were facing more difficult economic and social conditions (e.g. poverty, unemployment and political marginalisation) in comparison with more urban areas. Most of the village people were poor in financial respects, but rich in terms of their manners, values

and culture. This study tries to explore, identify and build upon these cultural and social aspects. It also aims to inform the wider educational system about possible ways of introducing positive changes to schools, especially those in rural areas.

6.3.4.2 Observing one mathematics lesson

I visited teacher J's classroom at the beginning of the project and observed one mathematics lesson. I asked the teacher to show me how he normally taught mathematics. The lesson's topic was multiplication. The children's desks were arranged in six small groups. The teacher began the lesson with revising some ideas from the previous lesson. Then he used plastic cubes (similar to Lego products) to explain the concept of multiplication as repeated addition. Then, there was a discussion between the teacher and the children. Some children were asked to come to the front of the classroom and use the cubes to solve some questions and then write the answers on the whiteboard. After that, all children worked on textbook exercises. The teacher went to the children in each group and gave some feedback about their performance.

From my experience, I think that this lesson can roughly illustrate normal teaching practice in primary mathematics classrooms in Bahrain. Mathematics lesson plans are usually framed by the Piagetian notion of moving from the concrete (using materials such as cubes, straws, and abacus) to the abstract (dealing with mathematical symbols). The teacher seemed to have strong control of the classroom. The teaching style seemed to be teacher-centred most of the time. Although the children's desks were arranged in groups, children were encouraged to work individually. It is fair to say that the teacher used calculating materials in an attempt to reduce the abstraction of the concept. He told me that he used egg cartoons in teaching the concept of multiplication in previous lessons. However, in my view, the lesson still seemed to be detached from the real life experiences of the children. The teacher seemed to put more emphasis on verbal and 'direct instruction'. Mathematics materials posted on the classroom's wall were focused mostly on symbols and signs representing mathematical concepts with few examples of mathematical concepts related to the children's real life activities. The mathematics textbook and activity sheets also seemed to emphasise the manipulation of numbers and basic computation

skills while less attention was paid to the meaning of mathematics and how it can be used in real life situations.

6.3.4.3 The camera activity (1)

During my regular visits to the school, I talked with the teacher and the children in order to make my presence in the classroom more normal. I tried to be considered by children and school staff as an 'insider'. The teacher and I spent some time thinking about the design and implementation of the first activity of the project which we called the 'camera activity'.

Aims of the camera activity

The main idea of the activity was to encourage children to explore and identify different mathematical ideas in their everyday situations outside school. Ideas from the photographs were intended to be used in various ways in subsequent mathematics lessons in an attempt to make children's learning more meaningful. This activity drew on the 'funds of knowledge' concept (Moll *et al.*, 1992) and the 'knowledge exchange' concept which was used in a similar 'camera activity' carried out in the HSKE project (Greenhough *et al.*, 2004). The main aims of this activity in my project were as follows:

1. To find out more about children's out-of-school mathematics learning experiences and to try to connect it with school mathematics learning. In later stages of the project I found that the classification of numeracy practices proposed by Street *et al.* (2005) (see Table 4.1) can be useful in classifying and utilising ideas found in the photographs. For example, some photographs can help in identifying children's out-of-school numeracy practices in the home site. This effort can lead to more recognition of out-of-school practices in the school mathematics classroom.
2. To see how children and their parents conceptualise mathematics knowledge. For example, I was interested to know to what extent children and parents recognise mathematical ideas found in the home site which are not explicitly similar to typical school mathematics.
3. To encourage children to think more about the connection between mathematical concepts learned in school and other mathematical

concepts which can be found in their normal daily life activities. Here, I was thinking about finding ideas from children's photographs which can be used in future activities to initiate learning application between different contexts.

4. To introduce new ideas that can possibly bring changes in the teaching and learning environment of the classroom. For example, to encourage children to work more collaboratively with each other, to express and discuss their ideas, to learn from each others' experiences, to give more attention to the social and cultural aspects of mathematics learning and to reduce the emphasis on didactic teaching in the classroom.

Trialling the camera activity with children from my family

Before introducing the camera activity to the classroom I tried the idea with three children of my family (ages 9, 11, and 12). I asked the children to use a digital camera to take photographs of things, situations and activities which they think that may have some mathematical ideas. The children took the pictures and also included some questions (similar to textbook templates) to explain the chosen mathematical aspects.

The photographs included different ideas which can be grouped in the following way

- Numbers and religion (e.g. photographs of a child reading Qur'an, a calligraphy design which has the 100 names of Allah, praying bead which has 100 pieces divided into three parts 33/33/34). Questions: how many names Allah has? (100), how many chapters in the Qur'an? (30), what is the time of dusk prayer? How many months in the year? How many days are in the month of Ramadan? What is today's date in the Islamic calendar?
- Numbers in telephones (photographs of mobile phone and home phone). Questions: what is your home phone number, what is the phone number of police? Can you find number 10 in the telephone's number pad? Why?
- Numbers in electric appliances (photographs of T.V remote control, satellite channels receiver with digital screen, and thermostat switch board on air conditioner). Questions: why are there numbers in these

appliances? Do you know other appliances which have numbers? At what time is your favourite T.V. programme shown?

The children included other sets of photographs which did not include questions:

- Numbers in time and date (a photograph of a calendar which combines the Gregorian and Islamic systems, different clocks).
- Using numbers in buying things (photographs of food items with price tags, par code tags, expiry dates).
- Numbers in address (photographs of different road and address signs)
- Mathematics in geometrical shapes and designs (photographs of decorative home accessories with different shapes and gypsum designs)

In general, the children found the activity enjoyable. The activity also seemed to broaden the children's view about mathematical ideas related to their daily life. For example, on several occasions after finishing this task, the children talked with me about their observations of other mathematical ideas and situations related to their interests. One of the children showed an extended family tree which he produced with the help of his mother. Another one talked with me about mathematics in his favourite computer game. The third child was interested to talk about mathematical ideas found in football league tables.

It is worth noting that:

- Those three children were older than the Year 2 children (7 years old) with whom I intended to work with in the classroom
- I helped the children in some aspects of the activity mainly by asking questions to scaffold their understanding
- The children seemed to consider 'numbers' as the most obvious mathematical dimension in most of the photographs

Consequently, I expected that the classroom children would respond differently (e.g. find the task more difficult or need more explicit instruction).

Introducing the camera activity in the school

The photographs were inserted in power-point presentations designed to be used in discussions with small groups of children in school. The school has a well equipped computer room. Sadly, it seemed to be rarely used since the computers were very dusty. The teacher and I talked with the children's groups

about different mathematical ideas presented in the photographs in different situations. We encouraged the children to talk about their own understanding about their own situations and mathematical ideas. Through talking with the children we tried to ensure that the children understood the aim of the activity: looking for mathematics ideas in different contexts and situations which are not necessarily similar to school mathematics. After that, eight disposable cameras were distributed to eight groups of children. Each group included three to five children who had a good relationship and lived in the same neighbourhood. 25 children participated in this activity. Children who did not have the opportunity to participate were either living far away from each other (e.g. living in the nearby town or in another village) or it was anticipated that they be moved to another classroom soon. Teacher J and I showed the children how to use the cameras and explained to them the importance of team work. We encouraged them to find new and interesting mathematical ideas and avoid repeating what they saw in the introductory session. We promised the children to reward them by arranging a trip for the whole classroom and also to give the group with the best photos some gifts. To ensure that the children understood the activity task, the teacher and I designed an initial activity (see activity 1 in Appendix E) which asked children to: (1) look for mathematics in different rooms of their houses; and, (2) draw or paste pictures for objects or situations in these places that involved mathematics. Most of the children returned the activity sheets and showed good understanding of the task. Parents were asked to write their comments about the activity. Some parents gave positive feedback such as thanking the teacher for this new idea. Many left the comments box empty. The children took the cameras to their homes along with a letter which explained the activity for the parents. The children carried out the activity during the two weeks mid-year holiday.

Before moving to the data collection section, I would like to highlight some issues regarding the camera activity:

(1) Children in the HSKE project worked individually on the camera activity. In my project, I asked the children to work in groups. There were two reasons for this decision. First, the cost of buying 25 disposable cameras and developing 25 rolls of film was above my budget. Second, I noticed the emphasis on individual work in the classroom and wished to introduce more collaborative work among children.

(2) There was an ethical issue regarding the exclusion of some children (e.g. those who lived far from each other) from participating in the camera activity. I tried to compensate for this mistake by focusing more on the group of excluded children in the 'practical' classroom activities implemented in the third stage of the project. I also included them in interviews carried out in the final stage of the project where the children talked about their weekly and classroom activities.
(3) The teacher and I were also concerned about possible cultural sensitivity caused if children mistakenly photographed female family members. We advised the children to avoid such a situation.
(4) It was necessary to provide adequate information to the children and the parents because: (a) we anticipated that because of the young age of children they might easily forget the instructions; (b) children have little familiarity with such a task; and, (c) it would be difficult to repeat the activity again in case of major confusion occurring (e.g. buying new cameras and the event of holiday time). At the same time, I was concerned that the children would copy ideas, presented in the introductory session or included in the parents' letter, instead of developing their own ideas. The teacher and I tried our best to explain for the children and parents that the presented examples are intended just to guide the work and children should be encouraged not to replicate it. I will come back again to the camera activity in the third stage of the project.

6.3.4.4 Interviews with two fathers

I asked the teacher to contact some parents and see whether they would like to be interviewed. I thought that it would be more likely for the parents to respond to the teachers' invitation because: (1) he lives in the same village and knows a good deal about the children's families; and, (2) he has also been teaching the same group of children for two years. The sampling criteria used throughout the study was basically to include fathers and mothers with different characteristics in terms of educational levels, economic / social backgrounds, age, and levels of involvement. This decision was guided by the findings of the literature which emphasises that parents should not be treated as one homogeneous group and more attention should be paid to exploring the variation of needs, perceptions and power of different groups.

It is worth noting that the participant fathers had different characteristics in terms of levels of education, occupation, socio-economic level (which satisfied my initial sample selection criteria). However I found later, when I finished the project, that my dependence on the teacher in the process of selecting the participant parents led to the problem of mistakenly excluding some groups of fathers (e.g. parents with lower levels of involvement or parents who have children with low-achievement levels – see Table 6.4). This point is considered as one of the limitations of the study. Perhaps the teacher chose those he expected to be more articulate and who he felt more certain would be likely to agree to participate. The teacher suggested two fathers to be interviewed in this stage: Father A who works as a teacher in another school and Father B a technician. The difference between the two fathers in terms of their educational level and pedagogic experience was assumed to have some possible effect on their perceptions. Each of them was interviewed in an empty classroom in the school. The interviews were audiotaped. In the interviews, I trialled a new set of questions which was developed from those of the previous stage. Through the new set of questions I tried to create more balance between the two issues of: (a) the home-school relationship (e.g. how parents define their rules and responsibilities, barriers of parental involvement, reasons for parental involvement, who helps the child in learning at home); and, (b) mathematics learning experiences (e.g. the aim of mathematics learning, teachers' and parents' ways of teaching mathematics to the children, children's everyday activities and their view about mathematical aspects in these activities, past experiences in learning mathematics, present experiences with teaching mathematics to their children, and learning resources available in the children's environment).

I began the interview with an informal chat in which I provided general information about myself and my research. Then, I asked the interviewee to give me some general information (e.g. job, educational background). Father A seemed to be more articulate and was very engaged in the discussion. His answers seemed to be more detailed. Father B seemed to be rather hesitant at the beginning (e.g. repeating an Arabic phrase similar to 'you know' or 'I mean' in English) but after the first several questions he gradually became more relaxed. I found that there was a need to simplify the wording of some questions.

After transcribing and examining the two interviews, the final schedule was determined. Again, I focused more on certain questions that seemed to require further investigation.

One of the emerging issues worth pursuing was how the educational level and the pedagogic background of the father can shape his understanding about educational issues and influence his relationship with the teacher.

Another emerging issue was transcribing the interviews and translating quotes from Arabic to English. The Arabic language has three forms: the classic, the 'modern standard' and the colloquial. The classic and 'modern standard' are used in written text and in formal speech. Colloquial Arabic varies from country to country and is mainly used in spoken / informal language. I noticed that the amount of standard or colloquial Arabic words noticeably varied in the two interviews (e.g. more colloquial with father B; more standard with father A). While transcribing the interviews I avoided replacing colloquial words with standard ones in order to preserve the language which reflected some personal features of the interviewee. This literalness caused some difficulty when I wanted to translate quotes from Arabic to English. This colloquial form uses very flexible grammar and uses words which are quite meaningless if translated literally. Therefore, the translation process was not straightforward. First, I needed to know the exact meaning in colloquial Arabic, then put this meaning in standard Arabic form and finally translate it to English. The implicit meaning inferred in using particular words can be lost during the process of translation. For example, the distinctive vocabulary and grammatical styles used by the two fathers A and B may be lost when I translated what they said to English.

There are other important issues that emerged from this stage such as whether to interview parents in school or at their homes and the difficulty of interviewing mothers. To avoid repetition I will deal with those two issues along with other issues when presenting the final stage of the project.

The teacher and I concluded this stage by reviewing the work already done and thinking about what we would do in the final stage.

6.3.5 The third stage: Implementing the project

The third stage of the project was carried out during the second semester (March, April and May 2005). I worked with teacher J in the classroom three to four days a week mainly in mathematics lessons. In this stage we worked on four aspects: (1) continuing the 'camera activity'; (2) developing new materials and teaching resources for mathematics lessons; and, (3 and 4) introducing two other activities; the weekly home activities and the classroom activities. More data were collected through interviewing parents, teachers and children.

Information about the classroom children and their parents

The teacher provided me with general information about the children and their families. This information was useful in terms of providing general idea about the children, their families, and their social background. A brief summary of families' information is presented in what follows. Appendix B includes more information about the classroom children and their parents. It is worth noting that due to my short research experience and also because of a lack of clear plans regarding the forthcoming stages of the project, I asked for this detailed information later in the data analysis process not during data collection process. This error had some impact on the data collection decisions.

The information included in Appendix B can be summarised as follows: most of the fathers had education at the intermediate or secondary level, and manual or clerical jobs. Most of the mothers were housewives with an average level of education (i.e. intermediate or secondary level) . There was a small number of children with learning difficulties. Most of the parents were involved to some degree. I would like to mention that the teacher seemed to give a different rating about the level of parental involvement in his classroom on different occasions. In the interview and informal conversations, for example, he often considered the level of parental involvement in his classroom as less than he hoped for (probably here he thought about parental involvement as parents' school visits or calls). The teacher seemed to give a contrasting evaluation when asked to provide written information about the same topic. There, he considered most of the parents as having excellent or very good levels of involvement (as he probably defined parental involvement here as general interest and care in the

child's education e.g. helping with homework and revision for tests, and providing emotional and financial care).

6.3.5.1 The camera activity (2)

After the mid-year holiday, the children brought back their cameras. We thanked them and took the films for processing. More than 100 photographs were placed in albums. My first impression was that most of the photos shared similar ideas such as geometrical shapes and numbers. Many photos replicated some of the examples used in the introductory session or in the parents' letter. There was a need to understand more about the mathematical content and the contexts of these photographs. After reviewing the photographs with the teacher we thought it would be interesting if each group of children would present the photographs and speak about their experiences in the classroom. Here, we wished to create a new atmosphere in the mathematics lesson which encouraged children to share experiences and learn from each other instead of being passive learners or information receivers.

6.3.5.2 Children's presentations of the camera activity in the classroom

The aim of the classroom presentations was to provide the children with the opportunity to share their experiences with each other, to talk about the activity and to clarify why, when and where they took these photographs? What mathematical ideas did they find and how were they going to talk about it? I hoped that these presentations would help me and the teacher to know more about the children's mathematical practices in their everyday life activities out-of-school. These insights would hopefully illuminate the teacher's understanding about his students as well as providing new ideas which could feed into mathematics lessons. I also wanted to find out more about mathematical ideas located in situations which can be more meaningful for the children. These ideas could then be used in forthcoming project activities.

In the classroom, children of each group were invited to present their work in front of the class. However, this plan was abruptly changed and I decided to

interview each group of children separately in another room. There were two main reasons for this decision:

(1) It seemed that neither the children nor the teacher were familiar with this type of presentation. The presenters were hesitant, the audience were too loud and the teacher was very nervous. It was difficult to hear what the presenters were saying, their attention and interest gradually decreased. The audience were busy with other things and only few of them showed interest in what was presented. This situation also had a negative effect on the quality of the voice and video recording.

(2) The high number of students and the small size of the classroom may also have had an effect on the classroom management style used by the teacher. The teacher had always shown a good deal of cooperation and enthusiasm during the presentation. He tried to encourage the children to be more confident and the audience to listen carefully and give constructive comments. However, the teacher eventually became more tense and impatient. For example, he constantly told the children to *"listen ... be quiet ... think quickly ... answer quickly in few words ... wake up ... and pay attention"* It seemed that the teacher thought that the successful presentation would be similar to presentations done by adults where the audience would listen carefully, work quietly and accomplish the required task independently with little noise. The teacher commented on that issue by saying that 'fruitful' discussions among children would always end up with a mess. Therefore, he instructed the children that instead of talking with each other, they should listen. When they wanted to talk they should only talk directly to the teacher so everybody can learn from what they say: *"If you have an idea ... and you want to participate ... don't talk with each other ... talk with your teacher .. is that clear! Talk to the teacher ... without annoyance"* (Teacher J).

It is worth saying that this kind of behaviour has been common in many classrooms which I have worked in or visited during my teaching career. I think that one possible reason for this behaviour is the teacher feels over-burdened with different responsibilities which need to be accomplished in a short time. For example, the teacher probably rushed the children because he knew that he

cannot allocate more than one lesson for this activity. There were other subjects to be taught and other work to be done (e.g. planning, marking and assessing).

During that time, I was video-taping the situation and thinking about alternative way of carrying out these presentations. Although the teacher and I were quite disappointed about the presentations, this experience highlighted certain aspects which should be given more attention in the future activities of the project. For example, the presentations revealed the general characteristics of the classroom culture which were quite hidden in the lesson which I had observed in the beginning of the project. The teacher's tension and negative criticism of the children, his way of asking children to think quickly and to give short precise answers and his desperate attempts to make them quiet are all elements that may negatively influence the children's behaviour. The more nervous the teacher became, the more the children became noisier and distracted others. A friendly encouraging atmosphere which accepts mistakes and a different pace of thinking is essential to help children to be more confident and more active. I took these aspects into account while carrying out the 'classroom activities' which will be described later.

Another important aspect revealed in the classroom presentation was the difficulty faced by many children in articulating and speaking about their ideas. For example, many children used hand signs to explain their ideas instead of talking. This behaviour disappointed the teacher who said to the students: *"The most important thing which I want you to learn is, expressing mathematical ideas, there are still some students who just 'point by their fingers', we have a language to speak! We can use it to express, to attain the concepts of mathematics"* (Teacher J). Therefore I tried to provide more discussion and talk opportunities in the next project activities.

6.3.5.3 Children's interviews regarding the camera activity

The eight groups of children who participated in the camera activity were interviewed outside the classroom. In these focus group interviews, the children talked about their experiences in the camera activity and gave their accounts about the content and context of their photographs. These sessions were videotaped in order to record children's voices as well as their gestures and

body language. Some of the children seemed to depend on body language to explain their ideas especially when they needed to talk about mathematical concepts new for them (e.g. horizontal and vertical).

The aims of the interviews were to encourage children: (1) to describe in their own words some of their out-of-school experiences; (2) to share their experiences with each other; (3) to learn more about how the children express their ideas; (4) to investigate aspects of similarities and differences between the children's experiences in- and out-of-school; and, (5) to think about ways of using children's experiences in mathematics teaching in the classroom as well as the project activities.

The children who participated in the camera activity were divided into eight groups; each group included the children who previously shared a camera. The number of children in each group is presented below:

Group	Number of children in the group	Group	Number of children in the group
1	3	5	4
2	3	6	3
3	5	7	3
4	2	8	3

One of the notable observations was how the children acted very differently in the focus group settings compared to their previous 'messy' behaviour in the classroom. In general, the children seemed more relaxed and talked more easily. One reason for this change in behaviour was probably because the interview included a smaller number of children who were already engaged in the same task and were often friends or neighbours. The calm atmosphere of the room may also add to the children's easy-going behaviour.

I arranged with the teacher to carry out the interviews with the children during the 'library reading time' which was considered to be a suitable time that would not clash with any other subjects. All the children showed good interest to participate in the interviews probably because it was an activity which was a change in the day's routine. This activity established my role as a 'teacher' in my

relationship with the children. The children looked forward to more activities of this type. For example, when I came to school during break time many children surrounded me and asked me about the next activities. Children in Group 6 were disappointed when they knew that their camera was lost. The camera was found after a few days and they were happy to see their photographs.

Some photographs were presented on a large sheet of paper in the classroom to let the children see it and talk about it whenever they liked. The teacher also used some of the photographs as examples in other mathematics lessons.

I was invited by the teacher and the children to go for a trip to the traditional crafts centre. This trip was a prize for the whole class for their participation in the camera activity. The traditional crafts centre was a good place to talk with the children about some ethno-mathematical ideas that can be found in traditional crafts in Bahrain. In the centre, the children saw the actual making of baskets made from palm tree leaves, pottery work, textiles, wood designs and other cultural crafts. We also gave small prizes to each child at the end of the activity. Appendix C includes more information about the photos and their mathematical content (mentioned by the children during the focus groups).

6.3.5.4 The 'shared homework' activities

In the literature review chapters, there was a main idea which was regarded as having positive potential for the children's mathematics learning. This idea argues that utilising parent-child relationships and investing social and cultural resources and everyday activities found in the children's homes will enrich children's mathematics learning. This general idea guided another activity of the project: the 'shared homework' activities.

I worked with the teacher on designing a number of homework activities which mainly follow ideas found in the IMPACT project (Merttens & Vass, 1990; 1993). The activities in my project tried to:

- Encourage parental involvement in children's mathematics through utilising shared homework activities: the task of each activity required the child to work collaboratively with his parents or any other family member. It was hoped that these activities might provide opportunities for

'scaffolding' and 'guided participation' through the parent-child shared work. The intimate parent-child relations may help children to achieve more meaningful learning through shared engagement with others in real life experiences. Parents and children were also encouraged to write their comments and suggestions regarding the activity by filling a short feedback sheet (designed as a short evaluation questionnaire)

- Utilise the social and cultural resources found in the children's homes and out-of-school contexts in school mathematics lessons. The content of the shared homework activities tried to build upon different resources and 'funds of knowledge' situated in the real life context of the children and their families

Due to space constraints, I have included the English translation of all the activities and the feedback sheet in Appendix D. In what follows I will describe two examples of the 'shared homework' activities followed by a table which summarises the content of all activities.

Activity 1: Mathematics in the street

The aim of the activity was to collect, organise and interpret data according to specific features. The children were asked to go out with their parent to the street and record the frequency of different types of vehicles that pass in 15 minutes. The children used the collected data to answer some questions such as which type of vehicles has the highest number and which type has the lowest number? Why? The activity also included some suggestions for parents which encouraged conversation about other issues such as road safety. The activity also tried to encourage parents to look for other instances in which they or the children use different mathematical ideas in everyday life activities.

Back in the classroom, some of the children talked about the activity in front of the class. The teacher and I used some 'real' data taken from the children's activity results to show the classroom how to use bar charts to present their data. We encouraged the children to work in groups to illustrate their findings on a coloured chart. The data charts were compared and discussed. For example, the children discussed the possible reasons for the common result that saloon cars had the highest frequency while motorcycles had the lowest frequency.

After finishing the classroom work, all activities were collected, marked and included in individual student folders.

Activity 2: Mathematics in the vegetable and fruit shop

This activity aimed to help students to collect and organise data according to specific features. We asked the children to go with one of their family members to a vegetable and fruit shop and ask the shop keeper about the price of one kilogram of different types of fruits and vegetables. The children wrote the prices of different vegetables and fruits in a table and then compared the prices with their family (e.g. expensive or cheap). In the classroom, children discussed their data and used it to answer a number of questions. Some questions were directly related to school mathematics (e.g. the most expensive, the cheapest) other questions were related to other subjects (e.g. what type of fruits and vegetables can be produced in Bahrain and what are not, why?). The children were encouraged to use mathematical vocabularies while describing their everyday experiences. The children also used their data to answer a number of word problems.

Reasons for choosing these activities

I noticed in the early stage of the project that mathematics lessons in the classroom seemed to be dominated by a teacher-centred and didactic teaching style. Some of the children had difficulties in expressing their ideas and they were encouraged to work individually in written arithmetic. Through the activities we tried to change this situation by providing more opportunities for the children to engage in group work and to allow more constructive conversation in the classroom.

I asked teachers and parents in the pilot interviews if there were any particular mathematical skills or concepts which seem to be problematic for the children, parents or teachers. The teachers often noted that skills and concepts related to problem solving, word problems, number sense and money as being more problematic. They often called them the 'new skills' as they are recently being given more attention in the new assessment system. The teachers also noted that there was a gap between the content of the textbook and the requirements

of the new assessment system. The textbook seemed to give more space and focus to basic concepts (e.g. numbers and arithmetic) and less attention to the 'new skills' emphasised by the assessment system. These skills included: reading and interpreting data, expressing ideas related to real life situations using mathematical terms, justifying the use of particular mathematical procedures to solve certain mathematical problems etc. This gap between the subject content and the assessment requirement was seen by the teachers as a problematic issue which needed more attention. In my own teaching experiences, I found that these skills were often given less priority in classroom teaching, probably because they seemed to lack clarity and also because they seemed difficult to apply in the typical mathematics lessons where the four basic operations are given priority.

Through the shared homework activities and classroom activities, we tried to bridge this gap by focusing on those specific learning skills. The content of the activities came from different sources such as: (1) The camera activity: children's photographs and conversation shed some light on mathematical topics that seemed more meaningful and interesting for the students (e.g. money, shopping and prices). These ideas were included in the shared homework activities in order to enrich the content of the curriculum which seemed to emphasise pencil-and-paper calculations. (2) The curriculum: the activities were closely linked with the content of the mathematics curriculum units taught in the classroom (e.g. basic statistics: collecting, categorising and presenting data, measurement using standard and non-standard units). The teacher and I wanted to make the activities part of the teaching plan of that academic term.

The follow-up classroom activities

Each 'shared homework activity' was discussed and followed by further work in the classroom. In an attempt to make mathematics learning more interactive and dialogical, the teacher and I introduced new learning activities and teaching ideas in the mathematics lessons. The children worked in groups on different tasks such as:

- They were asked to bring take-away food menus (e.g. pastries, pizza, sandwiches and grills). Based on those different menus, a simpler 'classroom menu' was produced. The children were asked to answer some word problems related to the classroom menu and to make orders of their own choice
- The children brought different shopping brochures and leaflets. They cut out the pictures of items and their prices (e.g. food, electronics, toys etc.) and pasted them on cards. These cards were used as a mathematical problem-solving game in the classroom
- Measuring and comparing the body weight and height of different groups of children. Each group used tables and charts to record, organise and compare their findings with other groups
- Using a stethoscope to measure heart pulse and thermometers to measure the body temperature
- Making a weighing scale and using it to weigh different objects
- Making and comparing sand clocks of different sizes
- Weaving small rugs made of paper strips

I will describe one of the classrooms' activities here as an example. For more details about the other activities, please see Table (6.1) below and Appendix D.

Using clay and plastic straws to design geometrical shapes

The aim of this classroom activity was to let children use their imagination to design different geometrical shapes which are not necessarily taught in the curriculum. In the beginning the children tended to create typical shapes (e.g. square, triangle etc). However, with the help of the teacher, the children gradually began to create more interesting shapes. One of the children, Yousef, who was according to the teacher, a low achieving child, worked very quietly on building a house frame (cube + triangular prism). Building the house was quite difficult because the materials were not strong enough to carry the whole frame. To solve this problem, Yousef added more 'columns' to support the structure and after a few attempts he managed to do the task successfully. The children produced many shapes such as: a pyramid inside a cube, Arabic tent, Indian tent, spider webs, fountains, triangular prism, kite, and swing. This activity encouraged the children to ask interesting questions about some geometrical

ideas that emerged through the activity. For example, one of the children, instead of using clay to join the plastic straws, inserted the hollow ends together. As a result, the triangle angles were round and not sharp. This action led to an interesting discussion between the children and the teacher about the concept of angles. At the end of the activity, the teacher rewarded children who made the most interesting shapes with some presents. The children were delighted when the teacher displayed their products in one of the classroom's corners.

Interviews with children

At the end of the project, I interviewed children in four groups (each group consisted of five children). The interview conditions were similar to the interviews for the camera activity which I explained earlier. In these interviews, I tried to investigate children's views about the project: what they learned from the activities, what difficulties they had encountered, whether that had noticed any differences between the traditional mathematics teaching in comparison with the new mathematics teaching ideas introduced by the project.

6.3.5.5 Parents' meeting

During the third stage of the project, parents were invited to a school meeting. The aims of this meeting were: (1) to explore parents' experiences and views regarding the project; (2) to provide parents with more information about the project; and, (3) to provide parents with information about mathematics teaching methods used in school. Teacher J was enthusiastic about this parents' meeting idea because he felt that it would provide an opportunity for the parents and the teacher to meet and discuss issues that have often been overlooked in the traditional 'open day' short meetings.

The parents' meeting was supposed to be carried out at the beginning of the project to introduce parents to the activities. However, the meeting was delayed for various reasons (e.g. I was busy with interviewing children about the camera activity, planning the shared activities, negotiating aspects of interviews with the participants etc.) I also wanted to carry out some of the project's activities before the parents meeting in order to have some materials to present and discuss with the parents.

11 parents (nine fathers, two mothers and one sister), the principal and the 'coordinating' teacher came to this meeting. Although the invitation card explained the purpose of the meeting, many parents thought that it was the regular 'open day' and expected to talk about their children's academic matters.

The meeting began with two short presentations, followed by a discussion with the parents. In the first presentation, teacher J argued that there are multiple methods to teach basic concepts such as addition and subtraction. He presented three possible ways of teaching these concepts and explained how each method can be appropriate for different children's abilities. He also highlighted how certain mathematical concepts were sometimes being taught differently in home and school. He encouraged parents to avoid using certain teaching strategies which he considered as impractical and clashing with school strategies (e.g. counting on fingers, using lines or dots). The teacher also focused on how these differences between school and home teaching methods can cause confusion to the children. I noticed that the teacher explained these ideas quite quickly using professional language with which some parents seemed to be unfamiliar. The teacher's presentation clearly reflected a point of view (e.g. school-centred view of mathematics learning and parental involvement, school-to-home type of knowledge flow) which contrasted with my research agenda (e.g. more knowledge exchange, more two-way communication, more recognition of parental role and social resources). However, I did not intervene in the teacher presentation at that time since I thought that working together on more project activities would hopefully change this traditional point of view.

The teacher then introduced me to the parents. In the second presentation, I talked about the two main ideas of the project: linking in- and out-of-school mathematics learning and encouraging more communication between parents and teachers. I talked about the project and how we can use everyday mathematical activities as a way of making meaningful connections between school mathematics and everyday mathematics. I also talked about how parents can use authentic mathematical activities found in everyday activities to help their children to learn mathematics in different ways. I presented some photographs from the camera activity, shared homework activities and some of the materials produced by the children in the classroom activities. Then, I invited

parents to comment on these activities and talk about their experiences and views regarding the project.

Many parents gave positive comments about the project and asked for more activities. Some parents contributed to the discussion by talking about what they thought about the activities done so far. Other parents provided some suggestions for the next activities of the project. Only one of the mothers asked some questions of teacher J. We asked the parents to fill in an evaluation sheet regarding the meeting. This meeting helped us to know more about possible ways of improving the next activities and to get a better understanding about parents' needs and expectations. More details about parental views and experiences will be presented later in the findings chapter.

6.3.5.6 Interviews

In this stage I interviewed five fathers, five teachers and four groups of children. Four mothers were interviewed by a female teacher.

Parents' and teachers' interviews focused on two main issues: home-school relationships and mathematics learning in and out of school. In addition, I asked the parents, the children and the class teacher J about their views regarding the project.

The topic of home-school relationships: The questions explored the nature of home-school relationships: how parents and teachers view each other and how they conceptualise the roles and responsibilities of themselves and others, home-school communication, parental involvement practices and school policies regarding parental involvement.

I also tried to investigate issues highlighted in the literature review such as how the participants defined parental involvement, what model of parental involvement seemed to dominate, whether certain groups of parents were viewed as deficit, power issues, conflicts and gender.

The topic of mathematics learning in- and out-of-school: Here, I asked questions regarding the aim of mathematics teaching, how mathematics is

taught in school and home, what the philosophical assumptions are that underlie particular ways of teaching, how parents and teachers view children's mathematical practices in- and out-of-school, what parents' and teachers' attitudes are towards mathematics, what their own past experiences about mathematics were when they were students and how they feel about teaching mathematics to the children.

I also tried to investigate issues mentioned in the literature review such as: finding out more about to what extent the social and cultural aspects of mathematics learning were recognised and utilised in school teaching, what kind of funds of knowledge and mathematical resources can be found in the children's homes, and to what extent these mathematical aspects are recognised and utilised in school learning.

The following discussion will focus on some specifics regarding the participant fathers, mothers, and the teachers.

Interviews with fathers

The parents' meeting evaluation sheet included a call for parents' voluntary participation in the interviews. Three fathers showed interest in participating in the interviews. Two other fathers from the group who did not attend the meeting were contacted by the teacher and showed a similar interest. I tried to include parents who had different characteristics in terms of age, educational qualifications and socio-economic circumstances. Information provided by the teacher (Table 6.4) shows that there is diversity among the fathers in terms of age, qualifications and occupation. However, most of the participant fathers were considered by the teacher to have a high level of involvement in their children's education and also have children who are high achievers.

All fathers were interviewed at the school premises except one. I was aware that interviewing parents in their own homes or in any other place outside school can provide a more comfortable atmosphere with less stress or power influence. This circumstance might also encourage parents to talk with more confidence and openness. However, there were different reasons for my decision of interviewing parents in the time and premises of school: (1) my first daughter

was born in the middle of the data collection time. She was born one month earlier than expected and I needed to divide my time between school in the morning and to take care of the family in the afternoon; (2) some fathers preferred to be interviewed in school during their work break; and, (3) I tried to avoid any burden on the children's families that might be caused by visiting their home. From my previous experience (when carrying out the data collection for my masters' project and also from my experience with the Bahraini traditions) I had a sense that parents would be wonderful hosts who show much hospitality, but at the same time this set-up would lead to complexity in the interviewing process. Yee and Andrews (2006) have noted, during their work with families from ethnic backgrounds in the HSKE project, that researching children and families in home settings can raise additional ethical dilemmas (e.g. the researcher may be seen as a guest who is invited to dinner or consulted about school issues).

The only father who was interviewed outside school was Father D. This father was interviewed in his office as he worked as a principal in another intermediate school. My experience in interviewing this father was quite different from interviews with all other fathers. The father's characteristics (higher educational level, strong ability of expression and higher job position) and also the place of the interview (his office) seemed to give the father a more powerful position in comparison to the other fathers. For example, although I had an appointment to visit him, during the interview Father D answered phone calls, discussed issues with other teachers, and left the room twice for more than 15 minutes to deal with some school issues. His answers seemed to imply some kind of higher professional and life experience. All these features were less visible in other interviews where fathers tended to show more compliance to the interview situation (e.g. avoiding the use of mobile phones during the interview or staying for the interview even when it took longer than expected).

Interviews with mothers

As I mentioned earlier, it was difficult for me – as a male researcher – to interview mothers because of social and religious restrictions. This circumstance was one of the main ethical and practical difficulties encountered during the project. Some researchers have noted a similar issue. For example, Jones and

Allebone (1999) have raised the issue of gender in their research about the home and school numeracy experiences of Somali families in the UK. They noted that in this Muslim society it is inappropriate for an adult male to spend time with an adult female outside the family. They concluded by saying that "gender is a major consideration when working with a culture in which there is clear gender differentiation within its structures" (p. 361) and it will add to the difficulty of reaching particular groups of parents.

Including mothers in my research sample was very important because they often are more involved in helping children with homework and other school tasks. It was essential to give mothers an opportunity to voice their experiences and concerns. Especially, because of social traditions, most mothers seemed to be reluctant to communicate with the school which was dominated by male staff.

I expected to encounter the difficulty of interviewing mothers from the early stages of the project. I had in mind different possible ways to overcome this difficulty such as carrying out telephone interviews, interviewing fathers and mothers in pairs, or using questionnaires. All these approaches were problematic in some regard.

One day I encountered one of my university students in the school. She was visiting her brother's teacher. I asked if she could help me in interviewing a number of mothers in the village. She was happy to help. I discussed with her different aspects of the project and gave her a copy of the interview schedule. I also gave her some instructions regarding the interviews which included:

- Selection criteria: to interview any female family member who usually works with the child (i.e. not just mothers, but also sisters or aunts, etc.). I asked her to select participants with different characteristics in terms of educational level, ages, socioeconomic circumstances.
- Seeking explicit verbal consent from the interviewees, providing information about the research and the researcher.
- Assuring the interviewees that the audio recordings and the interview transcripts would be used only for research purposes, and promising privacy and confidentiality.

- Carrying out the interviews in a friendly atmosphere and encouraging the interviewees to talk and provide detailed answers. Using a simple language in the conversation and the possibility of changing the style of expression of the questions.

The female teacher interviewed four mothers (Table 6.2) and sent me the audio recordings of the interviews. While transcribing the interviews I found some problematic aspects such as short responses by the interviewees, few probes, interruptions and leading questions by the interviewer. Although the outcomes of these interviews can be considered as generally adequate, having more detailed answers from the mothers would probably have allowed more in-depth understanding of aspects of home-school relationships and in- and out-of-school children's mathematics learning. Methodological issues related to gender can be seen as an important limitation of this study.

Interviews with teachers

Through my visits to the school, I talked about my research with the class teachers in the staff room. There seemed to be little difference among teachers in terms of age, qualification and teaching experience. Four teachers agreed to participate in the interviews. In addition, teacher J (the teacher who worked with me in the project) was interviewed twice (before and after the project). The teachers were interviewed in the resource room or in an empty classroom. They preferred to be interviewed in school during their free time instead of meeting outside school due to other commitments. I did not encounter any notable difficulties during these interviews. More information about the parents and the teachers who participated in the interviews is presented next.

Information about participant parents in the interviews

In Appendix B I discussed how I categorised the fathers and mothers of all classroom children into three groups according to their educational level. These groups were called BEL (Basic educational level), AVEL (Average educational level) and ADEL. (Advance educational level). Here, I will focus on presenting information of the parents who participated in the interviews (Table 6-5). Their information can be summarised as follows:

- Most of the parents belonged to the AVEL group (one parent with intermediate level education and 6 with secondary level education)
- There were two parents who have a bachelor's degree and one with a master's degree. Those three parents belonged to the ADEL group
- There was only one parent with primary level education (BEL group)

It is worth noting that the interviews did not include parents with lower level of communication or parents of children with lower achievement levels. This inclination towards choosing parents who were more in contact with the school was a result of my reliance on the class teacher in choosing the participant parents and considering the educational level as the main criterion for selecting the interviewees

Information about participant teachers in the interviews

During the process of analysing teachers' interviews, I tried to find ways of categorising them into smaller distinct groups which shared similar features as I did with the parents' groups. I thought that this procedure might help in finding contrasts or similarities that would enrich the analysis and which hopefully can generate interesting findings. Nevertheless, in contrast with parents, I found that there was a great deal of homogeneity among the participant teachers. For example, the participant teachers were quite similar in age (their ages ranged between 27 to 35 years), years of experience in teaching (ranged between 6 to 10 years), academic degree (bachelors in primary education obtained from the same institute), and finally they were all teaching the first three primary years. Teacher (A) was the only one exception as he had a master's degree in primary education and worked as coordinator teacher. To summarise, the participant teachers seemed to share many features in common and therefore they will be rather treated as one group in the analysis.

Summary of the data collection

- More than 100 photographs resulted from the camera activity

- Activity sheets (the shared homework and the classroom activities) and their feedback sheets. Each child organised his activity sheets in a folder. Each folder contained 8 activities and 8 feedback sheets
- Videos of children's presentations in the classroom talking about the camera activity and classroom activities
- Videos of children's focus group interviews: six groups talked about the camera activity and four groups talked about the shared homework activities
- Interviews with seven fathers, five mothers and seven teachers
- Field notes and photographs about the parents' meeting, the project's activities and regular mathematics lessons in the classroom

The project's activities can be organised according to two ideas emphasised in the HSKE project: home-school knowledge exchange and the two directions of communication between the two contexts.

Home to school knowledge exchange / communication:

- The camera activity
- Shared homework activities
- Interviews with parents
- Interviews with children
- Parents comments on the feedback sheets

These activities helped in finding out more about funds of knowledge and numeracy practices available in children's homes.

School to home knowledge exchange / communication:

- Parents' meeting.
- Notes and suggestions written in the activity sheets.

These activities provided information to parents about mathematics teaching in school.

6.4 The data analysis process

The data collection process was described earlier in full detail. This process included different data sets such as: interviews with parents and teachers, interviews with children groups, photographs, feedback and activity sheets, and observations of classroom lessons and presentations.

The data analysis process was carried out simultaneously with the data collection process throughout the three stages of the project. The data analysis process continued after the project finished until the last writing-up stages. Different data analysis ideas were trialled in various ways in each stage of this study. There were many unsuccessful attempts which sometimes created a sense of disappointment and frustration. Analysing, interpreting and compiling the large amounts of data were really challenging tasks. Telling how this process was done is challenging too. This section provides a general description about the data analysis which in reality was far more complicated and messy than the way it is described here.

I enrolled in some introductory courses of qualitative data collection and analysis before commencing the data collection and the data analysis processes. I also learned more about qualitative data methods and analysis through reading some major qualitative references. Some of these references were mentioned earlier in this chapter when I presented features of the qualitative framework which constituted the methodology of this study. I will focus here mainly on three references (Kvale, 1996; Miles & Huberman, 1994; Strauss & Corbin, 1998) which specifically guided the data analysis process of this study.

Miles and Huberman (1994) suggest that qualitative data analysis process can go through three interconnected phases:

1. *Data reduction* which refers to the process of cutting down the data in a sensible way which condenses the data and also preserves its meaning and its relationship with the context.
2. *Data display* which refers to the process of showing the data through diagrams, networks or charts in order to summarise and organise it and visualise the links between its segments.
   The above two processes rest mainly on two operations: *coding* (labelling pieces of data with specific names) and *'memoing'* (recording emerging ideas related to the codes or connecting the emerging concepts with each other).
3. *Drawing conclusions* which refers to the process of reaching possible findings which then need verification. The aim of this process is to integrate the outcomes of the first two stages in a way which reflects a

meaningful image of the data and provides cohesive answers to the research questions.

I found that Strauss and Corbin's (1998) work was also useful in this task. I was not particularly interested in adopting their grounded theory approach as much as I wanted to get a broader understanding about the data analysis strategies (e.g. coding process, levels of coding, ways of connecting concepts and finding patterns etc). Strauss and Corbin also offered a framework which organised the data analysis process into three stages: description, conceptual ordering and theorising – which is quite similar to Miles and Huberman's above-mentioned framework.

Finally, I found that Kvale's (1996) work was also useful in this respect as it provided systematic steps which were utilised in the interview design and analysis. It is worth noting that those three references have generally guided my work. I adapted their ideas in a way which suited my research purpose and circumstances. However, I did not strongly adhere to one specific framework or one particular idea and rather preferred to consider them as useful tools which can help me to understand more about the data analysis process and to solve problems encountered there.

During the three stages of the data collection I regularly reviewed, transcribed and analysed the data (e.g. the audio tapes, videos, notes etc.). I always went back and forth through the different sets of data, as I needed, for example, to refine the interview schedule, to use ideas mentioned in the interviews to develop mathematical homework activities, or to trace an interesting idea mentioned by a teacher with other participants in the forthcoming interviews. For the sake of clarity I divided these fused actions into the following separated steps:

6.4.1 Transcription

The parents and teacher interviews were audio recorded on tapes. Children's interviews and classroom work were video and audio recorded (in order to see children's reactions and body language). I listened to – or watched – the interviews after a short period of recording them in order to get a general idea

about the participants' responses. I took notes of emergent issues which needed be taken into account in subsequent interviews. Most of the interviews, especially those which were carried out in the data collection stage 3, were fully transcribed at the end of the project. The transcriptions were verbatim and included everything said in the interview. By rereading the transcripts many times I became more familiar with their content. Through this process I achieved a general understanding about the participants and their responses which contributed to the following stage of the analysis.

6.4.2 Coding and memoing

As I was aware of the benefits of using technological tools in qualitative research, I explored different types of qualitative analysis programmes throughout the data analysis. These software included: NVivo, Qualrus, Transana, and HyperRESEARCH. I downloaded trial versions of these programmes and explored their demo files which provided some data sets and examples which helped me in learning more about the analysis process. I tried analysing some of my data with these programmes. Interestingly, most of these programmes did not support Arabic text (e.g. could not read from right to left or could not recognise the non-Latin writing). Only one programme - HyperRESEARCH – was found to be useful in this process as it supported Arabic text and therefore I used it along with MicroSoft Word for selecting, retrieving and labelling segments of transcriptions' text.

I started the coding process by working on 'basic coding' where segments of data were labeled by using some words which indicated the general topic. This type of coding was used with little inference or interpretation. However, as I became more familiar with the basic codes, I began to discover new patterns and started to bring these basic codes together into more advanced codes which involved more interpretation and moved beyond the description level.

Throughout the coding process I wrote short notes for each code. These notes included recording ideas about the meaning of the codes, their relation with other codes, any possible pattern which can be developed from these codes, any deviation between codes, and discrepancies or similarities between ideas emerging from the analysis with ideas discussed earlier in the literature review.

6.4.3 Displaying data

The process of coding and re-coding was done many times until I reached a set of manageable codes which seemed to cover the main ideas highlighted in the interviews and seemed to give answers to the research questions. The ideas and the content of these codes were visually organised by drawing conceptual maps. These maps were basically small pieces of papers which included the main codes and their associated ideas. These pieces of papers were arranged and re-arranged according to the previous emerging patterns or according to new patterns generated through the data display process. These patterns were also refined until a number of main-themes and sub-themes were produced. New sub-research questions were developed in this process.

6.4.4 Drawing conclusions

The main- and sub-themes were organised in a systematic way which brought them together in order to create a structured framework which could lead towards reaching conclusions and answering the research questions which framed the study. At that stage, I wrote extensive pieces of analysis in Arabic about each theme (I used Arabic because expressing new and complex ideas in English was quite difficult for me at that stage). I refined the emerging ideas until I reached an adequate level of understanding which allowed me to start writing the first draft of the findings chapters. I found that the process of writing itself was useful in terms of reflecting and verifying ideas generated from the data analysis process. These themes will be presented in the following chapters.

6.5 General ethical guidelines

Research can be influenced by different factors such as the researcher's values, experiences, interests, beliefs, political commitments, wider aims in life and social identities (Willig, 2001). In accordance with this idea, I would like to highlight some issues which are related to my position as a researcher which might have influenced my research:

Firstly, I was interested in investigating the topic of home-school relationships because I believed that learning more about these relationships and looking into possible ways of facilitating them would be a worthwhile task as it tries to move a small step forward toward more democratic social practices. I believed that schools in Bahrain should do more to move in accordance with the wider democratic reforms in the country. Therefore, I saw my role as a researcher and as an educator is to explore new ways to encourage parents to have a more powerful voice in school and to find other possible ways which can move away from the deficit view and the top-down processes which seem to characterise parental involvement programmes in Bahrain. In addition, as an educator who believes in social justice and equity I believe that schools located in rural areas need more attention and support by the Ministry of Education. This study tries to highlight the richness of children's experiences within the social and cultural contexts of these rural areas and also to draw attention to the importance of building upon these experiences in formal schooling.

Secondly, I believed that mathematics has its deep roots in the history and culture of Bahrain. However, this rich mathematical heritage is still seemed to be untapped in the Bahraini mathematics classroom. In this study I tried to look at mathematics education from a different perspective which puts social and cultural aspects in front position. I think that introducing new educational ideas based on the social notions of mathematics education in Bahrain can be important as it may instigate some changes in teaching practices such as giving more acknowledgement and utilisation of children's social and cultural experiences and making learning more related to the life and experiences of children. The influence of the social factor on children's education seems to be disregarded in current Bahraini education. Reflecting on my previous teaching experience in primary schools in Bahraini villages I feel that there is a need to understand and appreciate the wonderful ideas of the children and the rich resources of their cultural and social environment. In addition, the educational system in Bahrain is facing challenging issues especially in finding ways to develop, educate and train its people to be able to compete in a rapidly expanding economy. Focusing on the quality of school education is seen as an important ingredient for educational reform. I think that one way of improving education in Bahrain is to begin by focusing on primary school education - as the foundation for further educational stages –. Building strong relationships between home and school and creating meaningful connections between in- and

out-of-school learning are two important issues which can help in improving primary school education.

My research was guided by some ethical guidelines stated in the literature (e.g. Cohen *et al.*, 2000; Hill, 2005). These guidelines can be summarised as follows:

- Official permission: The study was discussed and approved by the Bahraini Ministry of Education and the school administration.
- I tried to maximise opportunities for involving different groups of parents to participate in the interviews and in the project activities. However, some groups of parents were excluded unintentionally (e.g. those with low involvement, parents of low achievers).
- Cultural sensitivity: Interviewing female participants was an ethical issue which caused imbalance between my research aim (learning more about parents' experiences) and the participants' rights, values and welfare (social traditions which do not encourage male-female conversations). I tried to overcome this difficulty by asking a female teacher to carry out the interviews on my behalf. Prioritising the values and rights of the female participants led to a negative impact on the study (e.g. carrying out the interviews by the researcher might have led to more rich data).
- Informed consent: Participation in the research was voluntary and based on freely given consent. I gave the adult participants sufficient information about the research, the researcher, the data collection procedures, and how the data is going to be used or published. They had the choice of participating or refusing to take part, or to withdraw once the research had begun. An explicit verbal consent was requested from the adult participants to use the information during the course of the study.
- Parents and the class teacher were informed and consulted regarding their children's participation in the project. Children's participation in the project activities and the interviews was not compulsory. Most of the children were happy to be interviewed. Parents and the class teacher were informed about the children's interviews.
- I showed respect and gratitude to the participants and acknowledged their help. I invited teacher J for a meal and gave him a gift at the end of the project to express my gratitude. The school administration gave

some money to the teacher to buy small presents for the classroom children and to take them on a field trip as a reward for their participation in the project. I wrote a letter thanking the parents at the end of the project. I avoided any intrusive actions which could distress the teacher, parents and children.

- Privacy and confidentiality: the identities of the individuals who participated in the research have been kept confidential. Participants were assured that the audio recording and the transcripts will be used only for research purposes.
- I tried to maximise the opportunities for children's input in the research and attempted not to exclude certain groups of children from participating in the research. Children who did not participate in the camera activity were given more opportunities in the classroom activities.

The next chapters present investigate and discuss participants', that is, parents, children, and teachers, views about the issues under investigation: home-school relationships, parental involvement in children's mathematics learning, aspects of in- and out-of-school mathematics learning, and the project's outcomes.

Homework activity	Aim	Task	Subsequent classroom activity	Notes
Let's look for mathematics!!	To identify different objects or situations that involve mathematics in different places.	To look for mathematical ideas in different places.	Discussions	Used in the second stage of the project (before the camera activity) to encourage children to look for mathematical ideas in their surroundings.
Mathematics in the street	To collect, organise, present and interpret data	To record the number of vehicles that pass in the street during 15 minutes	Presentations. Presenting data in bar charts. Group discussions	The idea of the activity came from an IMPACT book. The activity is linked with the statistics unit in the textbook.
Mathematics in the vegetable shop	To collect, organise, present and interpret data. To use the mathematical terms to describe everyday activities	To record prices of 1kg of different vegetables and fruits	Discussions	The idea of this activity came from the children's photographs taken in the shops. The activity is linked with the statistics unit in the mathematics textbook and agriculture unit in science subject.
Mathematics and food	To collect, organise, present and interpret data. To use mathematical skills in everyday life activities	To read and record the expiry dates of different types of food.	Discussions Children used restaurants' menus to calculate costs of different food orders	The idea of this activity was suggested by the teacher. The activity focused on word problems.
Mathematics in the human body	To collect, organise, present and interpret data. To use different types of measurement tools and units	To measure different parts of the body. To measure heart beats	Children worked in groups in measuring and comparing their weights and heights	The idea of this activity came from the children's photographs (e.g. tailor photograph). The activity was linked with the measurement textbook unit and science subject.

Mathematics in store	To collect, organise, present and interpret data. To discuss the use of money in everyday activities	To collect and compare information about the prices of different items in the corner shop. To collect and compare price tags of different items.	Discussions. Cards made from shopping leaflets were used to develop children's skills in solving word problems. The teacher and the children made a classroom shop which has empty packs with different prices.	The idea of this activity came from the children's interviews (using money was key in their everyday activities). The activity was linked with the money unit in the text book.
Weight measurement	To measure different weights using a weighing scale	Using a home made weighing scale to weigh different things	Discussions. The children used their scales to measure and compare the weights of different things	The idea of this activity came from the children's interviews about the photographs. The activity is related to the measurement unit in the textbook.
Mathematics in kitchen	To learn about basic fractions through everyday activities. To use time in some everyday activities.	To fill glasses with different amounts of water (½, ⅓, ¼, ¾) and make different musical sounds. To cook a jacket potato and use concepts of fractions to read time.	Discussions. Using fractions to make art designs. Designing small rugs made of paper strips.	The idea of the activity came from discussion with the teacher. The rug design idea came from the children's visit to the traditional craft centre.

Table (6.1) Summary of the main points of the shared homework activities

	Age	Qualification	Occupation	Children	Interviewed in project stage
Mother A (wife of father F)	28	Secondary	Housewife	2	3
Mother B (wife of father A)	32	Studying education in university	Housewife	4	3
Mother C	33	Secondary	Housewife	3	3
Sister D	21	Secondary	Housewife	1	3
Mother E	50	BA in Arabic language	Teacher	4	1

Table (6.2) Information about the interviewed mothers

	Age	Qualification	Years of experience	Teaching Year	Marital status	interviewed in project stage
Teacher A	35	BA and MA in Education	10	2	Married 2 children	1
Teacher K	30	BA in Education	7	3	Not married	1
Teacher J "the participant teacher in the project"	30	BA in Education	6	2	Married 1 child	2 and 3
Teacher D	31	BA in Education	7	2	Married no children	3
Teacher E	27	BA in Education – MA student	6	3	Not married	3
Teacher S	29	BA in Education	7	1	Not married	3
Teacher Y	35	BA in Education	9	1	Married 3 children	3

Table (6.3) Information about the interviewed teachers

	Age	Qualification	Occupation	Wife qualification	Wife occupation	Level of involve-ment	Child's level of achieve-ment	Number of children	Interviewed in project stage
Father A	50	BA in social sciences	Arabic teacher	Intermediate	Housewife	Very good	Excellent	4	2
Father B	45	Secondary	Inspector of sewage stations	Undergradua te	Teacher	Excellent	Excellent	4	2
Father C	45	Secondary	Document / custom clearance	University student in education	Housewife	Very good	Good	4	3
Father D	49	BA in Business / MA in Education	School principal	Intermediate	Housewife	Excellent	Excellent	4	3
Father E	36	Primary	Farmer	Secondary	Housewife	Excellent	Very good	3	3
Father F	35	Secondary	School security	Secondary	Housewife	Excellent	Very good	2	3
Father J	50	Primary	Truck driver	Illiterate	Housewife	Excellent	Excellent	10	3

Table (6.4) Information about the interviewed fathers

Child's classroom serial number	Participants	Interviewee's qualification	Family group according to parental educational level	Parental level of communication with school	Child's achievement level	Child's level of participation on project's homework and classroom activities	Level of feedback sheet returned by parents
6	Father J	Primary	BEL	Good	Good	Good	Good
19	Father F Mother A	Secondary Secondary	AVEL	Good	Good	Good	Good
30	Father E	Intermediate	AVEL	Good	Good	Good	Good
31	Mother C	Secondary	AVEL	Good	Good	Good	Good
32	Sister D	Secondary	AVEL	Good	Average	Good	Good
10	Father D	Master	ADEL	Good	Good	Good	Good
12	Father C Mother B	Secondary Bachelor	ADEL	Good	Average	Good	Good
15	Father A	Bachelor	ADEL	Good	Good	Good	Good
29	Father B	Secondary	ADEL	Good	Good	Average	Average

Table (6.5) Information about the parents who participated in the interviews

7 The views of parents and teachers regarding home-school relationships

7.1 Introduction to the findings chapters

The analysis and findings of this study are divided into three chapters as follows:

- Chapter 7 presents parents' and teachers' views regarding home-school relationships
- Chapter 8 focuses on parents' and teachers' views regarding in- and out-of-school mathematics learning issues
- Chapter 9 presents parents', children's and Teacher J's views regarding the project's outcomes

Each findings chapter associates with one of the previous literature or methodology chapters. That is, Chapters 3 and 7 both focus on home-school relationships, Chapters 4 and 8 both focus on parental involvement in mathematics education, and Chapters 6 and 9 both focus on the project. All these chapters were based on ideas derived initially from the sociocultural literature presented in Chapter 2. Hence there were common threads among the chapters. All the main findings and implications emerging from the findings chapters will be joined together in the final conclusion chapter.

The main aim of the findings chapters is to investigate and discuss participants', that is, parents, children, and teachers, views about the issues under investigation: home-school relationships, parental involvement in children's mathematics learning, aspects of in- and out-of-school mathematics learning, and the project's outcomes. Chapters 7 and 8 drew mainly on data derived from parents' and teachers' interviews. Chapter 9 drew on additional data sets such as focus groups with children and their work on the project's activities.

The participants' views were considered important in this study because:

1. It is important for this study to achieve adequate understanding about the nature and characteristics of the particular school and home contexts under investigation. It is important to know more about the actors who interacted in these contexts, their concerns, their needs, how they viewed each other, and their conceptualisations about learning, teaching

and mathematical knowledge. This understanding would hopefully serve as a foundation for my attempt to introduce changes and to produce successful results. Knowing more about the research context may provide better opportunities for implementing changes through the project's activities introduced by this study. Several studies, discussed earlier in Chapter 3 (e.g. Drummond and Stipek, 2004; Lawson, 2003; Warren and Young, 2002), have emphasised the importance of building upon the existing knowledge and resources of stakeholders (e.g. parents, children and teachers). Other research discussed in Chapter 4 encouraged the integration of parents' ideas and experiences together . with the ideas introduced by the researchers (e.g. Hughes *et al.*, in press; Moll *et al.*, 1992). This exchange of knowledge among the researcher / teachers / parents / children - a main objective of this study - was influenced by the core idea of action research: collaboration for change (discussed in Chapter 6).

2. The studies presented in Chapter 2 (e.g. Abreu, 1999; Bishop, 1988; Lave, 1988; Rogoff, 1990; Schlimann *et al.*, 1997) emphasised the role of social interactions, cultural tools, values and identity and context in mathematics learning. These concepts are at the heart of sociocultural theory which framed this research. Therefore it was essential for this study to investigate these concepts directly from the people who participated in their community of practice. For example, through investigating their utilisation of different cultural tools in their interactions and movements between home and school contexts.

3. According to the class teaching system adopted in primary schools in Bahrain, teachers usually spend three consecutive years (Years 1 to 3) with the same group of children which would result in a long and continuous relationship between families and teachers. This study attempts to explore in more detail these relationships and to find out ways which may enhance these relationships.

4. As the research project was conducted in one society (Muslim, Arabic and Bahraini) and presented to the audience in another society (Western and English), I think that it is important to give the reader a general picture about the research's context and the characteristics of its actors

as the reader might be unfamiliar with some cultural and social issues at the heart of this research.

7.2 Parents' and teachers' views regarding home-school communication

7.3.1 Research questions

This chapter focuses on investigating home-school relationships issues and attempts to answer the following question:

How do the participant teachers and parents perceive home-school relationships?

Through the different stages of the data analysis this broad question was broken down into these smaller questions. Most of the questions focus on communication as one common type of parental involvement emphasised by the participants. Sub-question 6 focuses more on parents' and teachers' definitions of their roles in supporting their children's learning. The sub-questions are:

1. What are the available means of communication between home and school?
2. Are parents and teachers satisfied with the current level of communication?
3. What kind of difficulties might influence the home-school communication process?
4. What efforts were made to overcome these difficulties and to support home-school communication?
5. Are there any variations among parents in terms of their communication with school? If so, how did they vary, and why?
6. How do the participant parents and teachers define their roles in supporting their children's learning?

Due to the qualitative nature of the data analysis it was quite difficult to answer each question separately because the answers often overlapped or interlaced with each other. Therefore, I prefer to present the findings through a general discussion of the numerous themes which emerged from the data analysis

process. These themes will draw a broad picture of home-school communication practices thereby answering these questions. Eventually, more concise answers for each sub-question will be presented in the final section of this chapter.

7.3 Overview of Chapter 7

Throughout the interviews, most of the participant teachers showed considerable recognition of the importance of building strong home-school relationships and the need to encourage parents to become more constructively involved in their children's education. The parents also demonstrated this interest as they expressed their wish for more shared work with school, a desire to know more about their children and a willingness to provide any assistance required by the school as long as it would be beneficial for their children.

In the interviews, most of the participant teachers and parents focused mainly on three types of parental involvement (I use Epstein's (1995) typology here in this discussion): parenting, communication, and providing educational support for the children at home. These three types seemed to be more common than the other three types: volunteering, decision-making, and collaborating with the community. This chapter will focus mainly on one type of parental involvement: home-school communication. Helping with homework will be discussed more in the next chapter. 'Parenting' and the other less common types of involvement will be highlighted at various points in Chapters 8 and 9 they will also give more attention to the home-centred parental involvement activities discussed earlier in Chapter 3 (see Goos *et al.*, 2004).

Different themes emerged through the investigation of the participants' views on home-school relationships. They are as follows:

Theme 1: The need to move beyond improvised communication:
Sub-theme 1-1: Problems with current means of communication
Sub-theme 1-2: Social relationships and networks as sources of information
Sub-theme 1-3: More work is needed to improve home-school communication

Theme 2: The importance of quality issues in home-school communication:

Sub-theme 2-1: Low communication

Sub-theme 2-2: Regular communication

Sub-theme 2-2-1: More troubles, more communication

Sub-theme 2-2-2: Calling for help

Sub-theme 2-2-3: Communication as a way of monitoring

Sub-theme 2-2-4: Routine communication

Sub-theme 2-3: Effective communication

Sub-theme 2-4: Parents who know the "trade secrets"

Theme 3: Social positions and role distribution between teachers and parents

Sub-theme 3-1: Teachers' social position in the past and at present

Sub-theme 3-2: (Role distribution) Parents play complementary role while teachers play major role

7.3.1 Theme 1: The need for moving beyond improvised communication

Most of the teachers constantly expressed their wish for more organised and purposeful home-school communication strategies. They talked in the interviews about different means which they utilised in their communication efforts with parents. These tools included: telephone calls, letters and reports, school visits, 'open days' and a parents committee. Despite the availability of these means of communication, the teachers were more concerned with the low quality of communication between them and the parents. They highlighted some problematic aspects which seemed to affect their communication with parents. The teachers generally agreed that more work is needed in order to better use the available means of communication. They generally thought that it is important to go beyond the routine and 'improvised' practices in order to achieve more efficient home-school communication.

Sub-theme 1-1: Problems with the current means of communication

This sub-theme focuses on the teachers' views regarding the inefficiency of different means of communication which they used in their communication with parents. This sub-theme can be considered as an introductory theme which will

identify some ideas which will be discussed further in subsequent themes. These emerging ideas shed light on issues such as gender, power, and different types of capital which seemed to have an implicit influence on home-school communication.

Telephone calls

Telephone calls were considered by most of the participant parents and teachers as the most common and easiest type of communication. The teachers preferred using the telephone because it was more easily integrated into their circumstances (e.g. limited time and overloaded lesson schedules). The parents also preferred it as it seemed to be more suitable with their life circumstances. Telephoning was an easy solution for fathers who could not leave their work to visit school and it was also preferred by many mothers especially those who felt embarrassed about visiting schools administrated by male staff. Here, the social representations and gender elements seemed to influence the communication process. For example, Mother C (AVEL group) said: *"I don't visit the school, I usually call the teacher, as there are only men there, that's a problem. I don't know, like, I feel embarrassed to go there … it depends on the work schedule of my husband, when he is busy he calls from work, I can't go to school, I don't have a car and also there are only men there, so I prefer to stay in my own place!"*

For the same reason Mother E (ADEL group) – who worked as a teacher – said that she avoided visiting her son's school and preferred to write to teachers instead. She said: *"I prefer to write my comments in my child's textbook, as it seemed more useful, I can't go to the school because there are male teachers there."*

Father C (AVEL group) talked about how he prefers that his wife – who was studying education at the university – not be in direct communication with the male teachers in the school. He said: *"For us, a woman is not involved in issues outside the home … I'm the one who does the communication with the schools of my sons and also of my daughters; their mother calls the girls' school sometimes, but I'm the one who usually contacts the boys' school."*

Teacher K's comments were similar when he said: *"We have local traditions and conventions that must be respected."* Hence, mothers would usually expect that the school would call them only in problematic situations encountered by the child (i.e. injury, health issues, and serious academic difficulties).

Some teachers also mentioned that although they mainly depended on telephone calls in their communication with parents, they felt that this type of communication was inadequate for achieving the desired level of communication. For example, Teacher (J) said that, unlike face-to-face meetings, telephone calls did not give enough opportunity for both parties to have a thorough and interactive discussion especially when there is a need to discuss actual examples of children's work (e.g. tests, activities, grades etc). In addition, class teachers usually spend most of the day in classroom which they cannot leave to answer parents' frequent telephone calls. Although the school assigned specific times for parents to visit or call teachers, most of the teachers felt that many parents seemed to be unaware of these arrangements or *"they just call when it is convenient for them"* (Teacher A). Some teachers said that parents often call them at 'unsuitable times' (e.g. calling teachers during lessons or calling teachers after school on their mobile or home numbers) which can be quite annoying and inconvenient for teachers.

Letters and reports

Communication through letters and reports was considered by the participant teachers to be the second most frequently used type of communication. This process included writing notes on homework sheets, weekly plans, and grade reports by both parents and teachers. Parents were regularly requested to sign and write their comments on homework sheets. The main problem highlighted by the teachers was that parents often did not sign or write their comments or that they did not return papers to school on time. Some teachers were also concerned about the content of the comments written by the few responsive parents. Some teachers said, for example, that parents' comments seemed to be around 'less significant' issues such as expressing their thanks to the teachers or wishing more success for their children. They rarely included noteworthy comments which would provide the teacher with novel ideas such as: providing suggestions, offering new teaching ideas, writing about their child's performance at home, or alerting the teacher to aspects which needed more

attention. The issue of the content of parents' comments will be discussed in more detail later in a sub-theme which discusses the most effective type of communication. What is important to note at this point is that the topic of parent-teacher communication content will be later connected with the issue of cultural capital (e.g. parents' educational level, pedagogical experiences, personality and familiarity with school milieu) which seemed to influence the level of written and oral communication between parents and teachers.

Parents' visits to the school

The teachers generally welcomed parents' visits to school as these occasions could allow for more direct communication between them. However, again the teachers highlighted some problematic aspects with this type of communication. For example, some teachers said that they felt annoyed when parents surprised them by visiting them in their classroom without prior notice. These unexpected visits can cause some problems for the teacher such as interrupting lessons, perplexing the teacher and giving him a sense of being under surveillance. The teachers generally preferred to meet parents at a specific time outside the classroom.

Interesting stories emerged on the topic of parents' visits to school, which will be discussed in further detail later. What can be said at this point is that these visits are used by some parents as opportunities to obtain direct information about the teacher and their children in the actual context of the classroom. These visits are utilised by some parents as an opportunity to monitor the teacher and their children, to demonstrate their interest to the teacher, and / or to increase their power or to get more assurance as to what is happening within the school.

The open day

Most of the teachers considered the 'open day' event as the main organised event which provided opportunities for parents and teachers to have close contact. During this event, parents are usually offered a brief summary about their child's academic and behavioural progress, noticeable strength and weakness points, and suggestions for advancing their skills and abilities. Parents can ask questions and discuss their concerns with the class teacher.

However, some teachers said that the open day event offers very limited time for each parent, which undermines the option of teachers and parents having in-depth discussions. In addition, some teachers said that these meetings lacked privacy because parents and teachers talk in a room full of other parents waiting for their turn. This circumstance may cause some embarrassment for parents who have children with behavioural or academic difficulties as they might not want everyone to know about them. Some teachers mentioned other problems related to the timing of open days. For example, teachers preferred holding the open day events during mornings as they did not want to come after school hours. However, a morning schedule may not allow some parents to attend this event because they cannot leave their work and go to the school. Some teachers also talked about the difficulties encountered when relatives attended open days on behalf of parents. This situation was problematic because it does not allow the teacher to meet those who directly supervise or who are responsible and concerned for their children. Another point raised by some teachers was about how some parents seemed to find difficulties in understanding the educational issues discussed by the teacher as they themselves lacked educational knowledge or experience.

As I wrote earlier, this sub-theme served as an introduction. The above aspects will be revisited again with more elaboration in subsequent sections. We will see for example, how the issues of educational, pedagogical and linguistic capital play a significant role in parent-teacher discussions during the open day event. We will also see how the sense of embarrassment or shame of some parents can contribute to their reluctance to visit the school.

Parents' committee

The case study school participated in the PCP project (the Parents' Councils Project which was discussed earlier in Chapter 5), so I asked the teachers to talk more about it. Of note, the teachers often used the word *committee* instead of *council* during the discussions. They said that in their school, the theoretical goal of the parents' committee was to encourage some parents to cooperate and to provide support and assistance to school administration. However, based on what the teachers said in the interviews, I found that this goal seemed to be not fully achieved in reality.

The participant teachers generally thought that the parents' committee could play an important role in assisting the school in implementing changes which in turn could lead to a positive influence on children's schooling and education. However, in reality the school does not seem to give the committee a real chance to engage in discussing critical educational issues such as improving the quality of teaching and learning. There were number of obstacles which seemed to get in the project's way. One of these issues was that some parents (especially those who were more educated) felt quite intimated by the imbalance of power between them and the administrators. Some teachers (e.g. Teacher E) talked about how some parents (e.g. a retired principal and an engineer) expected to have some degree of authority through their participation in the committee. In reality however, the school principal seemed to treat these parents in the same way which he treated his staff (e.g. seeking to control them instead of seeking their collaboration).

In addition, some teachers suggested that there is a need for more clarification of the roles and responsibilities of the parents in the committee so they both can know their rights and duties. Some teachers said, for example, that parents and teachers in the committee do not know exactly what their roles are and how they can work together to achieve well defined goals related to urgent issues. Hence, it would be hard for them to implement changes if they do not have clear plans and organised structure. Teacher A said in this respect: *"There is no clear definition for parents' roles in this committee; there is a great deal of conflict between the work of school committee, administration committee and parents' committee. Parents are not given a chance to make decisions because no one knows what their exact roles in the committee are."*

In addition, Teacher D felt that the school administration should take parents' views and suggestions more seriously and not merely as '*some kind of decoration*' to satisfy the new Ministry of Education regulations. He continued by saying: *"Parents' committee can be seen as a good idea only when it is being utilised more effectively, this depends on the school administration, in our school, I think that this committee is like a décor, its decisions need more activation, if the committee wants to achieve something they should focus on serious issues ... parents are not keen to participate because they feel it is useless."*

Some teachers pointed out that certain groups of parents seemed to be more likely participate in the committee or to take more active role in it. This more preferable group mainly included fathers with average or advanced level of education. Mothers in general were reluctant to participate, probably because of social reasons mentioned earlier in Chapter 6. What can be inferred from the teachers' interviews is that they preferred to engage fathers with higher educational qualifications as they thought that they would be more likely to understand school regulations and strategies as opposed to the less educated parents. For example, Teacher E said: *"The previous committee was better as there were more educated fathers with different expertises, in contrast with the current committee which mainly included less educated fathers"* (Teacher D and Y had similar opinions). The current committee was described by Teacher D as *"worse than the previous one"*. This increase in the number of parents with lower educational achievement levels in the committee seemed to be a result of the withdrawal of the more educated parents and not from school recognition of the importance of their participation. Teacher S was concerned that giving more authority to parents and allowing them to be involved in decision-making would increase the workloads of the already over-stretched teachers.

Policies

Most of the teachers called attention to the reality that there was a lack of higher-level policies and efforts which would encourage, organise and support initiatives in the area of home-school relationships. Some of the teachers said, for example, that sometimes the Ministry of Education's inspectors and officials who visited the school highlighted the importance of creating strong home-school relationships. However, their calls seemed to remain as slogans with little implications in classrooms probably because those inspectors were quite remote from the real circumstances of classrooms.

Other teachers talked about their lack of training on home-school relationships (e.g. pre- or in-service workshops and courses). Interestingly, some teachers (e.g. Teacher J and K) said that after participating in the project they became more aware of the importance of this area which seemed to be often overlooked for different reasons. Some teachers also emphasised that current practices in home-school relationships area seemed to lack organisation and structure. There were few programmes which aimed to introduce new ideas to encourage

teachers to designate more time and efforts for improving their communication and promoting their relationship with parents.

Sub-theme 1-2: Social relationships and networks

Another important type of communication was mentioned by some parents and teachers in the interviews (especially those who were living in the same village). They talked about how their interactions in social activities (e.g. attending daily prayers in the mosque, attending lectures in religious events, marriage parties, funerals, shopping etc.) and how their social relationships (e.g. kinship and neighbourhood relationships) were considered as a good source of information which allowed them to know more about each other. In the interviews, I found that many parents, teachers and children were either relatives (e.g. they shared common family names) or neighbours. They were generally acquainted with each other outside of the school. I also found, through asking the children in focus groups and through looking at the register, that most classroom children were relatives (most of the children belonged to three main families). Teacher S said: *"Almost all of the children belong to related families, almost similar families, in every classroom you'll find cousins."* Father F said: *"I know most of the people in the village, probably 75% of them; we are all relatives or acquaintances."*

These dense social relationships seemed to allow teachers to know more about their students' families, their backgrounds and their circumstances. Teacher J, for example, said that living in the same village as his students has facilitated his communication with their families and made him more aware about their circumstances and characteristics. He said: *"This allowed me to know whether that particular parent is able to help his child or not ... I would give the child more attention and care when I feel that the circumstances of his family do not enable them to give enough support for their children."*

However, this close relationship between parents and teachers can sometimes affect teachers' authority as it could complicate the formal boundaries in teacher-student-parent relationships. For example, some teachers and parents talked about how conflicts or intimacy connected with kinship relationships (between children's families and teachers) outside the school can further

complicate their relationships in school. For example, some parents (e.g. Fathers J and F) implied that it might be quite embarrassing to criticise or complain about a teacher who was also a relative as doing so may have a negative effect on their personal relationships outside school. Similarly, some teachers (e.g. Teachers E and D) said that they avoided intervening when a related parent or child was involved in problematic situations in school. They thought that their intervention would put them in a situation where they might be considered by other people as biased towards their relatives. Teacher Y – who lives in another village – said that he preferred to work far from his village because this circumstance made him feel more objective in dealing with his students and their parents. This set-up also kept what he called an "informal distance" between him and the families. This informal distance would allow him to gain more respect from parents as well as avoiding the bias problem encountered when dealing with related parents in school.

Some parents mentioned that their social relationships with teachers and other individuals in their community have allowed them to know more about what was actually going on inside school. For example, parents often talk with other people in the community about their children's school and their experiences with different teachers. In these informal discussions, parents may drew on their previous experiences and recommend a particular teacher for other parents' newly enrolled children or may advise against another teacher whom they considered as incompetent. Some teachers seemed to be aware of this issue. Teacher K for example said: *"Some parents give a good reputation for the hardworking teacher. These ideas circulate between them; I noticed that some parents insisted on enrolling their child in a classroom of a particular teacher who has a good reputation."*

Teacher D felt that his good reputation in the village had encouraged many parents to enrol their children in his classroom. He said: *"Some parents brought their children to school and said to me 'enrol our child in your class'. They chose a particular teacher because they have a certain belief ... some parents would think that another teacher is not teaching (well), so they try to avoid these types of problems."*

Teacher S – who lived away from the village – said: *"Anything you do as a teacher in the classroom can spread to the whole family. This makes you very*

cautious in dealing with children, you deal with them with great care and use specific cultural norms in order to keep yourself out of trouble." Here, he was talking about how he avoided criticising children who chanted some religious songs in the classroom as he thought that this might be misinterpreted by parents who, for instance, might consider him to be against their religious sect.

The parents gave interesting views on the topic of social networks. For example, Father F (AVEL group) gave detailed examples about how he managed to obtain information about school from his widespread social networks. He worked as a school security inspector in the same school area and lived in the same village. He seemed to have multiple social relationships with people in the village as well as with teachers and security staff in his child's school and other schools. During the interview, he constantly tried to disclose his knowledge about what was going inside the school. He kept using the word 'I heard that' and 'they told me that' as illustrated in the following quote: *"What I have heard about Teacher J, frankly, what I have heard about him and about Teacher D is that they are the best teachers in Year 1, that's what I heard from most people in the village. I also heard from other parents and also from school staff, teachers and security staff that the school administration is often inefficient in controlling their students and their teachers."*

I talked about the issue of social relationships and networks with other parents. In contrast with other parents, Father D (ADEL group), as well as other ADEL parents who participated in the interviews, seemed to depend less on obtaining information through social networks outside the school. He argued that depending on what other parents said can be totally different from experiencing the situation yourself. He said: *"People nowadays rarely depend on what other people say regarding that teacher or that classroom. What I believe is that everyone should be convinced with his own experience with the teacher; the parent would not care a lot about other people's children, all what he (or she) cares about is what happened to his child. If the outcomes of his child were good, then this will give him a good impression about the teacher, if the outcomes were bad then the impression will be also bad."* It seemed that the ADEL parents depend more on social networks with other teachers and administrators inside the school.

Children as information sources

The participant parents talked about an additional source of information which they utilised as a means to learn more about their children's school life. Parents from the three groups (BEL, AVEL and ADEL) often talked about how they asked their children – and other students in the classroom - about what happened during the day at school. Here are two examples:

" (The child) chats with me after school in our way back home and for example he talked about how he did this and that, he is quite frank, he might say I didn't answer that question or I didn't finish that exercise, or the teacher did not engage me" (Father D, group ADEL)

"I often asked (the child) about what the teacher said to him in certain situations: did the teacher give you a chance to write on the whiteboard? Did you answer? Did someone laugh about your answer? What did you feel when they laughed at you?" (Father C, AVEL)

Sub-theme 1-3: More work is needed to improve home-school communication

The teachers and the parents often expressed in the interviews their recognition of the importance of building strong relationships and communication channels between home and school. They often used in this regard an Arabic word (mo'ta'ba'a) which means 'continuous communication' as well as using other words such as 'partnership' and 'connections' as synonyms for the word 'involvement' when they talked about home-school relationships and parental involvement issues.

Here are some examples from the parents' interviews regarding their awareness of the importance of maintaining good communication with the school:

"Both school and parents should work together, if one of them cares for the child and the other neglects, then this is obstructive" (Father E – AVEL group)

"If you (in school) and we (at home) did not communicate with each other then this can create problems because we don't know what the child does in school" (Mother B – AVEL group)

"Cooperation between home and school is important, it's like parts linked with each others: parents, family, school, and the child himself ... it is not just the responsibility of school" (Mother E – ADEL group)

The parents generally expressed in the interviews their satisfaction with the current level of communication between them and the teachers. Probably, as mentioned before in Chapter 6, this satisfaction was a result of the participant parents already demonstrating a good level of involvement in their children's education and they were also regularly communicating with school. It also appeared that the parents tended to make the first move toward the school to initiate communication.

The teachers also generally recognised the importance of building strong home-school communication but at the same time they seemed to concentrate more on their teaching responsibilities. They considered communicating with parents as an additional responsibility. The teachers generally acknowledged that more work should be done in this area. Some teachers also mentioned that they felt that there was a gap between home and school and that the responsibility for bridging this gap is divided between parents and teachers. Other teachers felt that they hold more responsibility in instigating better communication between them and the parents. Parents, in their point of view, seemed to be recipients of initiatives provided by school rather than instigators:

Teacher K, for instance, gave a brief description about the current situation saying: *"Previous attempts which aimed to enhance the connection between parents – or families – and school were slow, instead of developing them to be practical and active they became formal and traditional ... we don't have clear policies or organised schemes, all what we have is improvised and traditional communication."*

Teacher A similarly said: *"I feel that there is a gap in communication between parents and teachers ... there is a big inefficiency in this area, because we don't have a clear strategy which can guide us to know how we can benefit from*

parents, what are the limits of this benefit and how can we avoid exploiting them."

Teacher J said: *"[My] communication with parents is quite weak; I should create more planned initiatives ... The communication area is like a negative aspect in my practice which needs more attention I need to give parents more information and to encourage them to give more suggestions."*

Some teachers provided different justifications for their limited efforts in encouraging home-school communication. They mentioned obvious reasons (which were also used to justify insufficiency in other aspects of teaching practice) such as time pressure, workloads, and high number of students. Other teachers highlighted less visible aspects which could increase difficulties in home-school communication. These aspects can be summarised as follows:

Parents' diversity in terms of their educational and socio-economic backgrounds could add more complexity to the communication process. Parents have different levels of understanding, expectations, resources and school experiences. This circumstance may lead to different interpretations of ideas or messages which teachers send to them. Teacher Y, for example, produced a workbook which included extra exercises for home revision. He wanted to sell that book to parents so he could use the money to buy some teaching materials. Some parents agreed to buy the book while others refused because they thought that it should be distributed for free. The teacher felt he was being accused of financially exploiting the parents so the whole idea was cancelled. Teacher Y talked about how encouraging more parental involvement can be interpreted by some parents (or other teachers) as some sort of exploitation which he described as *"throwing teacher's responsibilities on them".*

Some teachers (e.g. Teachers K and A) indicated that they preferred to spend more time on one-to-one work with children who needed extra support in academic or behavioural areas instead of involving their parents. These teachers thought that if they allowed parents to intervene it would add more complexity to their work. For example, explaining children's problems and seeking support from parents would require more time and effort from teachers. Instead, they preferred to spend this time and effort on more individual teacher-student work. In addition, some teachers indicated that they do not have enough

time to explain every little detail to the parents of these children. Some parents may not understand well what the teachers want to say or what teaching strategy they want them to use at home. Teaching the parents how to teach the children would create more additional work for teachers.

Some teachers thought that increasing their level of communication with parents might encourage parents to increase their demands on the school which would in turn lead for more work for the already overloaded teachers. More importantly, this increase in parents' demands and interventions might have a negative impact on the level of teachers' power and authority in the school.

7.3.2 Theme 2: The importance of quality issues in home-school communication

This second theme focuses particularly on the quality and content of home-school communication.

The presentation of this theme is structured around three levels of communication (low, regular and effective) identified by the teachers during the interviews. The presentation of these three levels of communication includes a discussion of different issues such as:

- Reasons for some parents' lack of communication
- Situations which cause more home-school communication
- The content of parent-teacher communication
- Teachers' perceptions about more effective communication practices
- Different communication strategies adopted by different groups of parents

The participant teachers often talked in the interviews about the variations in parents' levels of communication with the school in terms of quantity and quality. According to the teachers, the quantity of communication was somehow not a major problem since most parents made contact with the school through attending open days or occasionally contacting teachers. Only a very few parents were considered to be completely distanced from the school. However, the teachers were generally more concerned about the content of the communication and not the act of communication itself. In other words, they

were concerned about what parents actually said to teachers in their visits or calls: that is, their questions, concerns, demands, suggestions, and expectations. In this regard, the teachers generally discussed three broad levels of parental communication which can be summarised in the following points:

- There was a small group of parents who rarely communicated with the school and often ignored the school's invitations and requests. Although those parents were generally concerned about their children's academic success, there were different factors which might hinder their regular communication with the school.

- Most parents tended to communicate with the school in regular or routine ways. They visited the school or called teachers on a regular basis. However, the quality of their communication did not satisfy teachers as they often focused on "narrow scope" issues. The information in this type of communication often seemed to flow in a one-way direction (from teachers to parents) and not in the other direction (from parents to teachers).

- A small group of parents was described by the teachers as communicating more effectively as they shared information with teachers (i.e. two-way flow of information), shared responsibilities with teachers and played a more active role in supporting their children's education.

These three types of communication are discussed in more detail in the following sub-themes.

Sub-theme 2-1: (Low communication) *"Parents who distanced themselves from school have their own reasons"*

The teachers talked about a small group of parents who rarely made contact with teachers or even avoided communicating with them. Most of the teachers generally considered the lack of communication among this particular group of parents as not necessarily a sign of lack of interest in their children's success, but rather a sign of difficulties in their life circumstances. Teacher A said in this

regard: *"Parents who distance themselves from school or those who rarely communicate have their own reasons ... You can't find a parent who doesn't want his child to learn, it is impossible to find a parent who is not concerned about his child's success, but yet there are issues which may discourage some parents from giving enough attention to their children. It is not about the parent being poor or rich, educated or uneducated; the one who really cares about his child will know how to take part in his child's education."*

Economic hardship was seen by some of the participant teachers and parents as one of the main causes for parents' lack of communication. They indicated that many fathers in the village worked in low income jobs. They were also the main breadwinner for their large families since most mothers were housewives. As a result, many fathers had two jobs or worked overtime in order to increase their income and to support their families. Therefore, some fathers would be unable to communicate sufficiently with teachers. Mothers are usually responsible for taking care of children and other home matters and some of those mothers have many children as well as an inadequate education. This small group of mothers tended to have little communication with school. The gender factor (discussed earlier) could also be another factor which hindered some mothers from communicating with the school.

Teacher Y talked about an example of these parents with lower levels of communication. He said: *"Those parents are aware of the importance of education, but they are affected by strong economic factors. From my experience, some children are suffering because their families are financially poor; the financial aspects in this community have very strong influence on children's education".* Teacher D similarly said: *"[The] children's environment is not very encouraging; it is a very modest environment. It is economically and culturally poor."*

The lack of education was the second main reason highlighted by the teachers and the parents in the interviews regarding some parents' lack of communication. Teacher K talked about this aspect in detail. He said that some parents with lower levels of education wish their children to succeed academically, but they lack the necessary skills and knowledge which would enable them to communicate well with school or effectively act in their children's education. Teacher K said: *"[The] parents' ability to help their child is an*

important thing; the parent may be concerned and interested in his child's education, but he doesn't know what to do, he doesn't have adequate knowledge."

It is important to note, that although these parents – who have lower education or are at a lower economic level - do not communicate well with school, some of them are willing to provide better educational opportunities for their children; that is, opportunities which they themselves did not have in the past. Teacher K said for example: *"We can't say that the low educational and economic level will always lead to poor academic outcomes for children. Sometimes these circumstances would serve as a motive for parents to the continuity of their children's education and for achieving higher qualifications, it is a challenge for them to change their life circumstance."*

Some of these parents would compensate for their lack of involvement by using alternative strategies to support their children's education. These strategies might include enrolling their children in private classes, or seeking help from other people (e.g. siblings, relatives or teachers in their community) to take part in assisting the child with homework and even to communicate with school on behalf of parents.

Another reason highlighted by some parents (fathers F and J who talked earlier about the social network topic) was that some parents did not like to communicate with school because they felt embarrassed about the academic failure or behavioural problems of their child. Other parents did not communicate because they felt hopeless that their child would do well in school. Other parents did not communicate with school in order to avoid being blamed by the teachers for their lack of support or to avoid being held responsible for their children's low achievement. This point was highlighted by Father F who said: *"A parent may not want to come to school because he has a sense of shame of his child's failure; he would be embarrassed to stand on front of the teachers, looking at his child on one side and other people's children in another side. If his son is behind, surely he would be ashamed. I know some parents who would say 'why I should come to school and ask about my children?' Their teacher may say this and that (i.e. blame them), so it is better to leave the child (and not make any contact with the teacher). This parent doesn't want to listen to lectures, the only*

thing he wants is that his child passes and moves to another grade" (Father F, AVEL group).

The issue of blame was raised by Teacher E who used an Arabic word which means "roast" as he proudly described how he reprimanded some parents in the open day event. He said: *"There were 7 to 10 parents who did not sign or write comments (on the homework activities and reports), I roasted them in the open day and I told them this is a sign of their carelessness ..."*

Finally, some parents and teachers talked about a very small group of parents who abandoned their responsibilities regarding their children's education because they viewed teaching as not their responsibility but as the sole responsibility of teachers. Father E (AVEL group) said for example: *"Some parents think that their responsibility would be just to take their children to school, and the teacher should do the rest!"* Teacher E similarly talked about a father who rarely came to school:*"I can sense from the father's way of talking - when I chased him [to discuss certain issues] - that in his mind, like if he was saying: teaching is the teacher's job, end of the story! It's the teacher's job!"*

Sub-theme 2-2: (Regular communication) most parents regularly communicated with teachers but they often focused on routine issues

There was general agreement among the teachers in the interviews that most of the parents usually demonstrated a regular on-going levels of communication. The teachers meant by the word 'regular' that most parents visited school or communicated with teachers from time to time. The quantity of these visits or contacts varied among parents. Some parents contacted school every week or every month. Others did so occasionally or just attended open days or came to school for final grades reports. Although the teachers were quite concerned about the communication gap between them and parents (as discussed in the previous theme), they considered the parents' regular communication with school as generally acceptable because it would at least offer some opportunities for parents and teachers to come closer together and allow them to know more about the children in the two contexts of home and school. At the

same time, the teachers highlighted some problematic aspects which seemed to mark this level of communication.

The following pages present a number of issues addressed by the teachers and the parents on the topic of how parents who demonstrated regular communication often focused on routine issues and depended on one-way (school-to-family) flow of information. These issues are organised in the following sub-themes:

- Communication increases when problems happen
- Parents communicated more when they needed help
- Communication as a way of monitoring
- Content of communication tended to be around routine issues

Sub-theme 2-2-1: More troubles, more communication

The participant teachers and parents constantly gave examples of problematic situations which motivated them to communicate with each other. They pointed out in the interviews that communication between them tended to increase when problems occurred, and tended to abate when everything was apparently going well. Problematic situations which required more communication stemmed mainly from issues such as learning difficulties, behavioural problems, and health and safety. The increase of communication in these types of situations can be seen as normal. What was more interesting is that the parents and teachers rarely initiated communication in order to discuss positive aspects or to exchange information which could lead to a better understanding of the child. For example, most of the teachers indicated that they rarely talked with parents about ways of fostering their children's talents and abilities. They also rarely talked about utilising parents' personal expertise and personal knowledge about their children. The parents also did not seem to take the initiative to talk with teachers about their children or their personal knowledge.

Teacher A, for example, clearly said that the lack of communication of some parents does not concern him much as long as their children were not encountering real problems in school. He said: *"It is not an issue when a parent doesn't communicate with the school as long as his son doesn't have problems.*

More attention is given to the parent who has a problematic child and he himself is not cooperative. We care more for this type of parent."

Teacher Y talked about how parents of his students tended to communicate more with him in Year 1 which he described as a "testing period" which can give parents a general idea about how the teacher and the children were getting along. In other words, some parents tried through their communication with the teacher to solicit more information about their children and the teacher in order to gain assurance that their children were not facing any serious difficulties and to make sure that the teacher was acting in their best interest in the classroom. Once parents reached this sense of assurance then they would gradually reduce their communication with the teacher. In addition, the parents' increased sense of assurance can generate more trust in the teacher which can subsequently lead to an increase in his authority as well as an increase in his share of responsibilities. Teacher Y said in this regard: *"Parents' communication with the school is stronger in the first year, but this communication may decline gradually in the next few years, maybe because parents by that time would manage to create a general image about their children, the classroom and the teacher. Thus they then would give all authority to the teacher ... You as a teacher would accept this responsibility, but the parent is also supposed to take part and to communicate with the teacher, not just in the first year. The child might be excellent in Year 1, but then he academically declines."*

The teachers also talked about another small group of hard-to-reach parents who did not communicate regularly with teachers or did not even reply positively to the school's requests or calls. However, these parents would "run quickly" to complain about the teacher (e.g. if he became rude or punished their children) or about other children regarding bullying or quarrelling situations. The teachers criticised these parents, not because they were concerned about their children's wellbeing, but because they did not engage in productive communication in normal situations (e.g. they ignored the teacher's requests for more communication in non-problematic situations) and intervened (sometimes recklessly) when problems happened. Teacher A considered this group of parents as *"[they] do not know how to deal with the teacher."* He said: *"There are parents who do not know anything about their child, they don't supervise their child and yet they like arguing with the teacher. If you don't supervise your child, at least don't ruin his relationship with the teacher; don't create tensions*

between you and the teacher." Many other teachers and parents highlighted that those parents' way of dealing with teachers and their manner of talking with them can significantly influence the relationship between them and the teacher as well as the relationship between their child and the teacher.

It was not surprising to find that all the parents who participated in the interviews showed keen interest in the wellbeing and success of their children. The parents emphasised that the school should provide a good education as well as a friendly and safe environment for their children. In the interviews, parents with BEL and AVEL educational levels seemed to stress more the behavioural aspects while remaining quite silent about the academic aspects. Two fathers (C and J) consistently talked about their concerns regarding several behavioural aspects and explained how they intervened on many occasions and contacted the teacher in order to protect or defend the child. They used a tactful manner in these interventions as they tried to maintain a balance between their concerns about their children and their concerns about not ruining their good relationships with the teacher. Father C (AVEL) said for example: *"I always visit the school when my child is involved in any problem. Sometimes the teacher said when I visited him: 'we want the parents [of the other children who misbehaved] to come to school, not you! Your child did nothing wrong'. But you know teachers! They sometimes amplify issues even if it's not really important. They might punish the innocent child even if he did nothing wrong and I should be there to defend my child."*

In addition, Father J (BEL group) talked in detail about his frequent visits to the school as he intervened to defend his children as well as the children of other relatives. He aimed to achieve various purposes through his visits to the school. For example, he talked about how he wanted to: *"Know exactly who was the victim and who was the offender."* He also wanted to show teachers that he is not lenient and that he is ready to discipline his child if he was guilty. If his child was the victim, then the father would expect teachers to take action. Finally, Father J wanted through his visits to school to increase a sense of respect – or fear (as he put it) – in his child and to show his determination to the teacher. He said: *"I told the teacher, if my child made a mistake I will discipline him in front of you, so the teacher wouldn't say for example that I'm spoiling the child. I don't like my child to hurt others and I don't like others to hurt him. This would make my child frightened when the teacher says:' we will tell your father (about what*

you did)'. If my child did something wrong I would discipline him and not defend him because I don't encourage improper behaviour" (Father J).

Sub-theme 2-2-2: (Calling for help): Parents tended to communicate more when they needed help from teachers

In the previous sections we saw how some parents tended to communicate more with the school in problematic situations especially when they thought that these situations could have a negative effect on their children's wellbeing. Here, I will present another type of problematic situation where parents sought help from teachers in order to get solutions or clarifications about their children's academic difficulties. In this regard, the teachers talked about two scenarios. The first scenario is when parents called the teacher's attention to the fact that their child is facing simple academic problems (e.g. having difficulty in learning a particular reading or arithmetic skill). Here, the teacher might be able to solve this problem, through providing more individual attention to the child or giving him extra homework, with little or no help from parents. The other scenario is when the child faced more complicated academic problems or intense learning and behavioural disorders. Solving these problems would not be an easy task as it requires more collaboration and the involvement of different people such as the teacher, parents and a special education teacher. If this collaboration was not achieved then the teacher would have no other choice than to work independently with the child. However, the teacher may lack the necessary time, knowledge or experience for this type of individual work. This circumstance may reduce the chances for solving the academic problems of the child. Different scenarios loaded with different emotions could then emerge when the teacher fail to help. For example, parents might lose their trust in the teacher and instead blame the teacher, which in turn would cause conflicts between parents and teachers. Some teachers talked about how this situation created in them a sense of guilt which can be reflected in turn as negative attitudes toward their profession and toward their students' parents.

Some teachers (E, S, K and D) talked about how some parents communicated more with them in order to find solutions for their children's learning difficulties. This situation began when parents noticed that there was some kind of gap between their children and other children in their family or in the classroom. The

parents' anxiety and need for assurance would motivate them to approach the teacher and ask for clarification and potential solutions. Solutions for these problems – especially for the more complicated cases – would not be solely available in the teacher's hands. The collaboration of parents and the special education teacher along with the teacher is essential. The teachers said that they tried to utilise available skills and resources in order to provide individual assistance which can help these children to achieve better progress. However, solving complicated problems can exceed the individual capacity of the teacher. The teachers said that they expected parents to work collaboratively with them and to share the responsibility. They considered parents as a valuable source of information and support as they have a closer relationship with their children and can possibly provide more individual assistance for their children in a way which the teacher cannot. The teachers also said that they wished that parents would play a greater part in their children's learning beyond simply pointing out children's problems to the teacher or asking him for quick solutions.

In reality, however, not all parents are capable of meeting the above expectations of the teachers for different reasons mentioned earlier (e.g. economic and social circumstances, lack of educational or pedagogical experience). This group of parents - who wanted solutions but could not themselves help the child in school-like ways – may "overdose" their communication with teachers in order to attract the teachers' attention to their children's problems. For example, some parents may call or visit school frequently and ask the same questions about whether the child was improving or not and what the teacher did in order to help their children. The teachers would normally try their best to help these children, but doing so is dependent upon the available time and resources. Tensions between parents and teachers may occur when the teachers fail to achieve notable improvements through their independent work with the children. Teacher S provided an interesting example when he talked about how the situation mentioned above created in him a sense of guilt because he felt that he was seen by the parents as holding the full responsibility for the failure of the child. This sense of guilt had amplified his negative attitudes toward parents as well as towards the teaching profession itself. He said: *"My weakest point in my work is my relationships with parents, frankly. Although I'm confident in myself as a teacher. But I don't know. I don't like parents to visit or call. Frankly, I have a good relationship with the children; I treat them equally and I know their circumstances ... But when a parent comes*

to me and says: 'my child is weak, my child is this and that (i.e. complaining)', I feel like I'm responsible (for the child's weakness) despite the fact that I did all I could to help This issue made me dislike my job; the issue of dealing with parents, because it is a huge responsibility, it's my responsibility to teach the child. If he failed and I told his parents about it, his parent would call once, twice, three times, asking: did he improve? This really makes me dislike talking to them ... the problem is that the child is not improving though I tried all that I can, but there is a problem in his mind!"

Teacher E spoke in a similar way about this issue: *"Some parents ask for help which exceeds our ability. For example, a parent would come to the school saying that his child has a number of problems ... I can give some solutions, the parent asks for more, so I must double my efforts. The parent feels that his child is facing a problem which he could not understand (e.g. carelessness or inattention) which makes the parent asks the teacher for help. The teacher would give general solutions but cannot make a case study for each student."* This issue will be revisited again in Chapter 8 when I discuss how parents and teachers divided their roles and responsibilities.

After presenting some examples of parent-teacher communication regarding problematic academic and behavioural situations, the next sub-theme will focus on how some parents utilised their communication with the school as a way of monitoring teachers and their children in the classroom.

Sub-theme 2-2-3: Communication as a way of monitoring

In the previous sub-theme we saw how some parents tended to communicate more with teachers in problematic situations. Here, I will talk about another group of parents who used their communication as a way of monitoring the teacher and the children in the classroom. Some parents, for example, talked about how they thought that their visits to the school could increase their control over their children (e.g. reminding their child that he is being watched by them at home and in school). Other parents wanted to give teachers a positive image of themselves (e.g. showing their genuine interest in their children's education) and by doing so they would probably increase teachers' attention towards them and their children. Those parents were also curious to see for themselves how their children were being treated by the teacher, how they worked with other children

in the classroom and whether the teacher was really meeting their expectations. In addition, some parents wanted to achieve a sense of assurance that everything was going well through their communication. Teacher K, for example, explained how some parents "sneaked" into the classroom in order to see what was going on in the classroom. He said: *"Parents are not supposed to meet teachers in the classrooms, but they deliberately sneaked into my classroom to see what was going on. I think that they did this because they wanted to see the classroom environment; this can be something which makes them happy and also helps them to get a sense of assurance about the environment in which their children stay in for five hours a day."*

Father J (BEL group) talked at length about his frequent visits to the school. He explained how he used these frequent visits as a way of getting "live information" about his child and also to create stronger relationships with teachers. These relationships seemed to expand his ability to achieve certain goals which he, as a result of his limited educational experiences, could not have independently achieved. These goals included, for example, solving a problem or getting help from the teacher on academic and behavioural aspects. He said: *"I come to the school every week ... the teachers are bored of my visits [laughter] ... I feel that I have a voice in this school, because the teachers said that they were happy about my weekly visits ... I always joke with them and consider them as my brothers; I always smile and greet them. If I frown then they would say this guy has bad manners!"* In another point, Father J described his sense of educational insufficiency. He used an interesting expression *"like a sleeping person in a wedding party"* to describe his lack of certainty about what exactly was happening in school. The father did not want to rely on information offered by his child or by other siblings. Instead, he preferred to see things with his own eyes and to get information for himself. He said: *"I have to go to the school on a regular basis. Why? Because my children may not say the truth about what happened in school; they might cover up problems ... School staff sometimes told me: don't visit the teacher in the classroom. They are right, but I want to visit them during the lesson to see my son and to see the teacher. Is he taking care of the children, is he teaching them properly? I'm like the ministry's inspector. I don't want to be like a sleeping person in a wedding party ... I don't want to rely on what the teacher or the child or other people say .. What they say can be true or false; I want to see everything live by my own eyes!"*

Sub-theme 2-2-4: (Routine communication): Parents' often asked routine questions and gave routine comments in their communication with teachers

So far, different aspects related to the means and motives for parent-teacher communication have been presented. Now, I will extend the previous discussion by looking into the content of parent-teacher communication such as the central topics and concerns usually addressed within these contacts.

The teachers often indicated in the interviews that most parents tended to ask routine questions or give routine comments during their communication with teachers. For example, Teacher A said: *"Parents' responses and attendance at school in the open day event were excellent, 90% to 95% attendance. The problem is not with their attendance but rather with their understanding (of what the teacher says in these events)."*

Most of the teachers also said that parents tended to ask general questions in order to achieve some level of assurance about their child. For example, parents of high-achieving children would ask whether their children were still keeping up or not; parents of low-achievers would ask about their children's progress and about the teacher's efforts to overcome their problems. I found that most of the participant parents (AVEL and BEL groups) were more interested in talking with teachers about their children's behaviour in the classroom and their children's relationship with the teacher and other classroom children. Some parents even complained to the teacher about their children's naughtiness at home and asked him to put more pressure on them in order to make them listen to their parents.

The teachers constantly described the above mentioned type of parental communication as "routine", "formal", "limited" or "occasional". I asked some teachers to talk more about what exactly they meant by these words. For example, I asked Teacher K about the meaning of the word 'routine'. The teacher explained that by using this word he was not suggesting a negative connotation. What he meant was that some parents seemed to confine the content of their communication when talking with the teacher about their concerns regarding their children's difficulties without taking active and

constructive steps to work collaboratively with the teacher in order to solve these problems.

Teacher J also said that most parents did not give useful information or actively share responsibilities with him. The teacher explained the phrase "routine content", which he used during the interview, by saying that parents usually asked him broad questions such as "what is my child's progress level?" while in reality they could know more than him about their children if they observed them well at home. He said: *"Parents can utilise their observation of the child at home to discover problems which might be invisible to the teacher. Parents can discuss certain problems with the teacher; they can work together in putting forward solutions. You as a parent can observe your child and know his level and his problems if you understand how to do this."* The last phrase "*if you understand how to do this*" is connected with the parents' educational level, pedagogical experience or recognition of their role in this area. Teacher A similarly said: *"There are few parents who ask useful questions; most of their questions focus on routine issues such as their children's level of achievement or about problems that happened in the classroom ... parents (in this community) seemed to emphasise behavioural issues and not academic issues."*

Some teachers also highlighted another aspect regarding the content of parents' written comments in school reports and homework sheets. The teachers often complained about the low rate of sheets returned to school and the absence of parents' written comments. These written comments can provide general feedback to the teacher about the homework. They also give him an idea whether the parents actually looked at their children's school papers or not. Here are some examples of what the teachers said in this respect:

"Most of the parents took the homework sheets and didn't return them. I urged them to return these sheets but they didn't return them." (Teacher J)

"There is some neglect among parents regarding our request for them to write comments on school papers. You give them a paper (e.g. a test) and wait to see their comments. Although I'm sure that they saw the paper, their children return the papers back empty without any written comments." (Teacher Y)

Teacher E considered the parents' written comments and signature as an indication of their level of attention to their children's learning and vice versa. He said: *"When parents do not sign school papers this can be a sign for their lack of attention. The father's signature indicates that he knows about the lessons which I taught to the child during the day; it means he oversees his child."*

There are some parents who regularly wrote their comments and put their signature as requested by teachers. However, their comments were still considered by the teachers as not very useful. Some teachers said that these parents often focused on showing some kind of courteous behaviour such as expressing their appreciation to teachers. They rarely commented on the educational content of the activity itself or provided additional suggestions which might be useful for teachers. Teacher K, for example, indicated that parents could have valuable ideas but they do not often write them down, probably because they faced some difficulties in expressing their ideas. He said: *"Parents' comments usually take a routine style, probably because the parent has an idea but he (or she) does not know how to articulate it properly. Instead of commenting on the content of the activity or the homework, the parent would express his or her appreciation to the teacher or wish him success (through writing some prayers)."*

Teacher Y extended the above idea by indicating that some parents might not want to cause themselves embarrassment by exposing their poor literacy skills to the teachers. Another reason was that some parents might not bother to write their comments if they felt that teachers were not reading these comments or not replying to their requests. Teacher Y said: *"I do not know why parents do not write their comments. Is it because they do not know how to write? Or because they are not aware of the importance of these comments? Are they really convinced that they should write it? Only a few parents write their comments! I think having adequate knowledge would be important because parents (who lack education) might not have enough confidence to write to the teachers; they do not have the skills to articulate their ideas well, so I think they feel quite embarrassed. In addition, we (the teachers) don't give much attention to their comments; we don't ask them why you didn't write your comments? So they might feel that we are quite lenient in this respect."*

Teacher A gave little priority to parents' comments, stating: *"Some parents write comments and some do not. The most important thing for me as a teacher is that their children complete the required task, even if their parents did not write comments. We read these comments anyway, but we have the choice of accepting them or not."*

A good example which can represent the above mentioned group of parents was Father J (BEL group). This father was the only parent who talked openly about his limited writing skills which he described as "broken and bruised". He talked about his embarrassment at exposing this weakness to the teachers – who were at the same time his neighbours and relatives. He said: *"Regarding the written comments, lying leads to failure (proverb). I have weak skills in writing and in expression, my writing is broken and bruised, but I can speak well, so I ask my daughter to write this and that (i.e. his comments)... I think that school papers should be written neatly; it is like writing a letter to a manager or an important person ... If I wrote it myself, the teacher then would not be able to read my handwriting, he might show it to another teacher, [and] this would cause me real embarrassment ..."*

Sub-theme 2-3: effective communication

So far I have talked about two groups of parents who seemed to follow two strategies of communication with the school. The first one included a small group of hard-to-reach parents who rarely communicated with the school. The second group included a high number of parents who tended to communicate more with the school but in a routine way. This final section presents the third group which included a small number of parents who were considered by the teachers as using more effective communication strategies with the school.

The scope of the communication of these particular parents seemed to exceed the previously mentioned routine aspects and show a more mutual relationship and two-way type of communication. This group of parents tended to provide useful information and additional support to the teacher as well as offering constructive suggestions which could help the teacher in enhancing his teaching practices. The teachers also looked at knowledge brought by these parents regarding their children and their performance at home as useful resources which could be integrated into classroom teaching. Parents in this group

seemed to draw on the academic knowledge and the pedagogical experiences of teachers as a resource which enabled them to achieve a better understanding about school matters and to know better about how to support their children's learning at home. In addition, the participant teachers seemed to be more accepting of this group of parents' interventions compared with the other groups.

This type of communication – identified by some teachers as 'the effective type of communication' – seemed to provide what was missing in the previously mentioned type of regular communication. Teacher K, for example, talked about this issue in some detail. He said that there are two types of communication between parents and teachers. He called the regular communication type - discussed earlier - as "nothing more than a call" in which parents would contact teachers to talk about broad issues, or to intervene or demand solutions for mainly problematic situations, or to show the teacher their general interest in the child and his education. The second type of communication was described by Teacher K as a "communication which leads to change". This type of communication was considered to be more effective as it focuses on clear issues of concern and has precise aims such as providing shared and practical solutions for a specific problem encountered by the child. Teacher K provided an example in which he talked about how mutual communication between him and a parent opened the door for significant academic improvement for a child who was experiencing learning difficulties. In the following quote Teacher K talked about how one of the fathers was concerned about his child's underachievement and how this concern motivated him to work collaboratively with the teacher to achieve better outcomes. He said: *"I noticed that some teachers looked bored when parents call them, especially when (the parents) repeated the same phrases, nothing more than a call! In contrast, some parents provided communication which can lead to change; they provided important information which can change things for the better. For example, I had a student (who had learning difficulties), and the mutual communication between me and his parent ignited the first spark for our cooperation, and gradually this cooperation helped the child to move from being a special education student to a child with very good grades. The parent was really amazed and often said: 'you have a magic stick!' And I replied humbly to this (praise) by saying that this progress was an outcome of our cooperation, because we were both honest, we had a plan, and we agreed to share the work … I worked with the child in the classroom on certain tasks and the parent worked on follow-up work at home and vice versa.*

This eventually had a positive impact on the child and his achievement" (Teacher K).

Other teachers (e.g. Teachers Y and E) gave similar examples about how the collaboration of some parents has led to remarkable improvements and success for their children. The participant teachers seemed to be in agreement that the effective type of communication usually avoids the flaws found in the regular type of communication. For example, the teachers highlighted general features of what they considered as effective communication. According to them, parents should:

- Comply with school regulations in terms of choosing a suitable time for their visits or calls, avoid surprising teachers by visiting them in the classroom during the lessons, and keep a reasonable time intervals between their visits
- Give attention to the teachers' comments and read carefully all school papers sent home (e.g. reports, letters and homework). They should always write constructive comments and return completed papers to school on time
- Show respect to teachers and avoid confronting them by using harsh language (e.g. blaming or complaining without in-depth understanding)
- Prepare well what they want to say before contacting teachers (e.g. choosing significant topics which are worth discussion with the teacher)
- Provide teachers with additional information about their children. Parents can obtain this information through their individual assistance and close observation of their children at home
- Provide teachers with moral support and motivate them to do their best (e.g. through encouraging and supporting new ideas introduced by teachers)

Teacher E provided a brief summary for the above points in the following comment: *"Parents should visit the school on a regular basis, choose a suitable time, and have a clear purpose for their visit. Some parents come to ask about something and then jump from one subject to another; they may waste a whole lesson talking about nothing! Or they visit you while you are teaching in the classroom and this creates many problems. Anyhow, when parents visit school they should made up their mind about which specific issue they want to talk about. The work, e.g. solving their child's difficulty with some learning aspects,*

should be divided between home and school, what the parent can do at home and what I can do in the classroom. This is better than when some parents come to school and say you should do this and that, you are supposed to do this." (Teacher E)

Sub-theme 2-4: parents who know the "trade secrets"

This final sub-theme focuses on three parents (Fathers A, D and Mother E – worked in the teaching profession - ADEL group) who seemed very different from other participant parents in terms of their relationships with the schools. The three parents showed a good deal of confidence and articulation during the interviews. They often considered themselves as very different from other parents as they were aware that their teaching experiences gave them what Father A called "the secrets of the trade" (i.e. wide understanding about education, school culture, how to teach their children and how to deal with other teachers). These parents seemed to use strategies which fit with the teachers' expectations of the above mentioned effective types of communication.

One of the interesting things which I found during the interviews was that Father A had taught his child's teacher (Teacher J) in primary school in the early 1980s. I thought that it would be interesting to learn more about their relationship. Father A showed a good deal of confidence; for example, he told the teacher that he has the right to come to the classroom anytime: *"I told him that I would come to school anytime, not just in the open day like other parents, I told him: 'forgive me if this burdens you as a class teacher, but these are the foundational years for the child'"*. He also said that he observed his child and learned about his characteristics at home. This knowledge helped him to correct the teacher's misunderstandings about the child by giving suggestions to the teacher to encourage the child to be more active in the classroom. He said: *"The teacher told me that my child was inactive in the classroom, I told him: I think you don't know my child well! He said: how? I said: I know my child he is very active at home, he always asks questions."* He then provided the teacher with some suggestions in order to make the child more active. He also talked about other situations where he intervened and gave the teacher some suggestions for teaching specific grammatical skills.

Mother E was also very self-confident and constantly pointed out that she is quite different from other parents. She said: *"As a parent I feel that I'm confident of myself, I think my answers would differ from other parents, my teaching experience would be an advantage because I know what schools want ... When I go to my child's school on the open day, they don't say anything new which I don't know about my child; I give more information than I take."* She also talked about how she gave suggestions to her child's teacher in order to improve his language skills. She said: *"I diagnosed my child and found that he had some difficulties in Arabic. I asked his teacher (female teacher) to use some of the learning materials which I produced in order to overcome these difficulties."* Finally, she talked about how her self-confidence and strictness has made her more powerful in front of the teacher. She said: *"It varies from one parent to another, but when I asked the teacher to do something, she will do it, because I'm strict. One day I had a problem. I didn't go to the headmaster; I went to the teacher in the classroom and said so and so. The way I entered the classroom has made her feel that I understand; teachers would fear parents who understand, she took good care of my child because she saw my strictness, she knew that I'm a teacher too and I understand, probably another simple mother would not get this attention."*

7.3.3 Theme 3: Social positions and roles distribution between teachers and parents

This theme focuses on the following issues:

- Teachers' social position has witnessed significant notable changes in the past decades. The issue of social position seemed to play a key role in shaping teacher-parent relationships
- The distribution of power, roles and responsibilities between parents and teachers can be influenced by the teachers' social status in their community and the parents' educational and pedagogical capital

Sub-theme 3-1: Teachers' social position in the past and at present

The participant teachers and parents talked in the interviews about changes in the teachers' social position in their community. The participants were generally

in agreement that teachers in the past had had higher social positions in comparison with those in the present. Nowadays, people view teachers quite differently. Some people still show respect and give high social status to teachers while others seemed to be more critical or apprehensive about schools and teachers.

The participant parents in the interviews and those who attended the parents' meeting (which was arranged as part of the project's activities) generally showed a good deal of respect towards the teachers. For example, they generally praised the teachers and avoided raising any issues which could be interpreted as blame or criticism. On some occasions, I felt that some of the participant parents avoided talking about negative aspects of the teachers' practice. That was probably because some parents saw me as a teacher or an insider who belonged to the school or because they suspected that Teacher J might listen afterwards to the interview tapes. In addition, the participant parents were already considered by Teacher J as "well-involved" and "friendly" (as discussed earlier) which possibly would explain why they concentrated more on positive aspects and somehow avoided elaborating on problematic issues. Nevertheless, some parents (from BEL and AVEL group) tended to be more critical towards other teachers and administrators in the case school. Their accounts were mainly based on what they heard through their social relationships with other parents in their community. For example, Father J (BEL group) talked with a lot of respect towards Teacher J in the interviews. He often said that he considered the teacher as "*a father, like a role model to children*". However, in later parts of the interview it appeared that he shared with other people a view which considered male teachers as less competent in comparison with female teachers. He said: "*People say that female teachers [apology] are better than male teachers, on emotional, moral and educational grounds. They are like mothers ... I think that there must be some good male teachers, but while they are good at teaching, I want them to be also good in encouraging good manners in their children, like encouraging them to respect their parents.*" Father F (AVEL) similarly reflected some people's apprehension towards male teachers. He said: "*In Year 1 I registered my child in another school which was administrated by female staff, but my child did not want to stay there ... I decided to move him to this school ... I called Teacher X and I said: but I heard some news that teaching in your school is not good. Actually, I thought that male*

teachers do not care like female teachers, but Teacher X said don't worry there are good teachers here, bring your child!"

Unlike the above mentioned fathers, Father D (ADEL group) - who worked as a school principal - seemed to be quite reluctant to accept what he called "unverified information" which circulated between people in his community. Instead, he relied mainly on his personal experiences which were created through direct interactions with the teachers (this issue is connected with the social network topic discussed earlier). He indicated that teachers in the past were given higher social position than today because in the past there were fewer educated people in society. He said: *"Teachers were well-respected in the society in the past because they were the only people who held the keys of knowledge. That made them the only resource of knowledge. Today, however, there are many other knowledge resources, [and] the teacher is no longer the only resource like before ... People still respect teachers, they still give teachers a special status, but surely not like their status in the past where they were the only source for knowledge, [and] the teacher was like an Imam [religious leader]. Today, there are many knowledge resources: computers, internet, books etc. Today's parents are more educated than before and this makes them more critical."* In addition, Father D thought that nowadays the number of incompetent teachers in schools is growing and this circumstance created negative social stereotypes towards teachers. He said: *"In the past, the whole society was illiterate so they looked at the teacher as a sacred person. Today lots of people in the society consider teachers to be weak or careless. In the past, teaching was like a sacred mission for teachers; today it is considered by some teachers as just a job, teaching to get money, without giving any sacrifices."*

The participant teachers seemed to be clearly aware of these negative attitudes towards teachers in the community. For example, Teacher S said, with a good deal of frankness, that: *"Parents do not know about teachers' huge responsibilities; they think that teachers are playing and not working, careless, [and] they take salaries without doing anything to their children, most parents have this idea about teachers."* Teacher K reflected on how some people in his village viewed the case school. He said: *"Our school is considered to be like a junk yard designated for punished teachers or those with a bad reputation, [almost] like an exile for the worst teachers."* Teacher Y also used the same label 'junk yard' to describe the school, but he considered it rather as a

destination for transferred children who suffered serious learning or behavioural problems. He said: *"I can describe this school as a junk yard which receives difficult children from other schools, even if we refuse to take them, we are forced to do so."*

In addition, the participant teachers said that they were not concerned too much by this common negative image about teachers in the society. Rather, they felt that most parents rewarded their teaching dedication with respect and trust. They felt that their society respected them because they cared for their students and also because they actively volunteered in religious and social activities in their community. For example, Teacher D said that he felt that teaching profession *"gives teachers high respect in the community ... Teaching gives more advantages than disadvantages; you would have a higher social position, people respect you more, they treat you differently and listen to what you say."* The other teachers also shared a similar view. Each of them talked about his voluntary activities (e.g. teaching in the mosque, working in the social centre, supporting charity work, and assisting sick people) and how these activities supported their social status in their community.

The teachers also described how well-known they were in their community, how their teaching profession added more social restrictions to their lives, and how this circumstance – positively or negatively - affected their reputation in their community. These ideas were all connected with the social networks topic discussed earlier. Some teachers gave interesting examples about the impact of the teaching profession on their social life. For example, Teacher J talked about how living with his students and their families in the same village has affected his personal life. He said: "*Your students see you wherever you go in the village, they see you as a real role model outside school and this would affect your demeanor. In the past I used to play handball in the village club, [and] it was OK for me to wear shorts and t-shirt and play in front of people, but now I feel embarrassed to be seen by students in these clothes [shudder]*". Teacher E similarly talked about how teaching profession can cause a lot of social restrictions, particularly on new teachers. He said: *"Being called a teacher would make you ten years older ... People in the community have certain expectations and ideas about what constitutes suitable teachers' behaviour ... You as a teacher are not supposed to do certain things such as laugh loudly with the guys, or going out with particular [naughty] people ... People give high respect*

to teachers, so they would be surprised when they see a teacher riding a bike or playing football; even if I joke with someone in the street someone would say: you are a teacher, you are not supposed to do such things, a teacher is expected to behave more wisely." Therefore, parents can easily become disappointed when they find that teachers did not meet their expectations in terms of professional or personal aspects. Such behaviour also can contribute to the parents' views about teachers as the main educators for their children. This topic will be discussed further in the next sub-theme.

Sub-theme 3-2: (Role distribution) *Parents play complementary role while teachers play major role*

This sub-theme focuses on how the participant teachers and parents perceived their roles and how they distributed the responsibilities of supporting children's learning between them. The data analysis generally indicated that the participant parents and teachers shared a view which assigned the main role to teachers and the complementary role to parents.

All the participant teachers seemed to view themselves as holding the main responsibility for their students' educational success or failure. Although they acknowledged the parents' role in some areas, they also implied that teaching is a task which can be done 'more properly' by teachers. Teacher Y gave an interesting quote which illustrates how some parents dealt with teachers in an 'old-fashioned' way. He said for example: *"Frankly, people in this area are quite simple, they don't like to impose their opinions on teachers probably because they don't want to interfere with the teachers' job, they deal with teachers as if they were still living in the 1950s!"*

Some participant parents and teachers indicated that the distribution of responsibilities between parents and teachers tended to be a flexible process. On the one hand, some parents gave more educational support to their child when they felt that the teachers' performance was less than expected. On the other hand, some teachers also tried to give more support to children who do not get enough support from their families, especially those from lower educational and economical backgrounds.

The teachers thought that they held three general responsibilities:

- Teaching responsibilities which include planning, using different teaching methods and learning resources, assessment, acknowledging children's individual differences etc. The teachers are also involved in non-teaching duties such as invigilation, covering lessons for absent teachers, administrative work, training, and committee work
- Creating suitable classroom learning environments for children. This includes organising the classroom's physical environment such as providing motivational learning materials such as games, books and computers as well as creating good relationships with the children, providing interesting learning experiences, and creating a safe and happy atmosphere
- Compensating for some parents' lack of involvement and supporting children from families with lower educational and economic backgrounds

It is worth mentioning that most classrooms in the case school, like most Bahraini primary schools, included more than 25 students, where teachers taught 20 or 22 lessons per week, and there were no assistant teachers available.

The teachers emphasised that the parents' role is mainly complementary to the teachers' role. They expected parents to fulfil various responsibilities which include:

- Overseeing their children's performance at home, providing help in homework tasks, learning more about their children's abilities, making sure that they have good level of understanding of what they learned in school, reinforcing this learning by giving more exercises at home, and teaching their children any concepts which they may not have understood thoroughly due to classroom conditions (e.g. classroom crowdedness or disorder)
- Concentrating on behavioural and disciplinary aspects such as encouraging their children to show more respect to their teachers and their classmates as well as following the school's regulations regarding absences, delays, school uniform etc.
- Monitoring teachers and taking action when they notice any inefficiency. For example, if teachers showed negligence or made mistakes then

parents should take action through discussing these issues with teachers or with school administration

- Communicating and sharing information with teachers more effectively (as discussed earlier).

There seemed to be good deal of similarity between parents and teachers regarding their views of roles and responsibilities. The parents in the three groups (BEL, AVEL and ADEL) viewed teachers as the main actors while parents play a peripheral role in their children's education. Parents' views about their roles and responsibilities focused on the following aspects:

- Providing general financial and emotional care for children
- Overseeing children's performance at home and in school
- Giving more attention to discipline and behaviour
- Communicating regularly with school and supporting teachers

Father D (the headmaster, ADEL level) said: *"I consider teachers as the cornerstone, why? Because they are the experts and the educators who are aware of their role; parents could be illiterates or do not have enough time to work with their children, as they are busy with work and business. Teachers are trained academically and educationally, They are aware of their role, they have plans and goals and therefore they have to take more responsibility ... They should enable others (parents and children) to carry out their roles more efficiently and raise their levels of aspirations and outcomes."* Father D thought that the parents' responsibility is mainly to: *"provide general care ... to provide financial and behavioural care, if they can provide educational help that would be an advantage, but it's not their duty to provide basic school education."* Father F (AVEL) also thought that teachers are more responsible for children's education. He said: *"The teacher's role, what can I say about this? His role is to teach the children; parents would do the rest, but teachers are more responsible than parents, because they sit with the children more than parents. They concentrate more on children and know everything about them such as their mistakes and their [level of] understanding."*

Some parents (e.g. Fathers J (BEL) and C (AVEL)) gave less attention to the academic role of the teacher and concentrated more on the emotional and behavioural aspects. They talked, for example, about how teachers should have strong personalities in order to achieve good classroom control and at the same

time they should maintain friendly relationships with their students. Father J (BEL) said: *"The teacher should guide and teach children, and encourage them to respect their parents ... respect is the most important thing, the ethical aspects. The teacher should avoid upsetting his students by beating or threatening them, as this would make children dislike school, and this creates troubles and embarrassment for teachers and parents."* Father C similarly said: *"The most important responsibility for teachers is to be kind with children, especially when children make mistakes caused by being confined inside the classroom for long hours ... Teachers should also search for the easiest ways of delivering knowledge to children because children's minds are not the same; they should show their forgiveness and kindness for children who couldn't understand quickly."*

Alternatively, the participant mothers, who were more engaged than the fathers in helping their children in homework and revision at home, seemed to have a stronger emphasis on the teachers' responsibility of creating stronger communication channels with parents through providing sufficient information and giving more attention to their needs and concerns. The mothers talked in this respect about their need for more information about their children's performance and about the teaching methods used in the classroom. Mother C said for example: *"The class teacher should provide us with more information about our child, his tests, his performance in the classroom ... We also want to know how the teacher teaches specific lessons because we don't know; our way of understanding is different from the children. We just see the exercises like this and answer them; we know the answer, but children understand things differently and need to be taught in a way similar to the teachers' way."* The issue of differences between home and school teaching methods will be investigated more in the next chapter.

7.4 Summary and discussion

This section provides a summary and discussion of the first findings chapter. This section is structured around the six research sub-questions presented earlier in this chapter. The answers to these questions will be joined with previous ideas presented earlier in the third chapter which focused on the literature on home-school relationships and parental involvement literature.

As I mentioned earlier, the main research question which guided this chapter was: **How do the participant teachers and parents perceive home-school relationships?**

This main question was divided into five sub-questions. These questions and their brief answers are presented below

S-Q 1: What are the available means of communication between home and school?

The research findings indicated that there were three common types of parental involvement found in the case school (based on Epstein's (1995) typology). They were: parenting, communication, and providing educational support at home. I found that other types of parental involvement, such as: volunteering, decision-making, and collaborating with the community, were less common in the case school. This chapter focused mainly on home-school communication. The next chapter will focus on 'providing educational support at home'. It is worth mentioning that most of the participant teachers and parents focused on school-centred types of parental involvement in the interviews (e.g. parental help with children's homework or communication with teachers regarding school issues). They seemed to overlook other types of 'family-centred' types of parental involvement (Goos *et al*,, 2004) such as parental engagement with their children in everyday activities at home which can involve authentic opportunities for learning. Thus, I think that the parental involvement model adopted by teachers in the case school can fit with the model which considers parents as supporters for school learning under the guidance of school and in school's terms (see: Townsend and Walker, 1998) and the consensus model (Cairney, 2000) where parents get information from teachers in order to fulfil school goals. The teachers often overlook the significance of children's homes as foundations and rich environments for learning.

Communication was considered by the participant parents and teachers as the most common type of parental involvement in the case school. The participant teachers and parents (regardless of their educational backgrounds) all acknowledged the importance of building strong communication and relationships with each other. The findings also suggested that communication

processes between home and school are complex and influenced by different social and cultural resources and circumstances such as power, gender, and social, linguistic and cultural capital These findings fit with previous studies (as discussed in Chapter 3) which suggested that parental involvement is multifaceted and complex. (These aspects will be discussed in more detail in the subsequent sections.)

The participant teachers talked about different means of communication used in school which included: telephone calls, letters and reports, school visits, open days and parents' committee. The participant teachers highlighted various problematic aspects with these means of communication and they were generally concerned about the communication gap between them and the parents. The participant parents however used the above communicational means offered by school as well as other informal information resources in order to get a clearer picture about their children and their progress in school. They mainly derived this additional information through social networks with other people in the community or through talking with their children. The issue of social networks will be discussed in another sub-question. What can be said here is that the issue of social capital (Bourdieu, 1986) was evident in this chapter. Different groups of parents tried to utilise different types of social relationships and networks to their advantage in order to increase their power position through gaining more knowledge about the 'regime of truth' used in school (Peressini, 1998).

S-Q 2: Are parents and teachers satisfied with the current level of communication?

Despite the availability of various communication means between home and school, it seemed that the participant teachers were generally unsatisfied with the current level of home-school communication. The teachers were generally concerned with the issue of quality and content of parental communication with them. For example, they often said that parents focus on routine issues, increase their contacts in problematic situations and rarely provide meaningful and useful information to teachers. Parents, in the teachers' view, often demanded action from them in order to improve children's schooling, but at the same time parents do not often collaborate or share responsibilities which can facilitate this improvement. This type of communication usually occurred in a

one way direction, such as teachers transmitting information to parents. This communication lacked mutual knowledge exchange or two-way communication between home and school (Hughes *et al.*, 2006) such as when teachers learn more about authentic learning practices taking place at home through shared interactions between parents and children in real everyday situations.

The participant parents highlighted various problems with the current means of communication and it seems that little has been done by school to improve them. Interestingly, the participant parents seemed generally satisfied with their level of communication with their children's teacher. As I mentioned before, this general satisfaction can be a reflection of the unintentional bias in selecting the participant parents in the interviews as all of them were already having good relationships with school and were already considered by the class teacher as involved and cooperative. I think that one of the limitations of this study was that no hard-to-reach parents with lower levels of communication participated in the interviews. It is worth mentioning that the participant parents often took the first step and initiated communication with teachers, while teachers seemed to be more focused on their teaching duties. The participant parents were very keen about their children's academic progress and wellbeing and that seemed to be the main motive for them to take the first step in their communication with teachers. It does not seem that they were invited or encouraged by teachers to initiate or to increase their communication.

S-Q 3: What kind of difficulties might influence the home-school communication process?

There were various difficulties which seemed to hinder home-school communication. Some difficulties were connected with school while others were connected with the families' circumstances.

The participant teachers mentioned numerous difficulties connected with the school which appeared to hinder their communication with parents. They included:

- Typical difficulties: such as time management, workloads, and dividing attention among the high number of children and parents with different needs and backgrounds

- Teachers' attitudes towards parental involvement: some teachers felt that their main job was to teach children and considered communication with parents as an optional or additional responsibility
- Difficulties with dealing with different groups of parents: the teachers indicated that it is difficult to deal with high number of parents who vary in terms of their education, social and economic backgrounds, pedagogical experiences, expectations and needs. This variation among parents could add difficulties for teachers who try to make their messages very clear in order to avoid any problematic misinterpretation by parents. This variation could also make some teachers biased to certain group of parents who share with them similar understanding and probably marginalise others who are not always consonant with school's expectations. This latter point is connected with the literature presented in Chapter 3 which focused on the issue of social and cultural capital (e.g. Bourdieu, 1986; Lamont and Lareau, 1988; Lareau, 2001). The participant teachers were in favour of communicating with the more educated parents who know how to 'speak well' with them and who know how to teach children in school-like ways. Other parents who did not have similar educational or personal skills seemed to be marginalised
- Prioritising the school's agenda more than utilising families' resources: the participant teachers often talked about parents as receivers of school information and as providers of support for teachers on school-like tasks at home. The teachers did not often take into account the possibility of utilising parents' resources and expertise. This point confirms Brown's (1993) about how schools sometimes view parents as agents of teachers at home. For example, in the parents' committee, the school was in favour of the participation of the more educated parents. Those educated parents felt reluctant to continue their cooperation because they felt that the school administrators were controlling them instead of seeking genuine partnership with them. These findings share similar difficulties mentioned by Warren and Young (2002) which indicated, for instance, that school staff sometimes do not favour parents' inclusion in the decision making processess
- Teachers' avoidance of more responsibilities: some teachers were reluctant to initiate communication or provide more opportunities for parental involvement because they were concerned that doing so would

encourage parents to increase their demands on the school. They also thought that the parents' interference would add more complexities to their work or increase their work loads. This point paralleled similar difficulties mentioned by Rhoda (1986). Some teachers were also concerned that giving more parental involvement opportunities can be interpreted by other people in the community as some kind of exploitation of parents and throwing teachers' responsibilities on them

- Lack of policies and initiatives which encourage stronger home-school relationships: the teachers generally indicated that there was a lack of clear and organised policies and initiatives in the area of home-school relationships. Some teachers thought that developing school relationships with families is a challenging task which should not be carried out by the teachers independently; it requires more support from school administrators and the Ministry of Education officials

This chapter also highlighted various difficulties connected with the parents' circumstances which influenced the school-home communication process:

- Most of the participant teachers wished that parents would be more considerate of school regulations and teachers' schedules. For example, they talked about how parents should choose the right times for their communication and return school papers on time
- Most of the participant teachers and parents indicated that families' circumstances can influence their communication with school. They highlighted numerous factors such as economic difficulties faced by some parents (long work hours, work shifts, large families, lack of transportation etc.), gender (mothers' embarrassment of dealing with male teachers, mothers do not participate in parents' committee although they are often the main supporters for children's learning at home), capital (educational level, pedagogical experiences, linguistic capital) and power. Parents who have certain characteristics (e.g. educated fathers who can regularly come to school and have the personal and linguistic skills to discuss educational issues with teachers in more depth) can have a more powerful position and voice in school. They are more in sync with school culture and more able to fulfil teachers' expectations. However, other parents (e.g. less educated parents who have economic hardships and who do not have the personal and

linguistic skills which enable them to convince teachers to listen to them and meet their demands) were quite reluctant to voice their concerns to teachers. For example they often did not write down their comments because they either lacked confidence in their writing skills or because they feared that teachers would misunderstand them and think that they are interfering in something which they do not understand. These findings confirm Lareau and Shumar's (1996) findings which indicated that parents' educational level, economic flexibility, social resources and positions of power could play key roles in shaping home and school relationships.

S-Q 4: What efforts were made to overcome these difficulties and to support home-school communication?

Although most of the participant teachers expressed their feeling of inadequacy regarding the quality of home-school communication, they did not take further action or develop new ideas or initiatives in order to improve their communication with parents. It generally appears that the idea of creating strong home-school relationships was not prioritised in the school's and the Ministry's agendas.

S-Q 5: Are there any variations among parents in terms of their communication with school? If so, how did they vary, and why?

As I argued earlier, it seemed that parents were usually the ones who took the first step in initiating communication with teachers. Teachers often focused their work on teaching duties and tried to compensate for the lack of involvement of some parents through giving more individual attention to their children in the classroom. Sometimes teachers initiated communication with parents regarding serious problematic situations related to their children' achievement, behaviour or health. It seemed that there were few opportunities for parents and teachers to communicate regarding more positive issues such as finding ways to develop children's talents, or exchanging knowledge with each other.

Parents' levels of communication were categorised into three broad levels as follows:

1) A small group of parents had a very low levels of communication with school. Their lack of communication does not necessarily mean that they were unconcerned about their children's success. There were different factors which hindered them from building constructive relationships with school. Some of these factors were mentioned in the answer to Question 3. In addition, most parents who did not communicate adequately with school often had low educational levels or had difficult socio-economic circumstances. This does not mean however that all parents who lack education do not communicate adequately with school or are not involved in their children's education as some of them tried to utilise alternative strategies to compensate for their lack of direct involvement or direct communication with teachers. For example, some parents asked elder siblings to help younger ones and also asked other relatives to communicate with the school on their behalf. Some parents highlighted notable factors which hindered some parents from communicating with school such as parents' sense of embarrassment and avoidance of being blamed by teachers regarding their children's academic or behavioural problems.

2) Most parents belonged to the second group of parents who communicated with teachers on a regular basis. These parents tended to focus on routine issues in their communication with teachers and mainly intervened in problematic situations. Their communication tended to be of one-way (school to home) type. They usually received information from the school but rarely exchanged information about their children's performance or interests at home. The teachers thought that this type of communication was quite acceptable because it is better than nothing. At the same time the teachers felt that in this type of communication parents do not often share responsibilities with teachers. They ask for solutions but they do not engage by providing essential help which could increase the chances for achieving successful results. If they do not adequately engage and the teacher failed to fulfil their expectations then this might create tension, mistrust and disappointments between parents and teachers.

3) A small group of parents was described by the teachers as communicating more efficiently. These parents are usually more educated and have some pedagogical experience. They were considered to have better communication with school as they share responsibilities, work together with teachers, and exchange information with teachers in a two-way mode of communication.

These parents do not just ask for help or talk about their children's problems; they take action and divide the work between them and teachers. This type of communication shares some features with the knowledge exchange idea and two-way communication proposed by Hughes *et al.* (2006).

This group of parents seemed to have the essential social and cultural capital (e.g. strong relationships with teachers, high educational level, pedagogical understanding, and similar discourse) which allows them to achieve this level of consonance with teachers' expectations. I asked the participant teachers to provide examples of their experiences with parents who belonged to the third group. It appeared that most of these more active parents either worked as teachers or had some educational experience (e.g. through participating in religious schools). The teachers generally seemed to be more in favour of this group of parents while the other groups who do not have similar capital seemed to be somehow marginalised. In the project I tried to utilise the initial form of these findings by providing more opportunities for parents from different educational backgrounds to express their ideas for us (the class teacher and me) through encouraging them to write comments in feedback sheets, to attend a collective meeting, and to participate in individual interviews. Their ideas were then utilised in mathematics lessons. I found that interviewing parents was very useful in eliciting their views, concerns and needs. I think that if teachers interviewed parents systematically then this can open more ways for knowledge exchange and hopefully would lead to more understanding between them. In Chapter 9 I will revisit this issue through discussing parents' responses regarding the project's mathematical activities. The participant parents from the ADEL group seemed to be quite distinctive in terms of their relationship with teachers and their educational experiences. They utilised their knowledge and familiarity with school culture to create special relationships with teachers. In these relationships they tried to create a balance between showing respect to their child's teacher as well as providing suggestions and constructive criticism. These parents also seemed to have social networks with other teachers which allowed them to achieve their goals.

Other parents in the AVEL group who participated in the interviews tended to use the regular type of communication as they focused more on routine issues and concentrated on behavioural aspects more than academic aspects. They also tried to create good relationships with teachers which would allow them to

have a better position and voice in school. They tried to avoid any kind of criticism towards the class teacher and usually asked him for help and increased their communication with him in problematic situations. They also did not tend to give further suggestions or give comments which could be directly connected with the teacher's work. They avoided any actions which could be misinterpreted by the teachers as negative criticism or blame which could subsequently affect the teacher's relationships with them and their children.

The only parent who belonged to the BEL group and participated in the interviews was quite distinctive as he tried to compensate for his lack of education through using alternative strategies such as creating friendly relationships with school teachers and administrators, paying frequent visits to school, surprising the class teacher through visiting him in the classroom in order to get more information about what is going on. He also oversaw his children's homework and asked elder siblings to write his comments on activity sheets.

This chapter also highlighted interesting issues in connection with power distribution between parents and teachers. I found that the teachers were not always powerful and the parents were not always powerless. For example, parents in the ADEL group seemed to have more power because they had adequate pedagogical knowledge and influential social relationships inside school which allowed them to approach the class teacher and offer their suggestions and even their criticism. Parents from other groups (AVEL, BEL) also tried to gain more power through utilising indirect strategies. For example, we saw how some parents have utilised information derived from social networks to get a rough evaluation of teachers in school and how they can spread good or bad reputation about certain teachers. The teachers were also aware that anything they do inside the classroom can be transmitted in one way or another for the whole community and that made them more cautious in the way they dealt with their students. Father J (BEL group) had a good deal of power as he utilised his friendly relationships with the administrators in order to solve his children's problems. He also wanted to gain more power through monitoring the class teacher and surprising him in the classroom. Some parents tried to increase their power through utilising their kinship relationships with some teachers while others seemed to find that this kinship can hinder them from criticising or complaining against their relative teachers. These ideas seem

to fit with Todd and Higgins's (1998) ideas about how parents and teachers can experience power and powerlessness in different ways.

S-Q 6: How do the participant parents and teachers define their roles and responsibilities in terms of supporting children's learning?

The third theme presented in this chapter has centred on parents' and teachers' views about their roles and responsibilities in terms of supporting children's learning. Findings that emerged from this theme generally indicated that most of the participant parents and teachers tended to share similar views that regarded teachers as holding the major responsibility of children's education in general. The parents' role was generally seen as supporting school learning through adopting school-like strategies which focus on learning practices that belong to the school domain and take place in the home site[1] (e.g. conventional revision and homework tasks) as well as providing general care of their children. The majority of participants gave little recognition as to the importance of parents as prime educators of their children and their role in supporting and extending their children's learning at home through everyday participation in shared out-of-school mathematics practices (e.g. authentic learning practices which belong to the home domain and taking place in the home site). It also seemed that there was limited acknowledgment among most of the participants regarding the importance of mutual partnership and knowledge exchange between home and school (Hughes *et al.*, in press). Most of the participants seemed to have a limited awareness about how out-of-school mathematics practices - which include social interactions, cultural tools and values – are not necessarily always similar to those learning practices which are associated with conventional school learning. They also seemed to have limited awareness about how these out-of-school practices and funds of knowledge can serve as a useful tool to enrich and extend children's learning.

The study also identified general explanations for why teachers were often assigned the major role for instruction while little awareness was given to the parental role in supporting children's learning especially in authentic ways that do not necessarily resemble school ways. One of the possible explanations was connected with the issue of the social status of teachers in their community. I

[1] Street *et al.* (2005) terminology (e.g. site, domain, practices) will be used frequently in this section.

discussed earlier in this chapter how teachers were often assigned a special social position which involved great deal of admiration and some times even some degree of idealisation in the community. This special social position seemed to generate higher expectations of teachers by some people in the community and this regard may consequently lead to increased responsibilities and authority. Further, the participant teachers highlighted different scenarios which might result from such relationship patterns. For example, some teachers indicated that parents - in general - tend to monitor teachers at the early stage of their children's schooling in order to get an overall idea about the teachers and their personal and professional competencies. Trust, authority and responsibility were often mentioned by the participant teachers in this regard as important factors which cut across parent-teacher relationships. For instance, when parents reach a good level of trust in the teachers - based on their initial observations - then they might gradually withdraw their involvement and give more authority and more responsibilities to the teachers. In this case, parents might rely on more routine types of communication in order to track their children's progress. Parents might also avoid direct intervention in the teachers' work because they might think that there is no serious need for such intervention (e.g. no major problematic issues are encountered by their children) or they might prefer not to distract teachers with unnecessary interference. Those parents might also sustain a good reputation for their children's teachers through circulating positive views in their social networks with other parents in the community.

The second scenario is when the teachers fail to meet parents' expectations, such as when they fail to give practical solutions for addressing the children's academic or behavioural problems or when they showed negligence toward parents and children. This circumstance would put parents in a difficult situation as they might either intervene by rudely confronting teachers about their concerns which might in turn jeopardise their relationships with the teachers, or they might use alternative actions such as increasing their communication to attract the teachers' attention to their problems and exert more pressure on them. It seemed that parents generally aim to maintain a good relationship with the teachers, even when the teachers were not up to their level of expectations. That would be because most parents are concerned about their children's well being and consequently preferred to avoid strong interventions or confrontations with teachers as such actions could have a negative impact on their relationship

with teachers and also on teachers' relationships with their children. It seemed that some parents feared that teachers might retaliate through mistreating or blacklisting their children. Therefore, some parents, especially those who lacked the special type of social, cultural and linguistic capital preferred by school – such as those who do not have strong social relationships with teachers and administrators in school or those who lacked educational and pedagogical knowledge which could enable them to have powerful position in their relationships with teachers – those parents might turn a blind eye to teachers' incapacity or negligence. First, because they probably saw teachers as more powerful because they can control the children's success or failure; second, teachers' high social positions in their communities and the past schooling experiences of some parents might inhibit some parents from expressing their concerns to the teachers, and, third, some parents might feel that they do not have the appropriate knowledge and personal skills which allow them to discuss their concerns and voice their demands to the teachers. Alternatively, other parents, especially those who have the social and cultural capital which enable them to be more familiar about what Peressini (1998) called the school's regime of truth (e.g. parents who are more educated, have certain personal skills and have strong relationships with administrators and teachers), could have more voice in the school and exert a more powerful influence in their relationships with the teachers.

In addition, the findings of the study often indicated that some parents and teachers had implicit or explicit deficit views about each other. For example, some teachers considered most parents as generally lacking the appropriate educational knowledge and pedagogical experiences which enable them to communicate efficiently with the school and to help their children on learning tasks at home in the way favoured by the school. These teachers did not show a high awareness about parents as having a different type of knowledge and experience which can enrich and extend school learning. These deficient assumptions probably contributed to some teachers' views about themselves as the main providers of education for children and also contributed to their allocating peripheral roles to the parents. Likewise, some parents also had deficit views about teachers. For example, some parents talked frankly about how they considered male teachers as less competent than female teachers and they also talked about their concerns regarding the poor quality of teaching and the vague future of their children in this primary school. What seemed to be

missing in most of the accounts of the participant teachers and parents was that viewing each other as deficient or blaming each other will not solve their problems but rather increase them. Instead, it might be more beneficial if they focused on finding ways of sharing and exchanging their experiences with each other. Teachers, for example, should acknowledge more the importance of the parental role in terms of encouraging their children to engage with them in their authentic everyday experiences and in utilising out-of-school resources to enrich school learning. Since these social and cultural resources may not always fit with school's framework, teachers should consider these resources, as the literature (e.g. Hughes *et al.*, in press; Moll *et al.*, 1992; Street *et al.*, 2005) constantly suggests, as different and not deficient. Schools should not just view parents as agents of the school at home (Brown, 1993) and should do more in emphasising the parents' role in supporting what the children learn in school and consider these practices as useful resources which can enrich and extend school knowledge. Parents should also show a more active role in sharing responsibilities and exchanging knowledge with teachers. They should take more collective action to make their voices heard in the school.

To summarise, most of the participant parents and teachers generally prioritised school learning and often overlooked the potential of utilising authentic learning practices taking place in out-of-school contexts in their attempts to promote children's mathematical understanding. These findings are generally in accord with previous ideas and findings addressed by other authors such as Street *et al.* (2005) who indicated that some teachers tend to view the parents' role as mainly supporting mathematical practices associated with the school domain at the home site and Brown (1993) who discussed how some teachers viewed parents as school agents at home.

I hope that this chapter was successful in sketching some of the features of home-school relationships in the case school. The next chapter will focus on another dimension of home-school relationships as it particularly investigates parental involvement in their children's mathematics learning as well as aspects of children's mathematics learning in and out-of-school.

8 Parents' and teachers' views on mathematics learning in- and out-of-school

8.1 Introduction

This chapter extends the previous discussion on home-school relationships presented in Chapter 7 through exploring parents' and teachers' perceptions of mathematics learning in- and out-of-school.

8.2 Research questions

The general question which guided this chapter was:
How do parents and teachers perceive children's in- and out-of-school mathematics learning?

Through the different stages of data analysis this broad question was divided into these sub-questions:

1. What types of mathematics teaching strategies were usually used by the participant parents and teachers? What theoretical ideas underlie these teaching strategies? To what extent were home and school teaching strategies consonant with each other?
2. How do the participant parents and teachers perceive the relationship between in- and out-of-school mathematics learning?
3. To what extent were children's out-of-school mathematical practices being recognised and utilised by the participant teachers and parents in the process of children's mathematics learning?
4. Were there any variations between the different groups of parents in terms of their perceptions about the above issues? If so, how did they vary, and why?

Due to the qualitative nature of the data analysis, I found that it was quite difficult to answer each sub-question separately since their answers often overlapped or interlaced with each other. Therefore, I preferred to present the research findings, as I did in the previous chapter, by first discussing a number of themes which emerged from the data analysis process. These themes will hopefully

draw a broad picture of the participants' perceptions of mathematics learning in- and out-of-school and parental involvement in their children's mathematics learning. These themes will hopefully provide broad answers for the above listed research questions. Concise answers for each sub-question will be presented in the summary and discussion part located at the end of this chapter.

The main themes discussed in this chapter are:

- Differences between home and school mathematics teaching
- Little utilisation of out-of-school resources in mathematics education

8.3 Theme 1: Differences between home and school teaching strategies

I illustrated earlier in Chapter 6 some features of Teacher J's mathematics teaching in the classroom which can be summarised as follows:

- The teacher adopted some Piagetian ideas in his teaching of mathematical concepts such as moving from the concrete level, which included using materials such as cubes or straws, to the abstract level which included dealing with symbols and operations. Lesson objectives included in the lesson plan were written in a behaviouristic form where a general skill is divided up into smaller pre-defined and separate skills which can be taught and assessed individually
- The teacher preferred that the children work individually with a teacher-centred and direct teaching style in the lesson. There were few opportunities for group work, learning through playing or encouraging children to go beyond the textbook's content
- During the early stage of the project, the children encountered difficulties in presenting their photos and in talking about their experiences in front of other children in the classroom. They also showed unfamiliarity with the idea of integrating their in- and out-of-school mathematics experiences in mathematics lessons. In the first of this project's activities, the teacher also had difficulties in classroom management during classroom activities work and children's presentations

The above features motivated me to explore in the interviews how other teachers were teaching mathematics. This further investigation has provided

more understanding about this topic as well as knowing more about whether these features were common among the participant teachers or they were unique to Teacher J. The analysis of the teachers' interviews indicated that there were more similarities than differences among them in terms of their teaching strategies and the theoretical ideas which underlie their practices. For example, all the participant teachers talked about using Piagetian ideas such as moving from the concrete level to the abstract level. They also seemed to depend - to different degrees - on one similar conventional teaching style which emphasised teacher-centred methods and direct teaching. This pedagogical practice reflected their theoretical models which considered teachers as knowledge-transmitters with children as knowledge-receivers. They generally considered this transmitted knowledge acquired in school to be automatically transferred to other contexts. However, the participant parents shared similar views with the teachers regarding the knowledge transmission idea. However, more variation was found between parents and teachers in terms of the teaching strategies which they use. The next sub-themes provide more details about these issues. Sub-themes 1-1 to 1-6 focus on teachers' views while Sub-theme 1-7 focuses on parents' views.

Sub-theme 1-1: Prioritising correct answers at home / prioritising concept formation in school

Teacher J's description of the parents' teaching style at home can serve as a good introduction to this sub-theme. He said: *"Parents give answers (of mathematical problems) to their children on a golden plate"* because they use *"simple and easy"* ways which mainly focus on obtaining the final correct answers without giving much attention to building the mathematical concept itself which frames these answers. He provided an example in teaching multiplication: when parents teach this mathematical concept they tend to rely on basic strategies such as memorisation or repetition. Their goal would be that their children instantly remember correct answers for each table. He explained that teachers of course want their students to reach the correct answers in multiplication exercises, but at the same time they focus more on the underlying concepts which can lead then to procedures and results. The participant teachers consistently indicated that their priority in teaching mathematics was to help children to understand the core concepts which underlie the mathematical

operation. The teachers also explained how they tried to construct conceptual understanding of their students through sequential steps which encourage children to know how concepts can be *"constructed, assembled and disassembled"* (Teacher E).

The teachers shared similar views about parental teaching styles. They indicated that parents usually depend on memorisation and repetition of direct answers when they teach mathematics to their children. They also said that parents seemed to have a limited awareness about ways of developing children's conceptual understanding. In addition, some teachers indicated that parents seemed to adhere too much to the textbook. Teacher J, for example, said that parents: *"don't try to challenge their children's minds through asking indirect questions which differ from those included in the book"*. He continued: *"In school we obtain concepts in specific way, at home parents give answers to their children on a golden plate; they would say to the child here is the answer write it down - how the child got this answer, he doesn't know! ... Here in school I don't easily give ready answers to the children, I always try to raise their curiosity ... A question in mathematics lesson would be used to challenge children's minds ... Each child may contribute with an idea and all these ideas will be incorporated together at the end of the lesson when they reach the required conclusion of the concept."*

Sub-theme 1-2: (Confusion): "Parents' teaching ways can create distorted understanding in their children's minds" Teacher E

The participant teachers also suggested that the differences between teaching methods used at home and school can create what they called *"a distorted understanding in the children's minds"*. The teachers described the parents' strategies for teaching basic concepts such as counting and mathematical operations as 'lower level strategies'. These lower strategies often emphasise drill and practice and use basic techniques such as counting on fingers or drawing lines instead of giving more attention to understanding the mathematical concepts. For example, Teacher Y talked about how some parents used *"impractical teaching methods that slowed down children's mathematical understanding"*. He provided an example of how parents' teaching methods can create confusion in their children's minds. For instance, when parents teach

addition procedures they would encourage their children to depend on "basic ways" such as counting fingers or drawing lines even when the teacher was trying to teach other types of addition procedures which required children to use mental calculations, such as using 'completing tens' procedure (e.g. 7+ 8 → 7 + (3+5) → (7+3) + 5 → 10 + 5 = 15). In addition, teachers usually began teaching new concepts by starting from the concrete level (e.g. using materials) and then gradually moving to the abstract level (dealing with symbols). The teachers (e.g. Teacher E) suggested that parents tended to *"jump"* to the abstract level (i.e. dealing with abstract symbols) and give less attention to constructing the *"concrete foundation"* of the concepts.

The participant teachers highlighted some mathematical concepts which seemed more problematic for parents. Parents were more likely to teach these concepts in what was deemed an undesirable way. These concepts included: word problems consisting of one or two procedures (e.g. adding two numbers and then subtracting another number), decomposition (borrowing from the tens), completing tens, open ended procedures (e.g. □ + □ = □ x □), mental calculation, estimation, money, and statistics.

Different explanations were provided by the participant teachers about why parents' teaching methods often conflicted with the teachers' teaching methods and why parents encountered difficulties in teaching the above mentioned concepts. These explanations can be summarised in the following points:

- In order to understand and apply school methods, parents need to have good educational experiences and knowledge of pedagogical techniques. The low educational skills of some parents would hinder their ability to support their children
- Some parents (even the more educated ones) may be unfamiliar with the new mathematical approaches and concepts introduced by modern mathematics curriculum. Most parents learned mathematics in different ways when they were in school. They may draw on their past experiences and procedures which might be inconsistent with the new mathematics approaches adopted by school
- Parents might be unaware that their mathematics teaching style is different from that of the school. Parents might know little about the school's teaching strategies because they usually do not get enough information in this area. This point is linked with the issue of lack of

communication discussed earlier in Chapter 7. In addition, there were few instructions or examples in the textbooks which can give some guidance regarding what is required in a specific lesson or what the best way of teaching a particular concept is. In addition, teachers seemed to give little information to parents about these new ideas or raise their awareness about teaching methods used in classrooms

Sub-theme 1-3: Preparative teaching

I discussed earlier in Chapter 7 parents' and teachers' perceptions regarding their roles and responsibilities in terms of children's education and how the parents' role was seen as essentially complementing the teachers' role. The sub-theme presented here focuses on some issues relevant to the idea of role distribution. It focuses on how the participant teachers expected parents to take the responsibilities of following-up and reinforcing school teaching rather than initiating new learning. The teachers seemed to overlook the role of parents as natural educators for their children and the potential of utilising parent-child interactions in their everyday natural settings to enrich children's learning.

The teachers criticised some parents who taught new mathematics lessons at home before they were taught in school. The teachers rejected this kind of preparative teaching because they thought that the parents could unintentionally teach different or even contrasting ideas to what their children would learn later in the classroom. This potential clash between teaching strategies could cause confusion to children and would also require more work from teachers in order to *"debug these misconceptions and replace them with the new concepts"* (Teacher E). In addition, Teacher J offered a good example about this issue. He explained how he wanted to teach addition by using the 'completing tens' procedure. The parents seemed to be unfamiliar with this procedure. They instructed their children to answer the addition problems by using a "simpler procedure" such as *"putting 8 'in your head' and then keep counting on 7 fingers, or draw lines and count them together"* (Teacher J).

Another problematic aspect related to the parents' preparative teaching emerged when the teacher found that some children had already completed all the textbook exercises at home before his instruction in the classroom. These children would lose interest in classroom work and consequently would create

problems for the teacher in classroom management (e.g. some children working while others feeling bored and distracting others).

All the participant teachers were concerned about the above mentioned issues. They stated on different occasions that they preferred to assign parents the following responsibilities:

- To check whether their child was encountering difficulties or if there were any aspects which he could not understand well in classroom. In this case, the parents should give more examples and exercises to enhance their child's understanding
- To regularly check their child's answers in the homework sheets and give the teachers useful feedback about their child's performance or about any difficult concepts which need additional focus in the classroom

Some teachers (e.g. Teachers Y and E) explicitly said that they viewed the parents' teaching methods as *"primitive and limited"* in contrast with the *"multiple methods"* available to teachers. They suggested that the latter methods can be utilised more flexibly in different stages and for different competency levels. Nevertheless, the teachers sometimes were compelled to turn a blind eye to the less favoured methods used by parents because those methods at least would allow children – especially those who struggle with advanced ideas – to achieve an acceptable level of performance. These methods could enable them to figure out the correct answers even if they do not fully understand the concept (e.g. they would know that 7 x 8 = 56 but probably do not understand multiplication as a process of repeated addition or that 56 ÷ 8 = 7). Teacher J said in this regard: *"Even if the child counted on his fingers or used an unwanted method, the most important thing is that he has some strategies which can enable him to solve mathematical problems. Some children would use the completing tens' procedure, others would count on their fingers, and others can get the answer by mental calculation."*

Alternatively, Teacher E was more insistent that children should only use school methods. He mentioned that he warned his students about adopting their parents' mathematical methods if they felt that they were different from what they learned in school. He noticed that some children rejected their parents' methods at home and this eventually motivated some parents to ask him about his methods in order to use them at home.

Teacher A said that he sometimes accepted preparative teaching when it was provided by particular group of parents such as those who were well educated and had good pedagogical experience. He said: *"I don't prefer inexpert parents to intervene; there is positive intervention which can be beneficial to the child, and there is another intervention which is not based on knowledge or education. If the teacher is academically qualified then there is no need for parents to intervene in his work, if the parent is educated and knows something about teaching then s/he can provide suggestions to the teacher without embarrassing him."* The teacher explained what he meant by embarrassment by talking about some parents who used their knowledge to unhelpfully criticise teachers. Teacher K offered an interesting metaphor on this topic. He thought that parents' higher educational levels can be seen as a "two edged sword". He said that some parents would utilise their knowledge in supporting their relationships with teachers and fostering their children's education while others *"would always look at the teacher as careless and command him to do this and that. They asked for things which seem good in theory but they are difficult in practice. They want the teacher to treat their child like they do but they forget that he is responsible for many more children."*

Sub-theme 1-4: "Children's performance might differ between home and school"

Some teachers (especially those who are themselves parents) drew on their personal observations on how children's performance can differ between the two contexts of learning: home and school. Teacher Y, for example, talked about his observations of how his wife taught their children. He indicated that his wife spent long hours in teaching their child and showed *"concentration and determination that their child must achieve the optimum level of understanding"*. He said that children cannot always receive this level of individual attention and high interest from teachers. He expected that some children would always be left behind in the classroom for different reasons. For example, he said that teachers tend to focus mainly on average students; students who face difficulties would be helped to some extent but then left alone because teachers have other work to do and other children to look after. Father F seemed to share a similar view with teacher Y, saying: "*There is a difference; parents*

would work harder to fill their children's brains, they are different from the teacher who teaches 35 students."

In addition, Teacher D said that some children who looked passive in the classroom can be more active and productive when they work with their parents at home. He thought that the relaxed atmosphere and individual attention provided by some families at home can contribute towards producing better academic outcomes for their children. In contrast, some children preferred their teachers' instruction and disliked their parents' teaching. Teacher D further explained that the parents' teaching style can cause confusion to the children (as discussed above) or because some parents tended to put emotional pressure on their children. Some of the parents talked about this emotional pressure in the interviews. For example, Mother A (AVEL group) talked about her husband's nervousness when teaching their child. She said: *"I tried to deliver the idea to the child, but I found some difficulty so I asked his father to teach him, under the condition that he doesn't shout at the child. If he became nervous then I should take the child and teach him by myself; I'll try all methods until the idea gets into his mind."* Another example was Father J (BEL) who talked about using the strategy of carrot (buying presents) and stick (using physical punishment) in order to make his children study more at home.

Sub-theme 1-5: Exaggerated parental assistance can lead to fake success

Although the participant teachers were quite sceptical of the parents' teaching methods, they emphasised the parental role in overseeing their children at home and helping them particularly on revision and homework tasks. They thought that this kind of involvement is important because it can offer opportunities for parents to know more about their children's abilities and academic progress.

The participant teachers highlighted various problematic aspects regarding homework. The most notable problem mentioned by teachers was what they called "unbalanced parental support". This problem occurs when some parents do not provide any help to the child either because they do not have the educational skills or because they think that their child should depend on himself in carrying out homework tasks. In contrast, other parents provide more help

than needed such as completing the homework exercises for their children. The teachers focused more on the latter group of parents because they considered their practices as very problematic for several reasons. First because teachers often do not know for sure whether the child completed his homework independently (or with some help) or if it was completed by others for him. In the latter case, the teacher might think that the child has made good progress on a particular skill and evaluate him on that basis, but in reality the child did not benefit a lot from the homework. Father D (the headmaster) provided an interesting account about what he called "fake success" which can be an outcome of such exaggerated parental help. He also talked about parents who thought that helping children in homework can lead to the children's lack of independence. Father D suggested that some parents do not like to spend a long time in overseeing their children on revision or homework tasks, either because they lacked time, knowledge and experience or because they thought that giving this kind of support will make their children always reliant on others. Father D, who seemed to share this view with other parents, justified this idea by saying: *"When my child depends on himself and gets 70%, in my view, that is better than getting 100% because I helped him in everything ... I don't want my child to be always reliant on others. Some parents may kill their children through too much revision and school work, [because] they want their child to get 100%. The poor child might get this 100% because his mother insisted and sometimes wrote on behalf of him and chased his teacher and forced him to give her child more grades, and his teacher might do this just to get rid of her and her insistence, but she can do this only in primary school. But, her dependent child could fail when he reached intermediate school because he was accustomed to being helped by others, and he doesn't have the courage to work by himself. The child's success was fake in this case."* Then he talked in detail about how he advised his wife to avoid overcorrecting their child's mistakes in the textbook in order to let the teacher see those mistakes and know the real performance of their child. This father raised an interesting point which connected parental involvement with the children's lack of independence. In contrast, other parents (e.g. Fathers A, B and Mother E) said that it is necessary to create a balance between the amount of help and the opportunities for independent work for the children. They suggested that their help to their children during the first three primary years laid the foundation for their children's autonomy and good performance in later school years.

The teachers gave different explanations as to why some parents complete the homework for their children. Their views can be summarised as follows:

- Difficult homework which exceeds children's abilities can create stress for both children and parents (e.g. completing long pages of sums). Therefore some parents complete the homework for their children to avoid this kind of stress
- Some parents found difficulties in explaining homework to their children because they found the explanations from the teacher or instructions in the textbooks to be inadequate. The children and parents might get bored because they do not know what is required in the homework. So parents would do the homework by themselves according to their understanding
- Some children might leave their homework to the last minute. Parents would do the homework quickly in order to protect their children from the teachers' punishment
- Some parents are very concerned about their children's grades. They write homework for their children in order to present the homework in a perfect form or to cover up mistakes

Sub-theme 1-6: Limited attempts were made by teachers to increase parents' knowledge about school teaching methods

The pervious sub-themes highlighted some differences between home and school mathematics teaching methods and highlighted some problematic outcomes of these differences. Here, I will investigate the teachers' attempts to raise the parents' awareness about the teaching methods used in the school.

The participant teachers generally indicated that they did not often give sufficient information to parents about school teaching strategies. For example, Teacher E indicated that the communication gap between home and school (discussed earlier in Chapter 7) as well as a lack of organised programmes can be considered as two important factors which contributed to the differences between home and school teaching methods. He said: *"Few parents can teach children (in a school-like way) because there is no clear programme, no regular schedule for teachers and parents to meet and talk about these aspects."*

Teacher A talked about some previous attempts made by the school which tried to give parents some ideas about the teaching methods used in the school. Seminars and printed materials were the main mechanisms here. He noticed that some parents were quite surprised when they knew about the differences between home and school teaching methods and how these differences can have a negative influence on the children's achievement. Some parents subsequently tried to modify their teaching methods in order to make them more in sync with the school's methods. Teacher A suggested that it is not difficult to change parents' ideas once they felt that this change would benefit their children. However, he stressed that teachers cannot work alone in raising parents' awareness on school methods. Other people (e.g. administrators and Ministry's officials) should be involved more in this process. He also suggested that teachers often overlooked this issue because it is not highly prioritised in local educational literature and policies.

Teacher K shared similar views on this topic. He added that the school's previous attempts to bridge the gap between school and home teaching methods were not very successful as they were usually implemented for only a few semesters and then stopped (e.g. organising seminars or providing printed materials). He felt that these attempts needed more structure and organisation in order to achieve better results. Teacher K thought that it would be more helpful to plan and implement projects which provide more organised opportunities (e.g. seminars, workshops, publications) to increase the parents' familiarity with the school's preferred teaching methods.

Teacher D talked about another difficulty which would hold teachers back from providing opportunities for parents to learn more about school mathematics teaching. He said that parents often varied in terms of their educational level and familiarity with mathematics and this factor would reflect on their ways of teaching mathematics to their children. It is hard for teachers to know how these different groups of parents teach their children at home. Other teachers also indicated that reaching parents with diverse educational and economic backgrounds is not an easy task. Some parents, according to the teachers' viewpoint, want to learn more from teachers but their own lack of education might hinder their understanding of what teachers exactly wanted them to do. Other parents may find the teachers' methods to be quite confusing and therefore they prefer to continue using their conventional methods. In addition,

the participant teachers considered teaching children as their priority and preferred to dedicate most of their time to classroom teaching. Teaching parents, as some teachers suggested, was not their responsibility.

Sub-theme 1-7: participant parents' views on the differences between home and school mathematics teaching methods

The participant parents' views on the differences between home and school mathematics teaching can be grouped into the following categories:

1) The first group of parents included a number of fathers (Fathers E, F, J from the AVEL and BEL groups). Those fathers said that they did not provide direct help to their children in homework or revision tasks. Their wives or daughters usually helped their children in these tasks. These fathers seemed to know little about the content of the mathematics textbooks and the school's teaching methods. However, they supervised their children through asking them general questions about their progress in school as well as encouraging them to achieve better results (e.g. they promise to take them out for dinner or to buy them presents if they made good progress). The fathers also checked their children's school papers in order to get general idea of their progress.

2) The second group of parents included parents who provided direct help to their children in homework and revision but they thought that there were no differences between their mathematics teaching methods and those of the school. Father C (AVEL group), for example, said that he does not think that there were major differences: *"We learned these methods from teachers ... For example, when teaching addition we teach the child like teachers, 3 + 7 put the larger number 7 in your mind and then count the rest 3 on your fingers or draw lines and count them together."*

3) The third group of parents (Father B and Mothers C, D - AVEL group) were aware of the differences between home and school teaching methods. They thought that this divergence could cause confusion to their children. Some of them tried to learn more from teachers in order to

avoid this disagreement. For example, Mother C said: *"The teacher's method is easier than mine. Our task as parents is to repeat lessons which our child did not understand, or to give the child some ideas about tomorrow's lesson; I think we should not go on and explain the whole lesson to the child because his teacher might give another idea which can be easier than ours ... Sometimes I told my child that I won't explain this lesson because his teacher might use an easier idea. I said let's wait and see how the teacher explains this lesson, and in the next day I found that he used an easier idea, and I asked the child to explain it to me."*

4) The fourth group of parents were all from the ADEL group (Fathers A and D and Mother E who worked as teachers). They were more aware of the differences between school methods and home methods (provided by spouses and other family members). However, the two fathers were not directly engaged in teaching mathematics for their children at home, they only intervened when their children faced a difficulty which other people who helped the child at home could not resolve. I found many similarities between the views of this group of parents with teachers' views on the topic of mathematics teaching methods.

I would like to conclude this theme by highlighting some additional features which marked parental help to their children in homework or revision tasks. They can be summarised as follows:

- Parents helped children in understanding difficult ideas or parts of lessons, but they do not prefer to teach entire lessons. For example, Father B said: *"I read the textbook examples, and then I ask my child to read them again. If he knew how to solve them then he can apply the same idea to the other exercises; if he couldn't understand them, then I would explain them more to him."*
- Some participant parents felt that they gave their children more attention and focus in comparison with the teacher who has to distribute his attention among many children. Mother B talked about how she regularly checked and corrected her child's mistakes. She said: *"The teacher wouldn't teach like (the parent) he wouldn't look at and correct each mistake. The most important thing for the teacher is that he taught the lesson and that most children understood, but my child might be one*

of the children who did not understand, that's why I should continuously check and correct his mistakes"

- Some parents seemed to consider teaching as a process of *"simplifying ideas"* to children. In contrast, some teachers considered teaching as providing learning opportunities which challenge the children's thinking. Father C, for example, thought that teachers should: *"use simple teaching methods"*. Mother A similarly said: *"I try to simplify ideas so the child can understand them"*. Conversely, Teacher J emphasised challenging his students' thinking by engaging them in more complicated ideas which exceed the average exercises presented in the textbook (as discussed earlier).

8.4 Theme 2: Little utilisation of out-of-school resources in mathematics education

This theme explores parents' and teachers' views about children's out-of-school mathematical practices. In the following pages we will see how the participant parents and teachers generally shared a theoretical view which gives priority and significant position to school mathematics which is considered as a multi-purpose knowledge which can be easily applied in different situations and in different contexts outside school. In addition, the conventional mathematics teaching style that is common in schools and the theoretical assumptions which frame these teaching practices all seem to pay little recognition to the influence of out-of-school contexts as well as the influence of social and cultural factors on children's mathematics learning. The participants generally perceived learning as an individual internal process. They seemed to separate school learning from children's out-of-school mathematical practices and prioritise school-like mathematics.

Sub-theme 2-1: (mathematics is required everywhere): The goal of mathematics learning is to facilitate children's ability to use it in everyday situations

Most of the participant parents and teachers tended to share a general theoretical view which perceived the goal of learning mathematics as to facilitate the learners' ability to use their mathematical knowledge - acquired in school - in other everyday life activities.

The participant teachers shared interesting views about what they considered as the main goal of mathematics learning. Their views often shed light on the theoretical models which underlie their teaching practice. Teacher D, for example, viewed mathematics as *"the language of numbers"*. He thought that when children reach a good *"acquisition level"* of this global language then they can use their mathematical knowledge anytime and anywhere. Teacher A considered mathematics as *"an everyday knowledge which is required everywhere"*. Teacher E similarly suggested that mathematics is *"the foundation of knowledge as it helps in promoting thinking skills which can be used in other fields of knowledge as well as everyday life"*.

The parents (from AVEL and ADEL groups) shared similar views with the teachers as to what they considered the most important goal of mathematics learning. They often highlighted the connection between school mathematics and everyday activities. For example, Father F said that mathematics learning: *"Can develop our minds and expand it and this can enable us to know more things because we use mathematics every day in calculations and in buying and selling."* Mother A thought that: *"Mathematics activates the mind. Mathematics is useful for the child in his everyday life; when he grows up he must know how to deal with life situations especially in buying and selling."* Father C (ADEL group) suggested that: *"Mathematics is like a key which can open all the doors of other natural sciences ... life is built on mathematics."*

Father J (BEL group), who lacked formal education, also showed a good deal of awareness about the importance of mathematics in everyday life activities. As he was trying to explain his view about the importance of learning mathematics, he provided interesting examples about how he and his child used mathematics in everyday life activities. He thought that the aim of learning mathematics is to use mathematical knowledge in everyday activities because *"one can get lost if he didn't know mathematics."* He talked about how he learned and used mathematics as part of his job as a truck driver for a poultry company. He considered himself as lacking proper mathematical skills because he often used a calculator. However, he gave an interesting example about how he counted chicken cages in his truck by estimation and without using a calculator. He explained it in this way: there are two types of trucks; one type can carry 210 cages, and the other type can carry 272 cages in each row. The first one has 9

rows and the second has 11 rows. Each cage can carry 10 live chickens. He said *"the first type of trucks carries 210 cages in 9 rows, if 210 X 10= 2100 then 210 X 9= approximately 2000* chickens (the precise result was 1890) ... *in the other truck 272 cages x 11 rows equals 2909* (the precise answer was 2992; he may have multiplied 272x10=2720 and wanted to add another 272 but made a mistake in addition). Furthermore, Father J was the main breadwinner for a family which consisted of 10 children and a wife. The difficult economic circumstances of Father J have made him very cautious with money. For example, he always asked his children about the prices of items which they bought from the local shop and he always checked the remaining change because items were not tag-priced and no invoices were given. He also talked about how he regularly checked and argued with the shopkeeper about his 'monthly credit book' in order to avoid being ripped off (where one payment is paid for the whole month's credit shopping). In addition, he talked about how his child's participation in helping his aunt in her small home-based shop has increased the child's mathematical abilities. He said: *"My child sat with his aunt in her small shop at home, and she taught him about prices, e.g. a small nappy package costs 2.450 and a big package costs 2.860, and now he knows how to add these prices."* Through my discussion with the children in the focus groups I found that some children were also involved in other activities such as trading poultry or working with relatives in their home-based small businesses.

Sub-theme 2-2: Automatic knowledge transfer

As most of the participant parents and teachers indicated that they considered the aim of school mathematics learning to be closely linked with its application in other everyday life situations, I was interested to see how this aim would be reflected on mathematics teaching practices in school and at home. I was interested to see whether the teachers kept this aim in consideration during their mathematics lessons or there were other issues which shifted their attention to other directions. I was also interested to see whether parents recognised the potential benefits of engaging their children in their everyday activities and utilising learning opportunities which could emerge from such shared work to promote children's mathematics learning.

The most notable finding which emerged from the data analysis of teachers' interviews was that they generally seemed to consider mathematical knowledge

learned in school as some kind of general and multi-purpose tool which can be used in different contexts. They indicated that when children learn specific mathematical concepts in a school context then they would be enabled to apply this concept directly in other contexts. This process seemed to be fairly unproblematic to the teachers. Teacher D, for example, thought that the mathematical knowledge which children use in out-of-school contexts does not necessarily differ from the mathematical knowledge which they learn in school because *"mathematics concepts are sequenced and overlapped, they are connected with out-of-school life."*

Teacher Y thought that learning mathematics in school would essentially develop the children's natural and instinctive mathematical skills, as: *"children have natural mathematical skills and they use mathematics spontaneously in their everyday life. School mathematics promote these already existing abilities in children and enables them to use these abilities in everyday activities more quickly and more accurately."*

The teachers also seemed to think that the more proficient children were in school mathematics, the more they will be able to apply these skills in other everyday experiences. For example, Teacher D said: *"learning mathematics in school will facilitate children's application of this knowledge outside school; they might deal with mathematics spontaneously outside the school but this can lead to an incorrect answer ... If they acquired mathematics properly in school then surely they will be able to apply it correctly outside the school."*

The teachers generally suggested that using materials available in the children's environment (e.g. tangible materials such as: cubes, toys, straws, and pictures) in the initial stage of teaching new mathematical concepts (based on their understanding of the Piagetian approach) would make the mathematical knowledge learned in school more relevant and applicable to the everyday activities of children. Some teachers also said that they encouraged children to engage in imitative classroom trading activities as a way of using mathematical ideas in some realistic situations. What was missing from the teachers' accounts was their recognition of the authentic home mathematical practices of their students and the intentional efforts for integrating them in classroom teaching.

Probably because Teacher J was influenced by our shared work in the project, he gave different views than the other participant teachers. He paid more attention to the potential value of the students' out-of-school context. He emphasised the parents' role in utilising these learning opportunities to enrich their children's learning. He said, for example: *"There are good opportunities for learning in the everyday life activities of children, but parents do not recognise these opportunities. For example, when a parent takes his child to horse racing he can ask him: who was the fastest and who was the slowest? When he takes his child for shopping, he can ask him about kilos and weights and how to use money. Parents should engage their children in these activities ... children often do not know how to deal with money. Parents should ask their children tricky question such as: someone has bought something which costs 700 Fils, why did he pay the shopkeeper one Dinar and 200 Fils (1.200 Fils)?"* (The answer: he does not want 300 Fils loose change, he needed a complete 500 Fils coin or note).

Teacher (E) highlighted an important difference between the children's in- and out-of-school mathematics practices. He assumed that people use similar mathematical operations in different contexts and activities. Children, for example, use the same mathematical operation (e.g. addition) when they answer homework exercises or when they count their money in shopping. However, he noticed more differences in what he called the "mathematical expressions" which people use in different contexts. For example, children use a specific type of mathematical expressions in school which can be quite different from other mathematical expressions which they use at home or in the shop. First, he indicated that children learn school mathematics in Standard Arabic (I discussed some aspects of the different types of Arabic language in Chapter 6), but often use Colloquial Arabic in their everyday activities outside school. Most mathematical terms therefore can have different Standard and Colloquial Arabic synonyms and this could cause some confusion for the learners. Second, children are more familiar with using specific out-of-school expressions which are not always accepted in schools. For example, many people in Bahrain still use names of old Indian currency (Rupee and Anna) along with new Arabic currency names (Fils and Dinar) in their daily activities (Table 8.1 – see also Activity 6 in Appendix D) . Children usually use Indian currency names in their everyday activities especially as most shopkeepers are from the Indian sub-continent. It seems that the old currency names are easier to pronounce and

also relatively easier to calculate because they can be associated with fractions (half, quarter, three quarters) instead of numbers (50, 25, 75). For example, some children who participated in the interviews often used words instead of numerals when they talked about their experiences on using money in the local shop. For instances they said that they add two halves and a quarter instead of saying 50+50+25.

What can be inferred from Teacher E's accounts is that these differences in currency names could influence the children's understanding and ability to apply their mathematical knowledge and skills which they acquired while moving between the two contexts. He said: *"When a child goes to the shop and buys three toys, if you tell him that each toy costs 2 Rupees, he would directly say the total is 6 Rupees, yet he probably doesn't know that this was a multiplication operation, his answer was spontaneous. But if you say 200 Fils (the child would probably find it more difficult) ... If you say 25 Fils, he will spend one hour thinking about its meaning, but if you say you have 4 Annas then he can add another one and say the total is half Rupee. The teacher should pay more attention of bringing these expressions more together."*

Finally, Teacher S implied that in contrast to school mathematics, out-of-school mathematics seemed to be more dependent on object manipulation and less dependent on symbol manipulation. In his view, children have natural abilities which allow them to solve basic everyday mathematical problems. These basic problems do not necessarily require lots of symbol manipulation. Alternatively, school mathematics can be less intuitive because it depends more on symbol manipulation skills. He said: *"It is strange that some students find it difficult to answer addition problems when they are presented in symbol form, however you'll see that these children are alert when people tried to cheat them out of their money (in the shop). They know how much change they should get. They have the mental capacity to solve some mathematical problems but can't link it with symbols; they find textbook exercises difficult because it is difficult to process these symbols in their minds."*

Old (Indian) currency names	New (official) currency names
10 Rupees = 16 Anna	1 Dinar (1000 Fils)
1 Rupee	100 Fils
12 Annas (used as three quarters)	75 Fils
Half Rupee	50 Fils
4 Annas (used as a quarter)	25 Fils

Table 8.1 Old and new currency's names in Bahrain

Sub-theme 2-3: Learning as an internal process

One of the difficult questions faced by the participant teachers in the interviews was the question which investigated theoretical mathematics learning models or ideas which guided their teaching practices. I found that they often blended different theoretical ideas which generally reflected their uncertainty in this area. Most of the theoretical ideas offered by the teachers were oriented towards conventional models of mathematics learning. Teacher Y, for example, used a common cliché - which other teachers often used in the interviews – which considered learners as: *"the centre of the learning process and everything revolves around them."* Therefore teachers should support what Teacher Y called *"self learning skills"* in their students. At first I thought that what he was referring to were specific skills such as problem-solving and learning through discovery which can help children to learn individually through independent efforts. However, the teacher's explanation of 'self-learning' was based on his understanding of an ancient Greek philosophical idea. He said: *"knowledge is already existing inside the child; we (the teachers) grind (i.e. elicit) it from the child's mind, like what Aristotle said, when the teacher interacts with the child then knowledge will be grinded from the child's mind. They call this self-learning, where the child deduces knowledge by himself, and this knowledge will be fixed and well-founded in his mind. It's not like lecturing where children quickly forget what they learned."* In another point in the interview Teacher Y gave contrasting views as he considered learners as raw material: *"a piece of wood which can be turned into a beautiful art work or a piece of junk depending on the skill of the person who shapes it [i.e. the teacher]."* It is worth mentioning that other teachers and parents in the interviews often described children as

"raw material" and *"knowledge containers"*. In addition, it is common that Bahraini people (and even people of other Gulf States) would refer to children by using a specific colloquial word (Ja'hil) which means 'someone who lacks knowledge'.

Teacher S also used the same cliché mentioned earlier: *"the child as the centre of the learning process"*. I asked him about whether this notion was really consistent with his actual teaching practices or it was just a slogan. After a short hesitation he gave different view which reflected a more conventional understanding about children as learners, stating: *"the problem with this idea is: does the child really have control of himself, does he have the determination to learn, can he take this responsibility? I don't think that a little child would know the importance of learning and meet its required responsibilities ... His responsibility would be to listen to what the teacher and parents say, and his responsibility is to do his homework and to be responsive to his teacher and to follow his instructions."*

The participant teachers also seemed to consistently emphasise terms associated with the acquisition metaphor (Sfard, 1998) discussed earlier in Chapter 2. Teacher D, for example, considered his role as a teacher as to *"transmit knowledge by any means to children's minds"* while the child's role is to *"receive knowledge and apply it in the required way."* Other teachers used terms such as *"acquiring skills"* or said that the teacher's role is to *"deliver knowledge to the children's minds."*

Furthermore, the teachers' views about theoretical ideas which guided their teaching practices tended to be associated with the absolutist view (discussed earlier in Chapter 2) which considers mathematics learning as internal, individual, culture-free and value-free. The participant teachers seemed to envisage learning as a process which occurs between teachers and students in isolation from other social factors. It is fair to say that some teachers (e.g. Teachers E and S) highlighted important ideas about in and out-of-school mathematics (e.g. mathematics language, symbol and object manipulation). However, most other teachers seemed to have limited views about the impact of social and cultural factors on children's mathematics learning process.

The teachers' conventional views (e.g. automatic knowledge transfer between different contexts and considering learning as an internal process) seemed to have a strong impact on their teaching practices. This issue will be discussed in the next sub-theme in more detail.

Sub-theme 2-4: Teachers' reliance on conventional mathematics teaching methods

Most of the participant teachers talked openly about their feeling of conventionality and routine in mathematics teaching. Some teachers talked about how they were keen in their first years of teaching to use creative ideas which they developed in University courses in order to provide better learning opportunities to their students (who were often their relatives and neighbours too). Unfortunately, these hopes and enthusiasm seemed to fade after a few years of teaching for different reasons. I asked the teachers about what they meant by 'conventional' and 'routine'. Some teachers explained this by saying that they mainly relied on lecturing and used similar teaching strategies year after year. Others said that they did not have chances to experiment with their novel ideas in practice because of school circumstances. More about their views is presented in the following points:

Teacher-centred teaching

I discussed earlier in Chapter 6 one of my classroom observations of Teacher J's teaching. This observation and other observations which took place during different stages in the project indicated that the teacher spent most of the lesson time instructing his students. There was little opportunity for the children to express their ideas or to talk about their own experiences. Teacher J talked about this topic later in the interview. He was aware that his students had few opportunities to talk in the classroom about their own experiences or their personal understanding. He said: *"I don't really give the children enough opportunities to talk about their experiences. I always focus on teaching them. I need to finish the curriculum and therefore I usually give the children a quick introduction to the lesson topic and then deliver the lesson to them. However, they can talk when there is a need for some kind of reasoning or deduction when they are required to explain how they reached a certain conclusion."*

The other participant teachers also implied that they relied on conventional teaching which introduces lots of mathematical facts and ideas to the students but at the same time pays little attention on how they can use these facts and ideas to solve real problems.

Emphasis on individual work

Although some teachers recognised the benefits of utilising collective work in the classroom (i.e. encouraging children to work together on shared learning tasks under the teacher's supervision), they generally preferred children to work individually on learning tasks. They felt that collective work is more time consuming and needs more effort particularly with regards to classroom management. Teacher S, for example, said that he preferred children to work individually because *"group work looks good in theory, but in practice it exhausts the teacher and bleeds off his energy. Group work has more disadvantages than advantages; it's difficult in group work to control the children and to make them seriously work together instead of fooling around."* Teacher D also emphasised children's individual work since he thought that collective work can develop a sense of reliance in some children. He said: *"Individual work is definitely more preferred; sometimes group work can generate a sense of reliance or some kind of degradation in children's personalities, where one would always be the leader while others would be subordinates."* These ideas along with some of the ideas previously mentioned by the parents raised many questions in my mind about how some teachers or parents linked individual work with independence and linked group work with reliance on others.

Only two teachers (E and K) seemed to encourage some kind of collective work in their classrooms. Teacher E, for example, talked about his successful attempts to encourage his students to work together. Children in his classroom first work individually on textbook exercises, and then those high-achieving children who finish first help other children in their group. However, he thought that children should be trained on this type of work from Year 1 or teachers will find it hard to implement in later years. He also highlighted that some children do not like to be helped by other children as this would make them feel subordinate to their classmates.

Emphasis on mastering basic mathematical skills

Two factors were often emphasised by the participant teachers as contributing to their reliance on routine teaching style: time pressures and over-loaded curriculum. For example, Teacher K wished to teach mathematics more innovatively. However, time limits and the overloaded curriculum forced him to *"work on the fast mode in order to accomplish the curriculum on time"*. In addition, Teacher S described the mathematics curriculum as *"very compressed"* and therefore teachers do not have enough time to teach each skill and concept thoroughly. In addition, Teacher E criticised the organisation of mathematics textbooks which gave priority (i.e. more space and units) to basic mathematical concepts (i.e. numbers and operations) while other concepts and skills such as problem solving, measurement, statistics and money were *"squeezed in few pages placed in the last units in the book"*. He said: *"Problem solving skills are not given enough attention because they need more time for planning and implementation. I divided the curriculum units by the number of school days and found that I can't teach these skills on more than a few days."* Other teachers gave similar views regarding the strong emphasis in the curriculum on basic mathematical skills while other skills (such as research skills, utilising family and community resources, and working with others in shared tasks and problems solving) were given less attention.

Classroom and school environment issues

Some teachers expressed their wish for more innovation and change, at the same time they talked about different factors which held them back from achieving this wish. Teacher D, for example, described his teaching practices as *"often adhering to conventionality."* He also expressed his wish for more innovation and change, stating: *"I have many interesting ideas which I wish to implement in reality"*. He stated different reasons which reduced his efforts to what he called *"the minimum level of teaching."* Classroom environment (e.g. the high number of children and small classroom space) and classroom management difficulties were considered by Teacher D and other teachers as the main reason for their reliance on conventional teaching strategies. Another reason highlighted by the teachers was the lack of encouragement and support from other school staff. Teacher D said, for example: *"I like to improve my self, I have interesting ideas but the school's atmosphere, and other teachers and*

administrators don't support you in achieving the level of innovation you wish for ... we lack encouragement which is necessary for us to be enthusiastic or to pursue our ambitions" (Teacher D).

Teacher E talked elaborately about the tensions and conflicts between teachers and administrators in the case school. He said: *"When the administrators insisted on their ideas and gave little attention to teachers' innovation and activities this would make teachers hesitant and disengaged; teachers won't make additional efforts in the classroom because they are disappointed and need someone to support them."*

Sub-theme 2-5: Little utilisation of children's out-of-school resources by teachers

Some teachers shared a general view which considered the village environment as *"poor and lacking the resources necessary for promoting children's learning."* These teachers showed a limited awareness about the possibility of utilising resources already available in the children's homes and community to enrich their mathematics learning. For example, I asked Teacher D about possible ways of utilising children's out-of-school mathematical practices in the classroom. The teacher thought that *"these experiences are limited; I don't think that children have wide experiences out there; where do they deal with mathematics? At home or market or in playing activities, I think that children deal with mathematics to a limited extent."* Teachers D and S concentrated on the children's mastery of school mathematics because they thought that the students' proficiency in school mathematics can generate some kind of flexible knowledge which can be applied in different situations outside school. They did not seem to acknowledge out-of-school mathematics as having advanced or structured mathematical ideas that could be integrated with school mathematics.

Other teachers (J and K) showed more recognition of children's out-of-school mathematical practices especially in shopping. The two teachers were already engaged in the project and this seemed to raise their recognition of the idea of utilising children's out-of-school mathematical practices in mathematics lessons. Teacher J, for example, said: *"The school environment is limited and artificial. In contrast to the outside environment which is based on real situations and real*

problems, problem solving is essential in everyday life," and then he gave an example of problem solving in everyday situations: *"I went to buy fish, the seller said 3 kilos for 12 Rupees, another seller said 1 kilo for 5 Rupees, which one are you going to buy from? You should think about the price but also think about the quality and whether you like to freeze the fish you bought or eat it fresh."* Teacher K also recognised that the children's out-of-school environment "*can be utilised depending on teachers' understanding about how important it is; even simple resources can be turned into rich resources depending on how clever the teacher is."*

Sub-theme 2-6: little utilisation of out-of-school mathematical practices by parents

Earlier in Sub-theme 2.1, I discussed how the participant parents considered mathematics learning in school as closely connected with its application in everyday activities. Now I will extend this earlier discussion by looking at some examples provided by the parents about their children's out-of-school mathematical practices. Most importantly, I will focus on whether these parents have utilised these out-of-school practices and resources to enrich their children's learning or whether they gave more priority to school-like mathematics.

During the discussion about their children's engagement with mathematical practices in out-of-school contexts, some parents focused on practices which involved money and shopping. For example, Sister D said: *"everything in the child's environment requires some calculation, wherever the child goes he will need to use money, in the shop he needs to know how to deal with the seller, he should know the prices, how much to pay and how much change should be received."* In addition, the participant mothers and fathers talked about testing their children's mathematical skills through sending them to buy items form the shop. Father J, for example, talked proudly about his child who wrote down prices of items - which he bought on monthly credit book - on separate sheets which can be used as a proof in problematic situations. He said: *"I always give the child some money and see how he deals with the seller ... One time I found that the seller cheated me with two Dinars on the credit book, I asked my child what did you buy he said I bought a 870 Fils yogurt drink and 850 Fils 2 litre*

milk, the child wrote it down on a paper, the seller wrote 2 Dinars. I don't mind if the seller cheated us, the most important thing is that my child didn't cheat others."

Father A (ADEL group) said that he talked with his children about his past mathematical experiences when he used to help his father in selling fish. He gave them examples about how dealing with mathematics in real situations would make this knowledge more fixed and firm in their minds. He said: *"I used to help my father with selling fish in the past; this process included selling, buying, addition, multiplication, subtraction, as there is also surplus amounts, profit and loss. I told my children that I knew multiplication tables since I was in Year 3 because when you deal with numbers in real situations you'll never forget it; this knowledge will be firm. I still like numbers and I like money (laughter)."* Other parents gave many examples of out-of-school mathematical activities which they or their children engaged with in their everyday life. Most parents indicated that they tested their children's mathematical skills through observing their performance in real life situations such as asking their children about the prices of different purchased items and how much money change they should get.

The participant parents (despite their educational differences) generally showed good recognition of the importance of mathematics in their everyday life as well as in their children's lives. They also gave multiple examples about their children's out-of-school mathematical practices with a particular focus on situations related to shopping. What seemed to be missing however was the parents' explicit and intentional utilisation of these out-of-school mathematical ideas and practices to enrich their children's mathematical knowledge and skills. It can be inferred from the parents' accounts in the interviews that they tended to give more attention and more value to school mathematics because the children's performance in this type of mathematics was associated with grades and assessment. The organised structure of school mathematics could also contribute to parents' prioritising of school mathematics and their tendency to view mathematics as mainly that type of knowledge associated with school practices. Out-of-school mathematics, on the other hand, were seen by most of the parents as more associated with common-sense and natural abilities especially that it seemed to be less structured and less explicit than school mathematics. This issue of the less explicit image of out-of-school mathematics

will be revisited later when we explore children's accounts and views about what they learned through their participation in the project in the next chapter.

8.5 Summary and discussion

I hope that the various themes and sub-themes which have been discussed so far in this chapter were successful in providing a broad answer for the main question presented at the beginning of this chapter: **How do parents and teachers perceive children's in- and out-of-school mathematics learning?** This section is structured around the sub-questions which were derived from the main question during the data analysis process. The section aims to review the main findings presented in this chapter and to highlight some of the relationships between these findings and the ideas reviewed earlier in the literature chapters or discussed in the previous finding chapter. The sub-questions and their answers are presented as follows:

S-Q 1: What types of mathematics teaching strategies were usually used by the participant parents and teachers? To what extent were home and school teaching strategies were consonant with each other?

The answer to this question is connected with the answer to the above-discussed first sub-question which highlighted the common view which considers teachers as holding the main responsibility and playing the major role and overlooks the parents' role in their children's education, especially in authentic learning practices which do not always subscribe to school-like learning. These views can be connected with another common assumption held by some teachers which prioritised and emphasised school teaching methods as more appropriate and considered home teaching strategies as inferior or even conflicting with the school's agendas and frameworks.

In relation to parent-teacher role distributions, I indicated earlier that most of the teachers emphasised that their role in children's mathematics learning is fundamental, therefore they believed that they are the one who should initiate the teaching of new concepts to the children whilst parents' role is to follow up on the teacher's work by reinforcing what they learned in school day by day. Most of the participant teachers also opposed the preparative teaching provided

by parents because they thought that it could include various practices which clash with the teachers' aims and might create confusion and additional difficulties for the students. At the same time, most of the teachers did not seem to do enough work in exchanging knowledge with parents such as learning more about home teaching strategies as well as raising the parents' awareness about the school's preferred teaching methods. Most of the teachers also consider children as empty vessels to be filled with school knowledge and overlooked children's pre-school knowledge and their natural motivation to learn through curiosity, observation, and engagement with others.

In addition, the findings of the study highlighted some differences between the parents' and teachers' mathematics teaching methods and their underlying theoretical foundations. The participant teachers generally indicated that their teaching practices were framed by Piagetian ideas such as: moving in the process of teaching mathematical concepts from the concrete level to the abstract level, and concentrating on concept formation and subsequently moving to procedures and symbols. Some teachers combined the above Piagetian model with more conventional teaching (e.g. direct teaching, more central position of teachers in the learning process, emphasis on drill and practice etc.). The participant teachers also shared a general view which considered parents as having limited teaching strategies and as using conventional or old-fashioned teaching styles (e.g. memorisation, practice, focusing on reaching correct answers more than focusing on concept formation). It seemed that the views of some parents and teachers at times overlapped – such as when some teachers tended to rely on more conventional teaching practices as a result of time pressure or negative attitudes toward teaching or when some parents learned more about school methods as a result of their accumulated experience from teaching their children year after year.

The findings indicated that most of the participant parents and teachers were aware that the differences between teaching strategies used at home and in school can have negative effects on children's learning. For example, these differences can create confusion in children's minds and reduce their confidence in their parents' teaching abilities. The findings also highlighted some possible causes for these differences such as the parents' lack of familiarity with school teaching practices either because they learned mathematics in a different way when they themselves were students or because the school gave them

insufficient information about the new teaching methods. The teachers generally seemed to make little effort in order to raise parents' awareness about school methods. Most of the teachers also did not try to learn more about how parents teach mathematics to their children. These findings were in accordance with previous studies presented in the literature review especially the studies carried out by Bishop (1988), Jones (1998), Street *et al.* (2005) Hughes *et al.* (in press) and O'Toole and Abreu (2003) who highlighted the conflicts between home and school teaching strategies.

S-Q 2: How do the participant parents and teachers perceive the relationship between in- and out-of-school mathematics practices?

The participant parents' and teachers' views on the issue of children's in and out-of-school mathematics learning seemed to be closely connected with their theoretical assumptions and their practical teaching practices. The study found that there seemed to be a notable contrast among the participant parents and teachers on three dimensions: goals of mathematics learning, theoretical assumptions about learning, and mathematics teaching practices used at home and in school. Most of the participant teachers and parents generally considered the goal of mathematics learning as closely connected with promoting learners' skills in using mathematical knowledge and procedures acquired in school effectively in everyday out-of-school situations. However, it seemed that most of the participants had theoretical assumptions and pedagogical practices which do not seem to match well with achieving this goal. For instance, most of the participant teachers and parents seemed to view learning as an internal and individual process and favoured conventional teaching methods which give little attention to the social aspects of learning. Most of the teachers, for example, emphasised individual work and teaching basic mathematical skills in its symbolic and abstract form, and they often overlooked promoting dialogue among learners or utilising learners' knowledge and out-of-school practices in an organised way. Most of the parents similarly used conventional teaching methods which probably can be seen as a reflection of the general approach adopted by school.

Looking at the participants' theoretical assumptions was helpful in explaining their tendency of using conventional teaching methods and assigning the major role to the teachers. Most of the participant teachers and parents shared a

similar view which considered the ultimate goal of mathematics learning as being able to use this knowledge to solve real problems related to real everyday situations. However, the problematic issue was connected with their theoretical assumptions about knowledge transfer which views school knowledge as a flexible or multi-purpose knowledge which can be easily transferred to other contexts and utilised in out-of-school situations. Only a few teachers were explicitly aware about the differences of mathematics used in and out-of-school practices. Some of them focused on linguistic differences between the two contexts while others focused on how school mathematics emphasised symbols manipulation while out-of-school mathematics involve more object manipulation. Nevertheless, most of the participant teachers seemed to share a general view which considered mathematics learning as shaped and developed primarily inside the classroom and paid little attention to the potential benefits of exploring and utilising children's out-of-school mathematics practices and using them to enrich school learning. In addition, some of the teachers gave vague views particularly on their conceptualisations about learning processes which underlie their teaching practices. For example, some of them used widespread slogans such as "the child is the centre of the learning process" while in reality their conventional teaching practices did not match well with this idea.

Two learning theories seemed to be more visible in the teachers' discussions about the theoretical ideas which framed their practices, namely: behaviourism and constructivism. The parents' teaching practices seemed to entail more behaviouristic views of learning such emphasising drill and memorisation as well as reinforcement and limited awareness about concept formation. However, teachers and parents all seemed to share an absolute view of mathematics learning especially in specific topics such as when they considered knowledge transfer as an automatic process and also in their concentration on mechanical performance, correct answers and, most importantly, giving less attention to the social and cultural aspects of mathematics learning. Although some teachers gave more attention to the idea of concept formation through using concrete materials or imitative situations which were connected with the constructivist ideas, they still overlooked the importance of creating a rich learning environment for their children or encouraging them to search, ask questions, discover and discuss their ideas with others. In addition, most of the parents and teachers emphasised the acquisition metaphor (Sfard, 1988) which views learning as knowledge reception and overlooked the participation metaphor

which consider learning as active participation in communities of practice. This emphasis on the acquisition metaphor seemed to reflect a narrow view of learning (as knowledge transmission and reception) and overlook the impact of social and cultural influences on learning.

S-Q 3: To what extent were children's out-of-school mathematics practices being recognised and utilised by the participant teachers and parents in the process of children's mathematics learning?

The participant parents and teachers showed more variation in their level of recognition of children's out-of-school mathematics practices. Some teachers did not consider children's out-of-school contexts as containing valuable mathematical practices which can be utilised to enrich children's learning. This group of teachers thought that their responsibility was limited to focusing on teaching mathematics in the classroom according to the formal procedures and official textbook. This prioritisation of school mathematics was perhaps supported by their theoretical assumptions about direct knowledge transfer where learning is mainly initiated in the school and then transferred to other social contexts automatically. Some teachers viewed out-of-school mathematical practices as based on common sense and intuitive thinking; school mathematics, according to their view, is more advanced and can be used to develop children's intuitive thinking. Alternatively, some teachers showed more awareness about the importance of children's out-of-school mathematical practices and gave various examples which reflected their awareness about how children use mathematics in everyday situations. However, they felt that school circumstances, work loads and a lack of encouragement have forced them to adopt more conventional teaching styles which do not pay much attention to issues such as utilising children's out-of-school mathematical practices in an intentional and organised way to enrich children's learning.

Most of the parents tended to view mathematics as an important subject which has numerous applications in everyday activities. However, the main problem was that this awareness was not clearly reflected in their support for their children's mathematics learning at home. School mathematics practices (especially homework and revision) seemed to be given more attention and value by all parents – probably because they depend on the textbook which is quite organised and structured. In addition, because mathematics is one of the

fundamental subjects in the curriculum, many parents sensed that their children's performance in this subject is vital for their general academic progress. Therefore, they preferred to adhere to the school standards which they probably regarded as being made by people who know best. Nonetheless, the children's out-of-school practices were considered by parents as important although also seen sometimes as simple and instinctive. Most of the parents focused mainly on shopping and using money as the most visible type of children's out-of-school mathematics practices while other out-of-school practices such as playing, locating, measuring, designing etc. (as discussed earlier by Bishop, 1988) seemed to be paid less attention. These findings also parallel with O'Toole's and Abreu's (2003) work which suggested that certain types of mathematical practices can be visible to parents – such as homework and shopping - while other types - such as playing - can be less visible to them.

Although most parents and teachers seemed to pay inadequate attention to the social dimension of mathematics learning, there were a few teachers and parents who drew attention to important aspects connected with the social and cultural influence on mathematics learning. Their ideas reflected some theoretical concepts which were discussed earlier in Chapter 2, namely: social mediation, tools mediation and values. For example, some teachers expressed the potential usefulness of parents' engagement with their children in everyday activities especially in shopping. However, those teachers did not seem to have clear practical ideas about how to activate and encourage the parents' role in this area (i.e. utilising parents' engagement with their children in out-of-school practices to enrich school mathematics). Some parents also highlighted different out-of-school situations which involved children's participation as a member in a community of practice such as when they talked about some children who helped their relatives in home-based small businesses, or when parents test their children's mathematical skills through sending them to buy some items from the local shop. The parents who talked about these experiences felt that their children's participation in these activities has contributed positively to their mathematical skills. However, it does not seem that they gave deliberate attention about connecting these out-of-school practices with school knowledge and *vice versa* or discussing the mathematical ideas encountered by the children in these mathematical events. The findings of this study seemed to accord with the findings of other studies such as Street *et al.* (2005) and Hughes *et al.* (in press) who indicated that children often engage with their parents and

other family members in various out-of-school practices which involve different kinds of mathematical knowledge and skills. However, the parents and teachers often fail to pay attention or recognise the mathematical aspects of these out-of-school practices or overlook the possibility of utilising such practices to enrich and extend school mathematics.

I discussed earlier in Chapter 2 how certain cultural tools such as mathematical systems and language can have a higher value in certain contexts such as the school and a lower value in another context such as out-of-school situations. Some teachers in my study provided some examples which drew my attention to similar ideas discussed in previous studies (e.g. Abreu, 1998). For example, one of the teachers pointed out the differences between old and new currency names. These names can be seen as cultural tools as they represent two different money systems and each of them has its own value in a particular context. The teacher clearly recognised how the old names were associated with out-of-school context as they are commonly used at home and in dealing with Asian shopkeepers. Yet, this old system seemed to be less valued in the school as it is considered by teachers as connected with some kind of backward or old-fashioned cultural practices. In contrast, the new money system was more associated with formal mathematics used in textbook and classroom instruction but used to lesser extent in everyday interaction by some groups of people. Another example about the differences in cultural tools used in and out-of-school was related to the mathematical language and particularly in terms of the differences between colloquial and standard mathematical terms which are used in different contexts. These differences were considered to create gaps in children's mathematical understanding as they need to figure out the meaning of different terms and switch between them according to the context. These differences between in and out-of-school cultural tools could create some difficulties as discussed by other authors such as the difficulties in transferring what children learned while moving between the different communities of practice (Lave and Wenger, 1991) or switching between the different practices (Street *et al.*, 2005).

S-Q 4: Were there any variations between the different groups of parents in terms of their perceptions about the above issues? If so, how did they vary, and why?

The participant parents provided diverse views on how mathematics is taught in school and at home. Some fathers (from BEL and AVEL groups) were not involved directly in teaching their children at home and they depended on other family members for this task. Therefore, the issue of differences in teaching methods used in home and school seemed to be unclear to them. Another group of parents (some fathers from AVEL group) provided direct help to their children on mathematical learning tasks (e.g. homework and revision) but did not see significant differences between their way of teaching and those of the teachers. However, the examples which they provided about how they taught mathematics to their children at home suggest that they used methods which are not preferred by teachers to some extent. In addition, most of the participant mothers (from AVEL group) were more aware about these differences and thought that they can cause confusion to their children. Some of them asked their children's teachers for more explanations or they tried to learn the new methods by observing their children while carrying out these unfamiliar mathematical tasks. Finally, fathers from the ADEL group showed more awareness about these differences as they had more pedagogical experiences. However, the fathers in this group did not always help their children in school learning tasks at home and only intervened when their wives or daughters found difficulties in figuring out what is required in unfamiliar mathematical exercises.

The participant teachers provided diverse views on the topic of the differences between home and school ways of teaching. Some of the participant teachers had clear deficit views about certain groups of parents especially those from lower economic and educational backgrounds (as mentioned earlier in the answer of sub-question 6 in Chapter 7). Those teachers thought that many parents lacked the appropriate knowledge and experiences which would allow them to teach mathematics in the way preferred by school. Therefore, they assigned parents peripheral roles which mainly involved checking their children's homework or rehearsing mathematical exercises. Other teachers were aware that some parents face difficulties in teaching mathematics to their children but they did not take action to resolve these difficulties through, for example, learning more about the parents' teaching methods and giving them more information about the school's teaching methods. Those teachers thought that parents would be generally keen to learn more about school's methods because they want their children to succeed and achieve high grades, but most of the teachers felt that they did not have the time and resources to raise the

parents' awareness about this issue and preferred to concentrate more on their students in the classroom.

Another interesting aspect which emerged in the data analysis was how some teachers had mixed feelings about the involvement of the parents who are more educated and who possess the social and cultural capital which enable them to approach school in a more powerful manner. Some teachers, for example, indicated that educated parents would intervene positively if they provided support to the teachers and shared the responsibilities together. Those parents also used more effective strategies in their communication with school. Some teachers also indicated that some educated parents would exploit their knowledge and familiarity with the school system and procedures to intervene inappropriately as when they questioned or criticised teachers, making more demands.

To summarise, this chapter explored parents' and teachers' views on different aspects of mathematics learning in- and out-of-school which included how they conceive of mathematics learning and how these theoretical ideas influenced their actual teaching of mathematics to their children. This chapter also highlighted some differences between home and school in terms of mathematics teaching strategies and discussed parents' and teachers' views about the nature and the connection of mathematics learning in- and out-of-school. The next chapter will extend this investigation by exploring the participants' views regarding the project's activities (presented earlier in Chapter 6) and its impact on home-school relationships and on children's mathematics learning.

9 The participants' views about the project's activities and outcomes of the project

9.1 Introduction

The previous two findings chapters investigated the views of the participant parents and teachers on two topics: home-school relationships and mathematics learning in- and out-of-school. I hope that these chapters were successful so far in providing a general picture about some of the ideas and practices which seemed to be common among parents and teachers in the case school. This chapter extends some of the ideas which emerged from those chapters. This chapter aims in particular to investigate the participants' views on different dimensions of the project's activities. The participants here include the classroom children, their parents or caregivers, and the class Teacher J. The content of this chapter is also closely connected with Chapter 6 which provided full details about the action research project and its various activities which took place in one classroom and intended to explore possible ways of promoting home-school communication and bringing children's in- and out-of-school mathematics practices closer together.

This chapter is structured around two main sections (Sections 9.2 and 9.3) which focus on this main research question:

How did the participants (the classroom children, their parents or caregivers and the class teacher) respond to the mathematical activities introduced during the project?

As I mentioned before in Chapter 6 and Appendix D, the classroom children and their parents were asked to provide their opinions about the mathematical homework activities in feedback sheets attached with each activity. Section (9.2) presents the findings of the quantitative analysis of these feedback sheets along with some qualitative interpretation and provides an overview of the collective responses of the classroom children and their parents regarding the mathematical activities introduced throughout the project.

Section (9.3) investigates in more depth the views of a smaller group of participants who were interviewed (i.e. fathers, mothers, children and Teacher J) about the projects' activities. It also focuses on the children's accounts about what they learned through their participation in the project and provides some insights about their out-of-school mathematical practices.

9.2 *Summary of parents' and children's views provided in the feedback sheets*

As I mentioned earlier, each homework activity produced during the project was accompanied with a feedback sheet which consisted of two sections to be completed by the children and their parents. Each section included a number of multiple-choice and open-ended questions. Due to space constraints, full details regarding the content of the mathematical activities, the feedback sheet questions, the descriptive statistical analysis of the participants' responses and the data summary tables are in Appendix D. The reader is advised to read Appendix D first as doing so would help to clarify some of the issues discussed in this chapter.

This section provides brief answers for the following questions originally included in the feedback sheet:

Question 1 (multiple-choice): Who helped the child at home while carrying out the activities?

The findings (see: Appendix D and Table D-1) indicated that the classroom children were often helped by different family members during carrying out the activities. It seemed that male family members, especially fathers and brothers, provided more assistance for the children in tasks which required carrying out tasks outside their homes such as counting vehicles in the street or collecting data about the prices of vegetables and fruits. In these two activities (Number 2 and 3) more than half of the children were assisted by male family members while around one third were assisted by female family members. In contrast, the majority of children were helped by female family members in most of the other activities (Numbers 4, 5, 7, 8) which required carrying out tasks inside their homes such as when they were asked to look for mathematical ideas in food

packages and in cooking. In these five activities, half of the children were assisted by female family members. Only Activity 6 (mathematics in the grocery shop) deviated from this pattern since female family members helped more even though it was supposed to be carried outside home. However, as we will see later, some parents did not follow the instructions as they, for example, did not actually go outside their homes to complete the activities and instead they gave estimated answers (e.g. the estimated the prices of goods in the grocery shops instead of actually visiting the shop with their child).

A number of points emerged from the above data. The first point is about the tendency of male family members to help with homework activities taking place outside home, the tendency of female family members to help with tasks taking place inside home and why female family members provided more help - in comparison with males - to the children in most of the activities. The issue of gender and parental involvement highlighted here is closely linked with other issues discussed in previous chapters. For example, some of the participant fathers (in Chapter 7) called attention to the social and religious customs in the village which tended to allocate at-home responsibilities to females especially in child care issues. Male members, for the most part, are the main breadwinner for their families and therefore they are outside the house for most of the time and were assigned outside-home tasks. Therefore, mothers seemed to take more responsibilities in terms of providing academic help to their children. Providing help to the children in the project's activities was part of these academic tasks which required mothers' help. The fathers seemed to help more in the activities which needed to be done outside the house or needed some interactions with male individuals such as male shopkeepers as these tasks seemed to fit more with the social image and reality of male responsibilities.

The second point raised by the data was the need to know more about the possible reasons for why some children were regularly supported by their parents while others were not supported by their parents but by other relatives such as siblings, uncles, aunts and grandparents. The findings suggest that parents from lower educational levels were more likely to provide less direct help to their children in the homework activities. Their children were helped more by other family members, mainly by siblings. In contrast, parents with higher educational levels tended to give more direct help to their children in the activities and relied less on other family members. These findings parallel with

what some of the participants said in Chapter 8 about how parents (e.g. Father J from BEL group) who lacked adequate education tried to overcome this lack by asking other family members or other educated relatives to help their children in homework, while the more educated parents (especially mothers from AVEL and ADEL groups) tended to provide direct help to their children and depended less on others.

The third point which emerged during the data analysis was about a group of parents who indicated that their children were not helped by anybody during the activity. I discussed this issue in the interview with Teacher J – the class teacher whom I worked with during the project – and he added that there were some children who did not actually carry out some of the activities and rather wrote 'mock' answers in the activity sheets. He discovered this issue through his discussions with children which followed each homework activity. He suggested that those children did not get enough assistance from their parents because they did not ask for help and preferred to do the homework quickly by themselves, or because their parents were busy and the activities were quite time consuming in comparison with typical homework, or because some families did not have the materials needed to do the activity (e.g. oven and sour cream in the last activity). In addition, some children, especially those who were helped by their siblings, indicated in the interviews that they did not often get enough assistance because their siblings were unwilling to help and therefore they carried out parts of the activity by themselves or copied the answers from other children.

Question 2 (multiple-choice): How difficult was the activity for the children?

Most of the parents thought the activities were easy for their children: in activities 2 to 6, the total percentage of parents who thought the activities were 'very easy' or 'easy' ranged between (28% to 56%) and (25% and 50%) respectively. No parents or only a few thought that the first activities (2 to 6) were difficult. The last two activities (7 and 8) seemed to be harder as more parents indicated that they were difficult (6% and 13% respectively). More information is included in Appendix D and Table D-2.

The most notable point which emerged from the above analysis was why most of the parents thought the activities were easy. As we saw earlier in Chapter 8, some parents seemed to consider mathematics which they used in everyday practices as spontaneous and based on common-sense. This type of mathematics was probably different from what they recognised as the 'real' mathematics delivered in school which is more rigid, organised and explicit. This idea provides a partial explanation for why many parents thought the project activities were easy. For example, the project's activities were quite different from what the parents used to see in the textbook exercises. The latter often consisted of long columns of sums which emphasise reaching similar answers whilst the project's activities were open-ended and therefore there were no correct or wrong answers. The project's activities were also less abstract as they were based on ideas such as shopping and cooking which most children and parents encounter in everyday life activities and therefore most people regardless of their level of familiarity with school education would be able to do well in them. In other words, some parents probably thought that the activities were easy because they were connected with everyday practices and did not require fixed answers or long procedures. In addition, the children who participated in the interviews considered some of the activities as entertaining experiments or games in comparison with the typical textbook exercises which required more writing and abstract thinking. The project's activities may have been considered more interesting and therefore they were deemed as generally easy. It is worth mentioning that the few parents who indicated that some of the activities were difficult did not actually write a lot about the problematic aspects they or their children encountered in the activity. This lack of clarity in parents' responses can be linked with previous findings discussed in Chapter 7 which suggested that some parents might feel reluctant to write their comments most likely because they lacked the writing or composition skills which enable them to express their ideas clearly or because they were concerned that the teacher might interpret their comments as criticism or as little appreciation of his efforts.

Question 3 (multiple-choice): How much help was needed by the child to do the activity?

Most of the parents indicated that their children needed a reasonable amount of help during the activity. Their views on this topic can be summarised as follows: the majority of parents (ranged between 56% and 75%) indicated in all the

activities that their children needed average or little help. In some activities (numbers 2, 6, 5, 8), one or two parents indicated that their children needed a lot of help. The number of parents who indicated that the children did not need any help varied between the activities and ranged between 13% and 28%. More information is included in Appendix D and Table D-2.

The above findings generally show that most of the parents provided a good amount of help to their children in carrying out the activities and is a positive indication that the project was successful in providing opportunities for parents and children to engage in everyday mathematical situations which include both in- and out-of-school mathematical practices.

One notable point which emerged from the above data was about who are the children who needed more help and were there any particular reasons which made them needed more help. Comparing the achievement levels of the children and their parents' indications about the level of difficulty of the activities suggests that the lower-and and average-achieving children tended to require more help in comparison with their higher-achieving peers. It is worth noting that the lower-achieving children sometimes provided unclear responses in the feedback sheets. There were three lower-achieving children: one always returned the activity and the feedback sheets empty while the other two provided feedback sheets which included fluctuating responses which changed or contrasted from one activity to another (e.g. one activity was seen as very easy but at the same time there was an indication that the child needed more help, while the next activity was considered as very difficult but the child was considered as not needing any help etc). In my view, I think that that these children were completing the feedback sheets randomly on behalf of their parents – who were often from lower educational backgrounds - because their answers were written in pencil and in the same childlike handwriting used in the second section allocated for the children's feedback. Therefore, some children might randomly indicate that that they needed more help in the activities and that can be one of the limitations of using the feedback sheet which is structured like a questionnaire.

Question 4 (multiple-choice): How much did the children learn through engaging in the activity?

Most of the parents thought that the activities contributed to their children learning. Figures and discussions presented in Appendix D and Table D-2 regarding this question can be summarised as follows: most of the parents indicated that their children learned a lot from the activities (ranged between 50% to 65%) or learned to an average level (ranged between 16% to 34%). No parent indicated that their children did not learn anything. However there were a few parents (1 to 3 parents) who indicated that their children learned little from the activities.

This last point called my attention to see whether there were particular parents who repeatedly indicated that their children learned little from the activities and whether they or their children have any particular characteristics. Through the process of comparing parents' feedback with their level of education, I found that some parents with lower educational background indicated that their children learned little from the activities. However, the situation seemed quite confusing because I found that these parents did not actually help their children in carrying out the activity. These children were helped mainly by siblings who often seemed to choose random and contrasting answers when they completed the feedback sheets on behalf of the children and their parents. Two sisters expressed in different activities their boredom of helping their brothers and they asked the teacher to stop giving these activities. Another problem was that most of the siblings who helped the children did not write any particular reasons for why they thought that the children did not learn something from the activities as they often left the comment boxes empty. This circumstance generally gave an idea about how some children might be disadvantaged because they could not get serious help from their siblings who substituted for their parents' positions in terms of educational support. However, these cases were very few. There were other examples of positive educational support provided by siblings who seemed to be more mature and who took the responsibility of teaching their younger siblings more seriously.

Question 5 (multiple-choice): How enjoyable was the activity?

Most of the parents considered the activity as enjoyable. Figures and discussions presented in Appendix D and Table D-2 regarding this question can be summarised as follows: most of parents indicated that the activities were 'very interesting' or 'interesting' (38% to 49% and 31% to 46%, respectively) in

activities 2 to 8). No parent indicated that the activities were 'boring' or 'very boring' in the first activities (2 to 5) whilst one or two parents indicated that the last activities (6 to 8) were 'boring' or 'very boring'. The teacher and I thought that the last activity was probably less interesting for some children because it involved cooking and it seemed that some of them did not like to engage with this type of work. In addition, some of the children said that the materials required to do the activity were not available at their homes (e.g. sour cream or oven).

Question 6 (open-ended): Parents' comments about any difficulties encountered by their children while carrying out the activities

Most of the parents indicated that their children did not encounter any notable problems while carrying out the activities or they did not write any answer (more details are included in Appendix D). I think that this finding can be explained in two ways: first, is that the children did not really encounter problems because the activities were well designed and they were suitable for their levels and abilities; and, second, is that the parents did encounter some problems but they did not feel that there was a need to write about them to the teacher. I tried to investigate this issue more with the parents who participated in the interviews and I found through our discussions that some children encountered some problems, but their parents preferred not to tell the teacher about them. For example, Father C talked about a problem encountered by his child during the camera activity. He said that the other children in the group did not give his child the chance to participate and therefore he did not take any photos. The father did not want to tell the teacher about this issue because he thought that this would make the teacher investigate this issue with the other children and consequently would create conflicts between the child and his friends (who are also his neighbours). Another example was provided by Father J who talked about how the Asian shopkeeper shouted at his child when he went with another child to collect information in the vegetable shop. The shopkeeper probably felt that the child was wasting his time by asking about the prices without actually buying anything. Some mothers also indicated in the interviews about how visiting shops to do the activities was quite annoying for them because they needed to stay at the shop and leave their other children at home and also they did not like to talk with the shopkeeper for a long time. However, none of the parents wrote any comments in the feedback sheets regarding these difficulties.

I discussed this issue with Teacher J who suggested that parents generally tend to show their appreciation to the teacher and hence they would probably think that writing about problematic issues might leave a negative impression on the teacher who worked hard to produce this activity. In addition, discussing some problems with the teacher can also reveal sensitive information about the child and his family. For example, some parents might not like other people to know that they do not have an oven at home or that they could not read some information written in English on food products. In addition, some parents (such as Father J for example) felt embarrassed to show their weakness in literacy and therefore they did not answer some of the open-ended questions.

Question 7 (open-ended): Parents' comments about what their children learned from the activities

Most of the parents responded to this question mainly by writing short sentences indicating that their children benefited from their participation in the projects' activities. The parents focused on a number of general learning topics which can be summarised in the following points:

- Mathematics learning skills which include: counting, comparing, collecting, presenting and analysing data, weighing, using money, reading dates, measuring heights, measuring temperatures, reading time, using stop watch, and prices and shopping
- Cognitive abilities such as: quickness, attentiveness, precise observation and mental calculation
- Personal abilities such as: independence, dealing with shopkeepers, bargaining and making decisions
- Learning through engaging in real everyday activities such as: road safety, reading road signs, different types of vehicles, shopping and cooking

More details about these learning dimensions will be discussed later when investigating how the three groups of parents (BEL, AVEL and ADEL) responded to the project's activities.

Question 8 (open-ended): Parents' additional comments about the activity or their suggestions for the next activities

Most of the parents were reluctant to provide additional comments about the activities or to write their suggestions for the next activities. Some of the teachers who participated in the interviews seemed to share similar experiences as they considered the unwillingness among many parents of providing additional comments or suggestions as quite common behaviour. This issue is connected with the previous discussion in Chapter 7 about how only some parents were communicating more effectively by sharing responsibilities and exchanging knowledge with the teachers while most of the parents depended on a more routine style and one-way school-to-home communication. Further, we saw before in Chapter 8 how some of the participant parents gave interesting ideas in the interviews about mathematical practices which they and their children engage with in their everyday life activities. For example, some parents talked about how their children helped their relatives in home-based small businesses and other parents talked about how their children buy things on credit and write down their expenses as a proof. Nevertheless, none of these ideas were mentioned by parents in the feedback sheets in the comments or suggestions boxes. There could be different explanations for this issue. One possible explanation is that parents were generally unfamiliar with being asked to provide their suggestions and they probably felt reluctant to offer ideas which might not fit well with the teachers' expectations. Another possible explanation is that the project idea was unclear to some parents who were unsure what the teacher wanted them to do. It is worth mentioning that when I compared the written comments of the participant parents with their accounts in the interview, I found that face-to-face conversation was more useful in encouraging the participant parents to talk about their opinions and to elaborate on their explanations in contrast with the questionnaire-like feedback sheet which can be a quite different experience as answering them required a more formal writing style and the need for more structure in presenting their ideas.

Parents' signature on the feedback sheets

Most of the parents regularly signed the feedback sheets. The percentages of parents who signed the activities (3 to 8) ranged between 65% and 78%. Activity 2 was an exception as it had a fairly low number of parents' signatures (39%).

This result was because it was the first activity provided in the main phase of the project (Activity 1 was for piloting purposes) and some parents were unfamiliar with the idea of feedback sheets. The parents were asked to sign the activities firstly, because it was common practice in the case school and secondly, because some teachers suggested in the interviews that the parents' signature would give at least some indication that the parents had looked through the activity and that they were aware about their children's level of participation in the project.

After presenting a general summary about parents' views on different aspects of the homework activities, I will now present the children's views on the same aspects.

Question 9 (multiple-choice): How much the children liked the activities

In all the activities, most of the children indicated that they 'liked' the activities or 'liked them a lot' (21% to 44% and 43% to 70% respectively). No child indicated that he 'did not like' the activity or 'did not like it all', except one or two children who said that they did not like activities 4, 7 and 8.

Question 10 (multiple-choice): Children's views about how difficult the activities were

In all the activities, most of the children indicated that the activities were 'easy' or 'very easy' (28% to 43% and 41% to 61% respectively). One to three children indicated that some activities (numbers 5, 7, and 8) were difficult. No child indicated that any of the seven activities was very difficult.

Q11 (multiple-choice): Children's views about how much they learned through their participation in the activities

Most of children indicated that they learned to an 'average' degree or 'a lot' (19% to 46% and 31% to 46% respectively in all the activities). Some children indicated that they learned little (between 12% to 22% in all the activities). In two activities (numbers 3 and 7), only two children indicated that they learned nothing. It is worth noting that the few children who gave extreme responses such as (they learned nothing or considered the activities as very difficult or very

boring) possibly picked the answers randomly as there was some inconsistency among their answers. More analysis about children's views regarding what they learned from the projects' activities will be provided later in the analysis of the children's interviews.

Children's signature

The majority of children signed every activity (59% - 84% in all activities). The number of children who did not sign the activities ranged between 0% and 25%.

I hope that the analysis and discussion presented so far in this chapter were successful in providing an overview about the parents' and children's general responses to the activities. The next section extends this analysis as it tries to obtain a more in depth understanding through a focus on how the different groups of parents responded to the homework activities provided in the project.

The responses of the three groups of parents (BEL, AVEL and ADEL) and their children regarding the homework activities

I explained earlier in Chapter 6 how I categorised the parents of the classroom children into three groups according to their educational level: basic level (BEL), average level (AVEL) and advance level (ADEL). The previous part of this chapter provided an overview about the feedback of the whole group of parents of the classroom children. In line with the structure of the previous two findings chapters, I will try to draw some parallels or differences among the three groups of parents and look for patterns in their feedback sheet responses. This process would be helpful to see how the different groups of parents might differ or accord on certain aspects. I particularly focus on three aspects in this investigation: the educational level of the parents, their communication level with the teacher, and the achievement level of their children (based on information set provided by the class Teacher J). My intention here is to see whether any of these dimensions could be connected with a particular pattern of parents' or children's views regarding the project activities.

In order to achieve this objective, I summarised different sets of information (which deal with the five issues presented below) into a more concise set (Table 9-1) which has six columns explained as follows:

- Students' serial numbers in the classroom which are used instead of their names
- Parental educational level: the parents were categorised according to their educational level into three groups (BEL, AVEL and ADEL)
- Parents' level of communication with school which was based on the estimation of the class teacher and was divided into three levels (low, average and good)
- Child's achievement level which was based on the estimation of the class teacher and was divided into three levels (low which include children with D level, average which include C level and good which includes A and B levels)
- Child's participation level in the project's mathematical activities which was calculated through categorising the children into four levels based on the number of activity sheets completed and returned back by each child (very low = 1-3 sheets, low = 4-6, average = 7-9, and good =10-12 sheets)
- Level of parents' responses to the activities which was based on the rate of returned feedback sheets completed by the parents (low = 1-3 sheets, average = 4-6, and good = 7-9)

Please note that Table 9-1 (located at the end of this section) includes information about 32 children. The total number of children at the beginning of the project was 35. Three children were excluded from this analysis: Child number 15 lost his activities folder while children numbers 4 and 33 participated for a short period at the beginning of the project and then they were moved to another classroom. More information about the three groups of parents and their children is presented in Appendix B.

The following discussion is structured around the three groups of parents BEL, AVEL and ADEL and it is based on their responses in the feedback sheets

Group (BEL)

This group included four couples with a basic level of education (primary or basic literacy). It also included two mothers (widows) at the same educational level. This group seemed to be quite distinctive from the other two groups. First,

because it is the only group which has parents who were considered by the teacher to have a low level of communication. There were three parents who were considered to have low communication and one with an average level. In contrast, there were two parents who were considered to have good level of communication with school. Second, the children of the parents who communicated less with school (children numbers 8, 17, 23) were also considered to be lower or average achievers. Similarly, the children of the two parents who communicated more (children 6 and 18) were considered to be good achievers. That finding would probably highlight some connection between the parental level of education, their communication with school and their children's achievement.

Four parents in this group responded well as they completed most of the feedback sheets. Interestingly, parents with a low communication level with the school (children numbers 23 and 8) responded well to the feedback sheets, while parents of two children (numbers 9 and 17) showed average or low level of responses.

Three children in this group were regarded as average achievers by the teacher. They showed mixed levels of participation in the project: low, average and good which were estimated by the number of completed homework and classroom work sheets provided through the project. An interesting case was child number 23 who was considered to be a low-achiever but who showed a good level of participation in the project's activities.

The examination of the BEL parents' responses in the feedback sheets indicated that most of them were not directly assisting their children in the homework activities. Other family members, especially sisters, were providing help (they will be called caregivers hereafter). In addition, there were some contradictions between the answers in the multiple-choice questions and the open-ended questions provided by the caregivers in the feedback sheet. For example, some caregivers chose 'child learned little' in the multiple-choice question, but they indicated that the child learned a lot in the open-ended question. This finding might suggest that some parents or caregivers did not read the feedback sheets thoroughly or paid little attention to the content of the multiple-choice questions. Some children talked about this issue in the interviews. They said that their parents or siblings were sometimes bored with the feedback sheets which

required them to answer the same questions every week. Further, the caregivers often did not write about any problems encountered. Only a few of them wrote brief sentences about the problems they encountered in some activities which were mainly about the children's lack of skills in literacy and numeracy. Similarly, in most cases, no further suggestions were provided. Most of the comments mainly consisted of thanking the teacher or asking him for more activities of this kind.

Learning aspects highlighted by the caregivers in the feedback sheets were often copied from the introductory topic already provided as additional information for parents in the activity sheet (e.g. measurement, expiry dates, prices, and time). It seemed that the caregivers found some difficulty in writing about learning aspects which emerged through children's work in the activity. On a few occasions, some of caregivers provided interesting information or recognised aspects of learning which differed from more typical responses. For example, one sister wrote: *"the activity helped the child to articulate his ideas; it motivated the child to learn more about the idea of weighing."* Another sister wrote: "*the activities helped the children to develop their imagination ... enrich their language skills ... (and) provided interesting and new ideas.*"

Group AVEL

This group included the parents of 20 children who have either intermediate or secondary levels of education. Most of the parents in this group (14 parents) were regarded by the teacher as having a good level of communication with school. A smaller group (6 parents) was considered to have an average level of communication. No parent in this group was considered to have a low level of communication.

Most of the children in this group (18 children) were considered by the teacher as being academically good. Two children were considered to be at an average level and none were considered to be at a low level of achievement.

In this group, most of the parents showed a good or average level of participation in the project – as estimated through the number of returned feedback sheets. Most of the children who belonged to this group also showed a

good level of participation in the project – as estimated by the number of completed and returned homework and classroom activities.

Looking more closely at the feedback sheet responses of the parents in this group called attention to the following aspects:

Although the mothers in this group took an extra role in assisting the children with carrying out most of the activities, there were some cases where the children were assisted mainly by fathers - especially when the fathers had higher educational levels in comparison with the mothers. I also found that when both parents have secondary level education, they were more likely to give direct help to their children in the activities and depended less on relatives or older children. In contrast, parents with an intermediate level of education seemed to depend more on their daughters in helping the children in the activities (similar to the above discussed parents in BEL group).

Similar to the BEL group, most of the parents in the AVEL group provided short comments and suggestions which often lacked clarity. However, in contrast to the BEL group, it seemed that parents in the AVEL group showed relatively more willingness to write about the problems encountered during the activity. Some parents wrote, for example, about unexpected problems such as: '*it was difficult for the children to read the 'English' numbers used in the price tags and expiry dates.*' Others wrote that in some activities that they did not think their children benefited from the activity because they were actually doing most of the work on behalf of their children because the task was quite difficult (e.g. making the weighing scale and carrying out the cooking activities).

Most of the parents in this group wrote their views about the learning experiences which resulted from their children's engagement in the homework activities. Like the BEL group, some parents copied the main learning ideas stated in the activity sheets while others wrote more details about aspects of learning which went beyond typical ideas. For example, some parents wrote that their children: *"learned about using mathematics in real everyday experiences ... they learned to think quickly ... to deal with the Asian shopkeeper ... this experience gave them a sense of independence and enjoyment."* However, most of the parents in this group did not write any further suggestions and instead expressed their appreciation to the teacher and asked for more activities

of this type. Only a few parents wrote short suggestions which called the teacher's attention to the importance of developing children's basic numeracy and literacy skills and encouraging children to work independently. This last point implied that some parents were somewhat unconvinced about the contribution of these activities to their children's learning as their comments indicate that they give priority to teaching basic skills and individual work.

Group ADEL

This group included the parents of 6 children. In some cases, one of the parents usually had a higher educational level than the other (e.g. one with a college education level while the other with a secondary, intermediate or basic education level). The gap between the education levels of some of the parents in this group was quite notable (e.g. a father with master's degree and a mother with intermediate level of education, or a mother with bachelor's degree and a father with intermediate level of education).

Most of the parents in this group seemed to have a good level of communication with the teacher except in one case where the parents were considered to have an average level of communication. Most of the children in this group were considered to have a good level of achievement except one child who was regarded as having an average level of achievement. This group showed notable contrasts with the parents of the BEL group in terms of education level, level of communication with the school and the children's level of achievement. Alternatively, parents of the ADEL group shared some features with the AVEL group as most of the children and parents in the ADEL group responded well to the mathematical activities and wrote some comments on the feedback sheets provided during the project.

Examining more closely the feedback sheets returned by the AVEL parents called attention to the following aspects:

In most of the cases, one or both of the parents provided assistance for their children on the activities. The type of the task played an important role in determining which parent will provide more support. For instance, mothers usually took part in at-home tasks while both parents helped with outside-home tasks. In addition, the parents in this group rarely depended on other family

members with helping their children - unlike BEL parents and some AVEL parents. In the cases where a large educational level gap existed between the two parents, the parent with higher educational level tended to provide more help to their child in carrying out the activities.

Like other groups, few parents wrote in a clear and detailed manner about problems encountered, learning aspects or suggestions. However, most parents did not leave the answer boxes empty and they at least wrote some short answers or brief comments. In the question which asked parents about what learning aspects emerged through children's participation in the activity, some parents copied the same ideas already stated in the activity sheet (as did BEL and AVEL parents) while others provided more detail about less typical learning aspects providing more insight about their children's out-of-school practices. Their examples included: counting money change, using the stop watch feature in the mobile phone for accurate time measurement, indicating that 'Western' numbers are more widely used than 'Arabic' numbers in the expiry dates, the process of bargaining with the Asian shopkeeper etc. Those few parents who gave these examples also highlighted genuine problems encountered by the children when carrying out the activities such as: goods are not priced in the grocery shop and the child found difficulty in dealing with the Asian shopkeeper who used different language.

Most of the parents in this group did not give any further suggestions for future activities and instead they expressed their appreciation to the teacher. Only very few wrote some suggestions which included, for example, an idea of reading water and electricity meters.

To summarise, there were various similarities between the three groups of parents (BEL, AVEL and ADEL) in their responses on the feedback sheets. One similarity was that most of the parents and the children responded positively to the activities and completed the feedback sheets regardless of the achievement level differences among children and the educational level and communicational level differences among parents. These findings suggest that the project's activities were quite successful in providing opportunities for all groups of parents and children – with very few exceptions – to participate and benefit from this new work. In addition, I assumed before carrying out the analysis that parents with a higher educational level would respond more while parents with

lower educational levels would respond less. However, the outcomes of this analysis suggest that there are some cases which deviate from this assumption. For example, there were parents who have a basic educational level and a low level of communication and their child's achievement was also low, but they responded well to the project's activities (e.g. Children 8 and 23). Alternatively, there were parents from the ADEL group with good levels of communication and their children were good achievers, but their participation in the project's activities were less than expected (e.g. Children 3 and 29). This finding would suggest that not all parents who have lower levels of education or lower communication with the school are necessarily distant or unwilling to participate in new initiatives introduced by schools. Some parents might try to compensate for their lack of education by adopting alternative strategies such as asking other family members to help.

There were also some differences between the three groups of parents. One of the most notable differences was that most parents from ADEL group and some from the AVEL group provided direct help to their children when carrying out the activities and did not rely a lot on other family members. In contrast, most of the parents in the BEL group and some of AVEL parents relied more on other family members in providing such help to their children.

Students' serial numbers	Parental educational level	Parental level of communication with school	Child achievement level	Child level of participation on the homework and classroom activities	Level of feedback sheet returned by parents
6	BEL	Good	Good	Good	Good
8	BEL		Average	Good	Good
9	BEL	Average	Average		
17	BEL		Average	Average	Average
18	BEL	Good	Good	Good	Good
23	BEL			Good	Good
1	AVEL	Good	Good	Good	Good
2	AVEL	Average	Good	Good	Good
5	AVEL	Good	Good	Average	Good
7	AVEL	Good	Good	Good	Good
11	AVEL	Average	Good	Good	Good
13	AVEL	Good	Good	Good	Good
14	AVEL	Good	Good	Good	Good
19	AVEL	Good	Good	Good	Good
20	AVEL	Average	Good	Average	Good
21	AVEL	Average	Good	Good	Good
22	AVEL	Good	Average	Good	Good
24	AVEL	Average	Good	Average	Average
25	AVEL	Good	Good	Good	Good
26	AVEL	Good	Good	Good	Good
27	AVEL	Good	Good	Average	Good
28	AVEL	Good	Good	Good	Good
30	AVEL	Good	Good	Good	Good
31	AVEL	Good	Good	Good	Good
32	AVEL	Good	Average	Good	Good
35	AVEL	Average	Good	Average	Good
3	ADEL	Good	Good	Average	Good
10	ADEL	Good	Good	Good	Good
12	ADEL	Good	Average	Good	Good
16	ADEL	Average	Good	Good	Good
29	ADEL	Good	Good	Average	Average
34	ADEL	Good	Good	Good	Good

Table (9-1) Summary of parents' and children's characteristics and their level of participation in the project

9.3 *The participants' views about the project discussed in the interviews*

This section extends the previous discussion by exploring the views of some parents who participated in the interviews as well as the class Teacher J regarding the project's mathematical activities. Later, I will discuss the children's views regarding the project's activities and their accounts about what their learning experiences were during their participation in the project.

9.3.1 Parents' views about the project

Most of the parents who participated in the interviews gave positive comments about the mathematical activities in the project. Here are some examples of what they said:

Father J (BEL group) said that he did not give direct help to his child, but other siblings assisted the child in carrying out the activities (which confirms some of the findings stated in the previous section). The father was generally happy about his child's work on those activities as he thought that they allowed the child to be more self-reliant and to take more initiative in everyday situations which require mathematical skills. He said, for example, that his child began to show a better understanding about using money and sometimes used some of the ideas introduced by the activities when playing with other children at home.

Father E (AVEL group) thought that the mathematical activities provided interesting and useful ideas which extended his child's mathematical knowledge. In addition, he indicated that the activities provided opportunities for him and his child to talk about other topics which may not necessarily be related to the original idea stated in the mathematical activity such as talking about the purpose of different types of vehicles and how people used different types of transportation in the past. Father E also noted that his child began to ask more questions about the mathematical ideas which he encountered in his daily life activities.

Father D (ADEL group) provided a more detailed view regarding the project's activities in comparison with the other parents. First, he gave very positive

feedback about the project as he thought that it: *"reinforced the desire for learning in the children and promoted important skills such as experimenting and discovering ... they fitted well with the characteristics of the children of this age who prefer manipulating material objects instead of dealing with theoretical and abstract ideas."* The father also talked about how his child used to talk about the classroom mathematical activities with him and with other family members and how the child was enthusiastic to do some of these activities again at home. The father said that he and his son were both pleased about their shared work during the activities although he sometimes felt quite bored with his child's "endless questions". Finally, Father D noted that his child showed more confidence in dealing with other people (especially shopkeepers) in situations which required mathematics as well as in expressing and talking about his ideas with others. The feedback sheet and the classroom presentations were considered by the father as new experiences which contributed to the child's ability to express his ideas and views.

The participant mothers generally gave brief answers regarding their views about the project's activities. They generally focused on how the activities contributed to their children's skills in terms of dealing with everyday mathematical problems in the context of real situations and how their children were motivated to ask questions about the mathematical aspects which they encountered such as when shopping with the family. One of the mothers (Mother B) said, for example, that through the project's work she began to know more about her child's mathematical abilities and became more aware of his strength and weakness. She provided an example about how her child was confused in the supermarket in reading two prices (3.750 and 375 Fils). The mother took this opportunity to provide more explanations for him about the differences between the two prices and noticed that this explanation improved the child's ability as he became more able in reading other prices correctly on later occasions.

9.3.2 Teacher J's views about the project

In the early stage of the project, the class Teacher J talked about what motivated him to participate in the project. He indicated that he hoped that the project would initiate some changes in two particular areas which he felt needed

more attention. First, he felt that there was a need for making mathematics lessons less routine and to show the children the usefulness of mathematics as an essential tool placed at the centre of everyday life activities. He thought that his students generally liked mathematics and rated it as their favourite subject. Nevertheless, he felt that their love of mathematics would disappear if they kept learning it in the same routine way which emphasises the symbolic and abstract aspects of mathematics learning. He implied that this abstract understanding is necessary, but it should be built upon and integrated with more practical work. However, he acknowledged that these practical aspects were often overlooked in his teaching practice in the classroom for various reasons described earlier in Chapter 8. Teacher J described his past attempts to add more practical activities in the mathematics lessons as being "limited and lacked outcomes". Therefore, he hoped that his participation in the project would provide some practical ideas for making mathematics more connected with children's daily experiences and also add some changes which hopefully would make mathematics teaching less routine and more meaningful for the children.

Second, Teacher J felt that there was a need to increase the parents' awareness about school teaching methods and *vice versa* (which he and other teachers discussed earlier in Chapters 7 and 8 on the topic of efficient communication between home and school and the need to bridge the gap and reduce the conflicts between home and school mathematics learning). He emphasised:

1. Teachers need to learn more about how parents teach their children mathematics at home and what kind of difficulties they encounter during this process so the teachers can take action and resolve these problems
2. Teachers should increase their efforts in increasing parents' awareness about how teachers teach their children and what aspects or concepts are more emphasised by the teacher in the classroom and how parents can provide constructive help in this area
3. Teachers should increase their efforts in raising parents' awareness about their important role in promoting their children's mathematical learning in school-like tasks such as homework and revision as well as their role in utilising the everyday experiences of the family at home to enrich and support their children's learning
4. There is a need for providing organised activities for shared work between the parents and their children as doing so would allow parents

to know more about their children's strengths and weaknesses and could also allow the children to learn "real knowledge" through their interactions with their parents and increase their sense of confidence and independence

I interviewed Teacher J again at the end of the project in order to investigate his views regarding the work done. He gave positive opinions and showed his willingness to continue this type of work in future. In addition, he highlighted various points which he considered as positive outcomes of the project. For example, he indicated that the project's activities helped him to "*break the routine style of teaching mathematics*" and made mathematics lessons more interesting for him as well as for his students. He indicated that his students showed a good deal of enthusiasm in their engagement with the different activities and they insisted on doing some of the activities again and sometimes gave some ideas for new activities. The children were also interested to know what they would do on the next weekly homework and classroom activities.

In addition, Teacher J indicated that the project's activities introduced useful ideas which helped him to change some of his teaching practices. For example, he indicated that he became more aware about the importance of integrating more practical activities with the typical theoretical teaching in mathematics lessons. The project work also turned his attention to the importance of utilising the everyday experiences of his students and the resources available in their out-of-school environments in order to make their learning more meaningful and more connected with their lives. Interestingly, he mentioned on some occasions that although he knew that the above aspects were important before his involvement in the project, he thought that the project helped him to transform this general awareness into real actions in the classroom through organised and collaborative efforts.

Teacher J also indicated that the project's activities provided more opportunities for the children to engage in group work and to discuss and share their experiences together inside and outside the classroom. He often said that this type of group work was quite difficult to implement at the beginning of the project because the students were more familiar with the individual type of work and also because there were some difficulties encountered with classroom organisation and time management. However, he thought that his students

gradually became more familiar with group work and became more organised and cooperative with each other. The activities also seemed to help the teacher in presenting a "new image" of mathematics to the children that is less rigid and more flexible and meaningful. The teacher felt that his students began to see mathematics as not just symbols, operations and results, but also as an essential tool which they constantly use in their everyday life. He also stated that after the project work ended, some of the children recalled and referred to some of the ideas introduced during the project and connected them with new ideas introduced in following lessons. Some of the children also brought up new out-of-school mathematical ideas during mathematics lessons and talked about them in the classroom. In the next semester, Teacher J emailed me some pictures of his students while carrying out some mathematical activities - which shared similar ideas with the project's activities - in the classroom. The pictures showed some children participating in different games which included mathematical ideas such as dominos, UNO, playing cards, 'number fishing' and selling activities.

Teacher J also indicated that the project activities helped him to discover more about his students more implicit characteristics. For example, he talked about a high-achieving child who actively participated in the project's classroom activities. After the project ended, the child began to raise interesting questions in the classroom which emerged from his out-of-school experiences and observations and he also demanded more "experimental" work similar to the project's activities. The teacher commented on this child by saying that that the project's activities were successful in "*activating the child's curiosity*". Furthermore, the teacher was surprised to see how two of the lower-achieving children - who always sat calmly at the back of the classroom – were active in some of the project's classroom activities. For example, they made some beautiful three-dimensional designs by using straws and clay and presented their work to the teacher and other children in their group. The teacher thought that those children had creative skills which were hidden behind their disengagement and poor performance in the typical classroom work. He thought that these two children found difficulties in engaging in the typical mathematics lesson because these lessons were detached from their interests and the lessons perhaps used a language which they do not understand. This idea remind me of Street *et al.*'s (2005) argument about the disengagement of some children who found difficulties in switching between the different types of

mathematical practices because of the disjoint between in- and out-of-school mathematical practices.

Teacher J also spoke about how the project's activities were helpful in providing some solutions for some difficulties which emerged during the implementation of a new assessment system recently introduced to the Bahraini schools. Teacher J talked about the difficulty he encountered in assessing the so called 'general learning competencies' which basically focus on promoting multi-purpose skills across all subjects. These competencies include, for example: reasoning, problem-solving, explaining, and collecting and analysing data. In the interviews discussed earlier, the participant teachers talked about a common difficulty which they encountered in designing suitable materials and finding ways for assessing these new competencies because there were little straightforward connection between them and the content of the textbook. The project's activities, in Teacher J's point of view, gave some practical solutions for these difficulties as the mathematical activities had a special focus on problem-solving, collecting and analysing data, comparing results, promoting research skills and utilising out-of-school resources which were all at the heart of the new assessment system.

Teacher J's views about the parents' responses to the project's activities generally indicated that he was glad that many parents were actively engaged with their children in carrying out the homework activities and most of them returned the feedback sheets on time. He indicated that there was notable difference in the level of parental involvement in their mathematics education before and after the implementation of the project as, for example, some parents began to ask him more questions about their children's progress in mathematics and were interested to learn more about the school's teaching methods.

Finally, he highlighted some problematic issues which emerged during the project which were overlooked due to time limitations. He suggested that there was a need to arrange more meetings with the parents in order to learn more about their teaching methods used at home and also to raise their awareness about the school's teaching methods. We arranged only one meeting which was insufficient for achieving this goal. The teacher also thought that the process of planning, designing, implementing, and assessing the mathematical activities during the project required more time and efforts in comparison with the typical

activities. This circumstance calls attention to the necessity of collaborative efforts among a group of teachers along with the help of parents in order to achieve good results because one teacher cannot carry out all this demanding work alone.

I generally share with Teacher J most of his views. In order to avoid repetition, I will focus on discussing other aspects which attracted my attention during the project. During the project I made some comparisons between the project's activities with the typical mathematical activities included in the children's portfolios (i.e. folders which included a collection of the children's work in different subjects) carried out before implementing the project. I found that the typical mathematics activities often consisted of exercises replicating those provided in the textbook. They were mainly based on numeric problems and sometimes there were some word problems which often had little connection with real situations or everyday problems. Similarly, homework activities were essentially repeated exercises which aimed to improve the children's skills through drill and practice. There was little space in these activities for expanding the children's abilities by providing new mathematical ideas which could challenge and extend their understanding and help them to apply their school knowledge in other contexts. The word problems in these activities were quite detached from the real life problems of the children. For example, there was a word problem which focused on the number of falling tree leaves in the autumn, a phenomenon that is uncommon in Bahrain as most of the plants are coniferous. In addition, I found that the typical homework sheets lacked adequate information which could help the parents to learn more about the purpose of the homework and to learn about how they can help their child in completing it as required. Most of the parents did not write any comments or even sign the typical activity sheets. As a result, the project's activities tried to overcome some of the above issues and I hope that they were successful in changing some aspects for the better. The next two sections provide more information about the outcomes of the project. The next section (9.3.3) discusses the impact of the project on home school communication and section (9.3.4) investigates the impact of the project's activities on children's learning.

9.3.3 The impact of the project on home school communication

I discussed earlier in Chapter 7 the teachers' views about of the gaps in home-school communication as illustrated by the predominance of one-way school-to-home type of communication and often lacking organisation and efficiency. Therefore, one of the main aims of the project was to find ways for improving some aspects of home- school communication by providing more opportunities of knowledge exchange and two-way communication between home and school. The project offered various new ideas which intended to achieve this aim. These ideas included: learning more about parents' views through seeking their feedback and suggestions in feedback sheets attached with each homework activity, and through interviews and open meetings. I also reviewed with the class teacher the current communication practices and we worked together in implementing some activities which tried to raise parents' awareness about their crucial role in their children's education and communicating that their cooperation and expertise are acknowledged by the school. We gave the parents some information which intended to help them to know more about the school's goals and strategies and also sought their suggestions and explored their views. The outcomes of these attempts varied from one activity to another. For example, the parents' responses to the feedback sheet were very good in general as most of them completed, signed and returned the activity and feedback sheets on time. However, most of the parents did not write much about their suggestions or about problematic aspects encountered during the activities. In addition, the number of parents who attended the open meeting in the school was below expectations. The parents who did participate in the interviews were very helpful and provided valuable insights which helped in understanding more about the research problem. It is important to note that achieving remarkable improvements in home-school communication is not an easy task which can be accomplished within a short-term period because this process of home-school communication is part of a wider micro-politics process which needs longer time and persistent efforts in order to implement real changes. However, I think that the project was successful in identifying some practical ideas and highlighting some important aspects which can be further developed in the future by other researchers and other projects.

9.3.4 The impact of the project on children's mathematics learning

Most of the classroom children were interviewed in the third stage of the project (as discussed earlier in Chapter 6). The first focus groups (called interviews hereafter) were carried out at the beginning of the third stage of the project. These interviews focused on the children's experiences with the camera activity which required them to take photographs of mathematical events in out-of-school contexts. The interviews focused on how the children worked together on these tasks and how they recognised the mathematical ideas embodied in different photographs taken in different contexts. The children were interviewed in groups again at the end of the project. These interviews focused on the children's views about the homework and classroom mathematical activities provided during the project and their accounts about what they learned through their participation in the project.

9.3.4.1 Children's views about the camera activity

Most of the children who participated in the six interviews - which explored their views about the camera activity - showed an interest in talking about their experiences and they were generally happy with the project. In what follows I will present an overview of the photographs taken by the children which will be followed then by a discussion of some important points which emerged through the analysis of these interviews. More information about the photographs and the mathematical ideas brought up by the children during the interviews is included in Appendix C.

The children took photographs in different places inside and outside their homes such as in the kitchen, sitting room, bedroom, garden, grocery shop, mosque, cemetery, and other sites. The photographs focused on different things (e.g. cars, home appliances, groceries, traffic signs, weighing devices, toys, cloths, decorations and furniture). Most of the children were helped by other people such as family members and friends during the activity. Children in some groups (groups 2, 5 and 7) went together to different places and sometimes with an older companion and worked collaboratively in taking different photographs. Other groups (3, 8) could not meet together so they worked individually on this task (each child took some photographs and then handed the camera to another

child). Some groups (1, 4) had difficulties in organising their work as some of the children did not take any photographs because other children took over the camera and did not allow others to participate. The outcomes of the camera activity can be summarised in what follows:

Extending children's mathematical knowledge

The photographs included different mathematical ideas which can be categorised into two main types. The first type is the initial mathematical idea which the children thought about at the time of taking the photographs. The second type included the mathematical ideas which were extended during the interviews through children's discussions with each other and through my scaffolding of their initial ideas. For example, I found that the children often focused on geometrical shapes and counting as the most explicit mathematical ideas found in most of the photographs. Therefore, I encouraged the children to talk with each other and try to find other less explicit mathematical ideas which included, for example, measurements, prices, estimating, sorting, and operations and also about their everyday experiences connected with the situation presented in the photographs.

The children's accounts about the content of the photographs, the places where they were taken, and the mathematical ideas embedded in these situations contributed to extending their ideas to include more advanced concepts. For example, one of the children tried to explain a pattern of tiles by using his hands to explain what he described as "*one tile is standing, the other is laying*" while another child tried to add more explanations by saying that the tiles were "*reversed or turned up and down*". Here, I introduced the children to a new concept of horizontal and vertical lines. Interestingly, some of the children used the terms horizontal and vertical instantly in other explanations of other photographs. In another group, the children were laughing about a parent's fingers shown by mistake in one of the photographs. The children suggested that the mathematical idea in that picture was about "*thin and fat*" fingers. I encouraged the children to think about more ideas. One of them said that they use their feet to measure the distances such as when measuring the football field. Some children noticed that there was an opposite relationship between the size of the foot and the number of total units resulted from the measurement process, and one of them said: *"if your foot is big the (total) number will be*

small; my foot is small so the (total) number will be big". Some children called attention to the differences in shoe sizes. One of them joked by saying that his size was 101. Another example was about a photograph of a water meter. At the beginning, the children indicated that the mathematical idea in this photograph was about numbers. But through more discussion, the children provided more interesting examples such as the relationship between the numbers in the water meter and the amount of money due in the water bill. There were many other examples where the children began by talking about simple mathematical ideas and gradually - through peer discussion and scaffolding - they managed to find out more interesting and less explicit mathematical ideas. These examples are included in Appendix C.

Discussing mathematical ideas found in some photographs allowed me not just to learn more about the children's understanding, but also to correct some of the children's misunderstandings regarding some mathematical ideas. For example, some children confused rectangle and square shapes when they talked about some objects shown in the photographs. Others were confused in reading prices such as 5.900 (one of the children read it as 90 and 500 while another child said 900 and 500). Another group of children thought that shapes such as circle, disk, oval and ball items were all the same. Discussing these ideas with the children through using examples taken directly from the photographs, which were also related to authentic situations, was helpful in clarifying these mathematical ideas and explaining them to the children more effectively.

Providing more opportunities for the children to talk about their experiences

One of the interesting observations during the interviews with children was about how the children acted differently in the classroom and the interview room contexts. I discussed earlier in Chapter 6 some of the difficulties which I and the teacher encountered when the children were asked to present their work in front of the class. The main challenge was the children's difficulties in expressing their ideas and talking about their experiences regarding the camera activity in front of other children in the classroom. There were also other problems connected with classroom management and discipline. Therefore, I hoped that the interviews would provide a quiet and encouraging environment which would help the children to express their ideas more openly. The children in the interviews

showed some variation in their ability to express their ideas. Some children were shy and did not like to talk, while others were talkative and dominated the discussion most of the time. However, I found that some of the shy children became more talkative later in the next set of interviews regarding the mathematical activities probably because they became more familiar with me or the project's ideas or because they had more opportunities to talk at different occasions during the eight weeks of mathematical classroom and homework tasks. Some children on the other hand, showed wonderful skills in expressing their ideas and talking about their experiences during the camera activity. It is worth mentioning that videoing the children during these interviews was a wise decision as it allowed me to see the body language and gestures of the children which subsequently helped me to understand what they wanted to say especially for the children who faced difficulties in verbally expressing their ideas.

Learning more about the mathematical language used by the children

One of the interesting observations which emerged through the interviews – and is connected with previous findings in Chapter 8 - was that most of the children often used the old currency names (e.g. Rupee, Anna) when talking about their experiences about using money. For example, one of the children who was concerned about getting cheated by the shopkeeper said: *"when we give the seller five Rupees, he might cheat us, so I told him to return back four Rupees (if I bought something that costs one Rupee). If I bought something that costs half Rupee, I would say return the other half, or four Annas, or 12 Annas, like this!"* Although the teacher constantly gave more emphasis on using the new currency names (e.g. 100 Fils, 50 Fils), the children rarely used these names during the interviews. In addition, these differences seemed to be totally overlooked in the textbook which only uses the new system and mentioned nothing of the old system. Some of the teachers indicated that that these differences can be one possible reason for difficulties encountered by the children in solving textbook problems while the children in reality do have the mathematical skills to deal with shopkeepers and they always argue with their parents about issues related to pocket money.

Another issue which attracted my attention during the interviews was that some of the children found difficulties in shifting between the Arabic / Eastern numbers

(i.e. ٠,١,٢, ٣) used as the main medium in instruction and curriculum in school, and the Arabic / Western numbers (i.e. 0, 1, 2, 3) which are widely used in out-of-school contexts such as in price tags, expiry dates, digital and ordinary clocks, T.V. channels, mobile phones etc. Again, the mathematics textbook did not seem to give much attention to these differences and focused only on the Arabic / Eastern numbers.

Learning more about the children's out-of-school mathematical practices

The children took photographs of different everyday situations in different contexts. These photographs and the following explanations provided by the children in the interviews gave a vivid picture about their out-of-school contexts and their mathematical practices there. These included their environments, activities and places which they like, social relationships and cultural resources and their views about mathematics and how they use it in school and out-of-school. As I mentioned in Chapter 6 and Appendix D, I used many of the ideas which emerged though these interviews later in the homework and classroom mathematical activities. Some of the photographs were also displayed in the classroom and were used by the teacher as additional examples in mathematics lessons.

During the interviews, the children repeatedly talked about how they tried to use basic mathematical strategies in order to avoid being cheated by the shopkeepers. Some of the children gave interesting accounts about this issue, for example, a child said that the items in the grocery shop are not priced and therefore he needed to ask the shopkeeper about the price of many things and then chose which things he would like to buy. Therefore, some of the children showed good knowledge about knowing the exact prices of many items showed in one of the photographs taken in the grocery shop. Some children showed an excellent ability in mental calculation as I asked them some questions which required them to add the prices of different items or figure out how much change they would get if they paid a specific amount of money to buy certain items. Another example was when the children talked about a photograph taken in the mosque. At the beginning, they talked about the geometrical shapes found in the Islamic designs, then they moved to more advanced ideas such as trying to figure out the name of the dome shape at the top of the mosque - which some children called the half-ball - and how the sun rays went through the small

windows around this dome and reflected to the other side at different times of the day.

The third interesting example was a photograph of a bird cage. The children who took this picture talked at the beginning about the geometrical shapes which appeared in the photograph, and then one of the children said that there were more birds in the top half of the cage than the bottom half. The conversation continued to revolve around how much the children pay to buy food for the birds, and the relation between weight and price, and the different types of weighing devices. Some of the children diverted the conversation to talk about their experiences in buying vegetables and fruits. They were particularly interested in the weighing process where the shopkeeper uses different iron weighing units. Another child talked about his observations about how the nurse measured his mother's weight in the hospital and used a different type of scale there.

9.3.4.2 Children's views regarding the project's mathematical activities provided by the focus groups

The second set of focus group interviews with the children were carried out at the end of the project. In these interviews I invited the children – who were divided into four groups - to talk about their views and experiences about the project's homework and classroom mathematical activities (as discussed earlier in Chapter 6). In what follows, I will focus on four main topics which summarise the outcomes of these interviews:

Children's accounts about what they learned through their participation in the project

The participant children talked in the interviews about their learning experiences which emerged during their work on the project's activities. Most of the children gave general description about what they learned by saying, for example, that they learned about: *"length ... measurements ... heartbeats ... weighing scale"* etc. However, there were some children who provided more interesting and detailed accounts about their learning experiences. There were some children from different achievement levels who indicated that they learned from the project about using mathematics in everyday activities. They said for example:

"We learned to count money and measure weights in the vegetable shops"
"I learned about the cash machine and weighing scale in the grocery shop"
"We learned to check the expiry dates; if I bought an expired strawberry milk then I might get sick or die"
"We learned that there are different prices for different things, some things are expensive, some things are cheap"
"I learned that mathematics is everywhere and we need to search for it"
"I learned how to make things from anything available, even from rubbish, things which involved mathematics"
"We learned from the activities (how to avoid being cheated) by the shopkeeper, if he cheated us our parents would get mad at us ... now we became smart, the shopkeeper can't cheat us"

One of the most interesting answers was provided by the children in group 4. They implied that what they learned from the activities was that mathematics is not restricted to what they learn in the textbook, but it includes a wide range of ideas which they did not previously consider to be mathematics. Here is part of our conversation about this topic:

"Osama: so what do you think about these activities?
Child 1: we liked them because they were easy
Child 2 : not just because they were easy, but because they included many things, you taught us that everything has mathematics, we did not know that weight and length are mathematics
Child 3: and we did not know that everything has mathematics
Osama: what was your idea about mathematics before?
Child 3: we thought that only few things have mathematics
Child 1: we thought that it was just calculations and numbers, that's all
Child 3: or operations
Child 4: through the activities we learned what mathematics is
Child 3: you gave us the activities which showed us that mathematics is everywhere ... you taught us only one thing and we learned everything after that, you taught us that everything has mathematics"

Children's views about whether they noticed any differences between the project's activities and typical textbook exercises

I asked the children about whether they found any differences between the project's activities and the typical textbook exercises and which type of activities they preferred more. The children provided different views on this topic:

Some children thought that school activities and the project's activities were different because as one of the children said: *"mathematics which we learn in school is about answering exercises, which is good; the mathematics you gave us is like when we recite Koran (we need to follow some rules which require stopping or extending some letters)"*. My interpretation of what the child meant was that school mathematics is based on symbols while the project's activities were part of situations which apparently are not overtly linked with mathematics, but in fact mathematics could be an essential part of it.

Some children indicated that the typical homework activities were just a repetition of what they learned in school and that cause them to dislike typical homework. The project's homework activities in their view required more physical work and not just mental calculations and that made the activities more interesting and easier for them. One of the children also thought that the project's activities required them to search for information which is something not always needed for typical homework. He said, for example: *"in the book we answer the exercises by writing; you asked us to go out and search and then write what we've found"*.

One of the children indicated that the project's activities included more shared work with others in comparison to the typical classroom activities, stating: *"in the classroom we don't teach others, but in the homework activities we work with our mother, father and siblings"*.

Children's accounts about how their parents responded to the project's activities

During the interviews, the children gave more information about how their parents or other family members helped them in carrying out the project's activities at home. Some of the children indicated that their parents provided them with useful assistance and even extended their understanding by talking with them about other learning experiences which emerged during the process of carrying out the activity. For example, some of the children talked about the

activity which required them to count different types of vehicles in the road and how their parents talked about other topics such as car registration numbers, annual registration stickers (similar to Road Tax badges in the UK), numbers in gauges, wheel sizes etc. One of the children said: "*you must put this paper (the registration sticker) because it shows the date; if the police man does not see it he might stop you ... then you must pay a fine*".

Some children indicated that their parents liked the activities. One of the children said: "*they were happy; they should praise you because you gave us these activities because now we can make things, invent things with our own hands. During the summer holiday, I will take some iron and a reel to make a fishing rod*".

In contrast, some children indicated that their parents were quite bored, especially about completing the same feedback sheet every week. Here is an example of what some of the children in Group 4 said:

"*Child1: my parents become nervous and say: every day you bring homework! big troubles*
Child 2: my sister was mad at you, she said every Wednesday I bring this homework, we don't get rest
Child 3: my father too
Osama: why don't they like this work?
Child 1: because every Wednesday they want to do things, [they want to] clean the house, we told them we have homework, they looked at it, it needs to be done outside home, big troubles, they got bored
Child 2: teacher, when I wanted to do the activity I went to one of my sisters and asked for help, she said: later, after sunset prayers, I asked her again and she said she's busy, she get bored and say offfff!"

Child 4 in this group elaborated more as he felt that his siblings did not provide him with the help he needed, stating: "*I need help because I can't do the activity alone; if they gave us some help, we can get some experience, but they are always busy.*"

Some children indicated that sometimes their parents ignored the instructions provided in the homework activity sheet. For example, their parents did not take

them to the vegetable shop, and instead they completed the activity by estimating the prices because they are used to buying these things everyday and they know their prices well. In addition, one of the children talked about the difficulties he found in completing the activity on his own especially when that activity required dealing with a shopkeeper who seemed to be rude to him sometimes. Interestingly, most of these difficulties were not mentioned in the feedback sheets and parents rarely talked about it with me or with the class teacher.

Learning about children's interests, skills and their out-of-school mathematical practices

Talking with the children about their experiences with carrying out the activities provided me with more insights about their interests, skills and practices in out-of-school contexts. For example, most of the children gave interesting examples about how they spend their pocket money in the grocery shop or the cafeteria. Some children talked about the types of food which they liked to buy, their prices and how they calculate these prices and negotiate with the shopkeeper. Some of the children talked about how their parents sent them to buy some items from the local shops and how they checked the expiry dates and sometimes bought things on credit. One of the children gave an example about how he discussed the prices with the shopkeeper: *"I asked the shopkeeper about how much is this and how much is that, if he said it costs a Rupee or a half Rupee then I will take it. Yesterday I went to the shop and the Asian seller didn't know the prices because he was new, so he gave me different prices from what I used to. I said: give me a discount - you don't know the prices, I used to buy it all the time and it cost less; when the other seller came he said that I was right".*

One of the interesting examples provided by the children was about buying Indian pastries (4 cheese pastries cost 100 Fils, 8 vegetable pastries cost 100 Fils) and how they used multiplication to know how many pieces they will get if they pay specific amount of money. Other children gave examples about buying bread (5 pieces cost 100 Fils) and how they calculated how many breads they can buy for different amounts of money and some of them were able to figure the amount of change they would get if they bought a specific amount of bread or pastries.

The children also talked briefly about some mathematical ideas which they used in playing activities such as in sports (e.g. the number of players on each team) and electronic games (e.g. sizes of memory cards, game scores, number in fighters and available time for each stage), and in TV programmes (GMT time, local time, and charts which appeared in sound equalisers). One of the most interesting examples was provided by one of the children who noticed that the lines which appeared in the two hand palms represent the numbers Eastern / Arabic numbers ٨١ and ١٨ (i.e. 81 and 18).

9.4 Summary

This chapter focused on the participants' views about the project's activities and its outcomes. The following points summarise the parents' and children's responses in the feedback sheets discussed in Section 9.2:

- Most of the children were helped by their mothers or their sisters during the activities. Fathers and brothers helped to some extent, especially when the activities required activities outside home
- Most of the parents and children thought the activities were easy
- Most of the parents indicated that they provided a reasonable amount of help to their children while carrying out the activities
- Most of the parents and children thought that the activities were beneficial in terms of mathematics learning
- Most of the parents and children considered the activities as enjoyable
- Most of parents indicated that their children encountered little difficulties or did not write a lot about this issue
- Most of the parents indicated that their children benefited from engaging in the projects' activities, but they did not write a lot about these learning aspects
- Most of the parents were reluctant to provide additional comments about the activities or to write their suggestions for future activities
- Most of the parents and children signed the activities
- Various similarities and differences between the three groups of parents (BEL, AVEL and ADEL) in terms of their responses in the feedback sheets were discussed

Section 9.3 focused on the findings which emerged through the analysis of the interviews which included smaller numbers of parents and children and the class teacher. The parents who participated in the interviews expressed similar views which accord with the views discussed in the feedback sheets. The class teacher also thought that the project was successful as it helped him to find practical solutions for a number of problems which he encountered and provided him with new ideas which helped him in changing some of his teaching practices.

The project was also successful in achieving its initial goals: (1) finding ways to improve some aspects of home-school communication through providing opportunities of home-school knowledge exchange and two-way communication; and, (2) enriching and extending children's mathematics learning by providing more opportunities for parental involvement in this area of learning as well as making some connections between children's in- and out-of-school mathematics practices. Part of Section 9.3 focused on the children's accounts about their learning experiences through their engagement in the project's activities. Discussions about the camera activity in the children's focus groups indicated that this activity helped in extending children's mathematical knowledge and provided opportunities for the children to talk about their experiences. This activity also allowed me and the teacher to know more about the mathematical language used by the children in different contexts and provided insights about their out-of-school mathematical practices. Section 9.3 also focused on how the participant children talked about their experiences in the focus groups about the project's homework and classroom activities. The children gave interesting accounts about what they learned through their participation in the activities. Some of the children were aware about the differences between the project's activities and the typical mathematics activities provided mainly through the textbook. They also talked about their parents' role in supporting their learning during the project. These accounts provided more insights about children's interests, skills and mathematical practices in the out-of-school context.

The next chapter puts together all the main findings and implications which emerged from the findings chapters, discusses the limitations of this study, and provides some recommendations for further research.

10. Conclusions, implications, and recommendations for further research

I mentioned earlier in Chapter 7 that each findings chapter associates with one of the previous literature or methodology chapters. That is, Chapters 3 and 7 both focus on home-school relationships, Chapters 4 and 8 both focus on parental involvement in mathematics education and in- and out-of-school mathematics learning issues, and Chapters 6 and 9 both focus on the project structure and its outcomes. All these chapters were based on ideas derived initially from the sociocultural literature presented in Chapter 2. Therefore, the same structure will be used here in the conclusion chapter where all the main findings and implications emerging from the findings chapters will be joined together. Home-school relationship issues will be the focus of the first section, parental involvement in mathematics education and mathematics learning in- and out-of-school will be the focus of the next section, and finally the general implications and limitations of the study will be presented in the final section.

10.1 Home-school relationships issues

Chapter 3 discussed the new shift in educational research and policies in the area of home-school relationships. The literature in this area generally has tried to move beyond the deficit model to the asset model of parental involvement. This new shift was influenced by different social and political factors as well as the new developments in learning theories (as discussed in Chapter 2). These new learning theories questioned the narrow standpoint which considers learning as a process of teacher-to-learner knowledge transmission, and proposed a wider view which considers learning as a social process which involves individual participation with others in communities of practice. These new learning theories have drawn attention to the impact of the following issues on children's learning: (1) parents' influential role in mediating their children's learning; and, (2) the social and cultural environments of children's homes and their out-of-school activities. Therefore, building strong home-school relationships has been considered a significant issue in many educational systems around the world because it has been considered an important factor which can influence the development of children's learning.

The body of research reviewed in Chapter 3 generally indicated that home-school relationships are a complicated area of study. The research indicates (e.g. Hanafin and Lynch, 2002) that: (1) parental involvement is a multifaceted and complex business which can be interpreted differently by different parties and used to serve a variety of purposes at different times; (2) there is a need for critical examination of assumptions related to the rationale and benefits of parental involvement; and, (3) there is a need for more investigation into the micro-politics of home-school relationships which include various aspects such as gender, class and educational levels of families which can play a key role in shaping home-school relationships.

The main findings of the research presented in Chapter 7 (which investigated parents' and teachers' views on home-school relationships) can be summarised as follows:

There were three common types of parental involvement practices found in the case school (based on Epstein's (1995) typology). They were: parenting, communication, and providing educational support at home. I found that the other types of parental involvement, such as: volunteering, decision-making, and collaborating with the community, were less common in the case school. Most of the participant teachers and parents focused on school-centered types of parental involvement (e.g. parental help with homework or communication with teachers regarding school issues). They seemed to overlook other types of family-centred types of parental involvement (Goos *et al.*, 2004) such as parental engagement with their children in everyday activities at home which can involve authentic opportunities for learning. In addition, it seemed that the parental involvement model adopted by the teachers in the case school can fit with the model which considers parents as supporters for school learning under the guidance of school and in school's terms (see: Townsend and Walker, 1998) and the consensus model (see: Cairney, 2000) where parents get information from teachers in order to fulfill school goals. The teachers often overlook the significance of children's homes as foundations and rich environments for learning.

The findings suggested that communication processes between home and school are complex and influenced by different social and cultural resources and

circumstances such as power, gender, and social, linguistic and cultural capital. These findings fit with previous studies (as discussed in Chapter 3) which suggested that parental involvement is multifaceted and complex.

The participant teachers highlighted various problematic aspects with the different means of communication which they typically use. They were generally concerned about the communication gap between them and the parents. The participant parents did however use the available means of communication offered by school as well as other informal information resources (e.g. through social networks with other people in the community or through talking with their children) in order to know more about their children and their progress in school. The issue of social capital (Bourdieu, 1986) was evident in these findings as different groups of parents tried to utilise their different types of social relationships and networks to their advantage in order to increase their power positions through gaining more knowledge about the 'regime of truth' used in school (Peressini, 1998).

The participant teachers were generally unsatisfied with the current level of home-school communication. They were generally concerned with the issue of quality and content of parental communication with them. Parents, in the teachers' view, often demanded action from them in order to improve children's schooling, but at the same time parents do not often collaborate or share responsibilities which can facilitate this improvement. This type of communication usually occurred in one way direction, such as teachers transmitting information to parents. This communication lacked mutual knowledge exchange or two-way communication between home and school (Hughes *et al.*, 2006) such as when teachers learn more about authentic learning practices taking place at home through shared interactions between parents and children in real everyday situations.

The participant parents often took the first step and initiated communication with teachers, while the teachers seemed to be more focusing on their teaching duties. The participant parents were very keen about their children's academic progress and wellbeing and that seemed to be the main motive for them to take the first step in their communication with teachers. It does not seem that they were invited or encouraged by the teachers to initiate or to increase their communication. Sometimes, the teachers initiated communication with parents

regarding serious problematic situations related to their children's achievement, behaviour or health. It seemed that there were few opportunities for parents and teachers to communicate regarding more positive issues such as finding ways to develop children's talents, or exchange knowledge with each other.

There were various difficulties which seemed to hinder home-school communication. Some difficulties were connected with school while others were connected with the families' circumstances. The difficulties connected with school included:

- Typical difficulties such as time management and work loads
- Teachers' negative attitudes towards parental involvement
- Difficulties with dealing with different groups of parents who vary in terms of their education, social and economic backgrounds, pedagogical experiences, expectations and needs. This variation could make some teachers biased towards certain groups of parents who share a similar understanding and probably marginalise others who are not always in accordance with the school's expectations.
- Prioritising school agendas more than utilising families' resources. The participant teachers often talked about parents as receivers of school information and as providers of support to teachers on school-like tasks at home. The teachers did not often take into account the possibility of utilising parents' resources and expertise
- Teachers' avoidance of more responsibilities
- Lack of policies and initiatives which encourage stronger home-school relationships

The difficulties connected with the parents' circumstances which influenced home-school communication process included:

- Most of the participant teachers wished that parents would be more considerate of school regulations and teachers' schedules
- Most of the participant parents and teachers indicated that families' circumstances can influence their communication with school. They highlighted numerous factors such as economic difficulties faced by some parents (e.g. long work hours and large families), gender (e.g. mothers' embarrassment of dealing with male teachers), and capital (educational level, pedagogical experiences, and linguistic capital).

> Some parents were more in sync with school culture and more able to fulfill the teachers' tacit expectations, while other parents were quite reluctant to voice their concerns to teachers because they felt that they lacked the skills and experiences which would allow them to take a more powerful position in school

Although most of the participant teachers expressed their feeling of inadequacy regarding the quality of home-school communication, they did not take further action or develop new ideas in order to improve their communication with parents. It generally appears that the idea of creating strong home-school relationships was not prioritised in the school's and in the Ministry's agendas.

The parents' levels of communication were categorised into three broad levels as follows:

A small group of parents had a very low level of communication with school. There were different factors which hindered them from building constructive relationships with the school (as discussed above). Most of the parents who did not communicate adequately with school often had low educational levels or had difficult socio-economic circumstances. Some of those parents tried to utilise alternative strategies to compensate for their lack of direct involvement or direct communication with teachers through for example asking elder siblings to help younger ones and asking other relatives to communicate with school on their behalf. These parents' sense of embarrassment and attempts to avoid being blamed by teachers regarding their children's academic or behavioural problems were mentioned in the interviews as possible reasons for some parents' lack of communication with the school.

Most parents belong to the second group of parents who communicate regularly with teachers, but tended to focus on routine issues and mainly intervened in problematic situations. Their communication tended to be of one-way (school to home) type. They usually received information from the school, but rarely exchanged information about their children's performance or interests at home. The teachers felt that in this type of communication parents ask for solutions, but they do not engage by providing essential help which could increase the chances for achieving successful results.

A small group of parents was described by the teachers as communicating more efficiently. These parents are usually more educated and have some pedagogical experience. They were considered to have better communication with school as they share responsibilities, work together with teachers, and exchange information with teachers in two-way mode of communication. This type of communication shares some features with the knowledge exchange idea and two-way communication proposed by Hughes *et al.* (2006). This group of parents seemed to have the essential social and cultural capital which allows them to achieve this level of consonance with teachers' expectations.

The findings of the project paralleled the above views provided by the participant parents and teachers regarding the three types of communication. Through the process of discussing the parents' responses regarding the project's mathematics activities, the participant parents from the ADEL group seemed to be quite distinctive in terms of their relationships with teachers and their educational experiences. They utilised their knowledge and familiarity with school culture to create special relationships with teachers. In these relationships they tried to create a balance between showing respect to their child's teacher as well as providing suggestions and constructive criticism. These parents also seemed to have social networks with other teachers which allowed them to achieve their goals. Other parents in the AVEL group who participated in the interviews tended to use the regular type of communication as they focused more on routine issues and concentrated on behavioural aspects more than academic aspects. These parents tried to avoid any kind of criticism towards the class teacher and usually asked him to help and increased their communication with him only in problematic situations. They also did not give further suggestions or give comments which could be directly connected with teacher's work. Finally, the only parent who belonged to the BEL group and participated in the interviews was quite distinctive as he tried to compensate for his lack of education through using alternative strategies such as creating friendly relationships with school staff, paying frequent visits to school and surprising the class teacher through visiting him in the classroom in order to get more information about what is going on.

These findings also suggest that the project's activities were quite successful in providing opportunities for all groups of parents and children – with very few exceptions – to participate and benefit from this new work. The findings also

suggested that not all parents who have lower levels of education or lower communication with the school are necessarily distant or unwilling to participate in new initiatives introduced by schools. Some parents might try to compensate for their lack of education by adopting alternative strategies such as asking other family members to help. The project offered various new ideas which intended to achieve this aim. These ideas included: learning more about parents' views through seeking their feedback and suggestions in feedback sheets attached with each homework activity, and through interviews and open meetings. The project was successful in identifying some practical ideas and highlighting some important aspects which can be further developed in the future by other researchers and other projects.

10.2 Parental involvement in mathematics education and mathematics learning in- and out-of-school issues

Chapter 2 provided detailed discussion about different theoretical concepts and philosophical standpoints in the field of learning in general and in mathematics education in particular. For example, it discussed the absolutists and the fallibilist perspectives on the nature of mathematical knowledge, and it also highlighted the main features of three major learning theories: behaviorism, constructivism and sociocultural theory. It also discussed various approaches in mathematics education research which share a broad interest in investigating the influence of social and cultural factors embedded in the out-of-school contexts on children's mathematics learning.

The body of research reviewed in Chapter 4 (which drew upon much of Chapter 2) focused mainly on the area of parental involvement in children's mathematics learning and looked into different projects and studies in this area. Some of these studies investigated parental perspectives about their children's mathematics learning (e.g. O'Toole and Abreu, 2003) , explored children's mathematical learning practices in out-of-school settings and identified home resources that can be utilised to enrich and extend children's mathematics learning (e.g. Fleer and Raban, 2006), and searched for innovative ways of promoting parental involvement and connecting children's in- and out-of-school mathematics practices (e.g. Street *et al.*, 2005; Winter *et al.*, 2004) . In addition,

some studies (e.g. Anderson, 1997; Aubrey, 1993 and 1994) challenged the views common among some educators, which considers children as empty vessels to be filled with knowledge in school and argued instead that children often come to school with mathematical skills, knowledge and experiences which they acquire at home through their daily interactions with parents and other family members. These interactions in everyday social activities can provide a context for meaningful learning experiences for the children. Another group of studies (e.g. O'Toole & Abrue, 2003, Street *et al.*, 2005; Winter *et al.*, 2004) investigated parents' perspectives on their children's mathematics learning and their views about what they count as mathematics, their views about explicit and implicit aspects of home numeracy practices, the differences in teaching methods and the tools used between children's homes and in the classrooms. These studies generally suggested that the parents' personal views and experiences in mathematics learning and teaching can be different from those held by teachers or by other parents with different social and cultural backgrounds. These differences can influence children's learning and hence they should be identified and taken into account in mathematics education.

I focused in Chapter 8 on exploring parents' and teachers' views about mathematics, their teaching practices, the theoretical foundations which underlie their teaching practices and how they conceptualise their roles and responsibilities in developing their children's mathematics skills and abilities. I also tried to utilise parents' and teachers' ideas to develop new teaching materials which intend to enrich and extend children's learning. The findings presented in Chapter 8 suggested that most of the participant parents and teachers recognised the importance of mathematics in their children's and their everyday lives; however they often overlooked the influence of external social and cultural factors on the process of mathematics learning. These social and cultural resources (e.g. families' funds of knowledge, children's out-of-school mathematics practices, different cultural tools embedded in children's participation in different communities of practices) were often not accommodated by teachers in the classroom or by parents at home. Mathematics knowledge as taught in the school was often considered by the participant parents and teachers as a multi-purpose knowledge which can be generalised with little difficulty in other out-of-school contexts. These theoretical assumptions generally held by parents and teachers could have a significant influence on the way mathematics is taught at home and in school. For example,

most of the participant parents and teachers emphasised routine transmission teaching methods which involve the mechanical application of learned procedures and stressing fixed right answers. Some teachers tried to extend their teaching strategies by using some ideas adopted from constructivist theory. However, they still viewed mathematics learning as an individualist and internal process and paid little attention to the influence of social and cultural factors on children's learning and they rarely utilized children's out-of-school mathematics practices in a meaningful and intentional way in their classroom teaching. Mathematics as learned in the school was often abstracted from the real life contexts of the learners and their social and cultural experiences were often not visibly integrated in mathematics lessons. In addition, most of the participants viewed mathematics learning as an individualistic mental process based on the acquisition metaphor (Sfard, 1998). There was limited awareness among them about the importance of children's participation in different social interactions, the different cultural tools they used in their everyday life activities, and the values which they associate with certain cultural tools in certain social contexts. Some teachers tried to break the routine cycle of teaching by introducing new ideas but often faced various difficulties which inhibit their efforts.

To link the above findings with the findings of the project (presented in Chapter 9)
I can say here that I tried – with the cooperation of the class teacher – to raise the parents' and teachers' awareness about the importance of giving more attention to the real social and cultural worlds of the children and their families and to provide more opportunities utilising their funds of knowledge in order to extend and enrich children's mathematics learning. The project provided opportunities and instigated changes which can be summarised as follows:

- In contrast with the dominant perspective in Bahrain, in this study I tried to look at mathematics education from a different perspective which puts social and cultural aspects in the front position. The project's activities provided opportunities for more interactions among the classroom children both in- and outside the classroom (e.g. through their interactions in the camera activity and the classroom activities). The project activities also provided opportunities for the children to interact with their parents, family members and other people (e.g. shopkeepers) in joint problem solving tasks

- The project's activities provided opportunities for the children to engage in mathematical dialogues and encouraged them to express and exchange their experiences with others (e.g. through the classroom presentations and through the focus groups)
- The project's activities helped in learning more about the extended social worlds of the children outside school, the psychological and material tools which they utilise in different events situated in different contexts, and issues such as power and values connected with particular cultural tools or participation in communities of practices (e.g. how they used different mathematical vocabularies, money names, number systems which differs between home and schools)
- The project's activities provided practical examples about how teachers can utilise children's out-of-school mathematics practices to extend and enrich school mathematics. The activities also provided the children with opportunities to explore, identify and utilise a wide range of mathematics practices and to engage in meaningful and authentic mathematics learning
- In the project, I took into account that parents are not necessarily one homogeneous group. I tried as much as I could to provide opportunities for different groups of parents to take part in the project and its activities in different ways. The interviews with parents and teachers extended my understanding of the similarities and differences between parents and teachers and between the different groups of parents. The interviews allowed me to know more about the parents' and teachers' theoretical understanding about mathematics and the frameworks which underlie their teaching practices and the conflicts between home and school mathematical pedagogies. The findings also suggested that the differences between home and school pedagogies can influence some children

The project also investigated the impact of the project's activities on children's mathematics learning. For example, the outcomes of the camera activity can be summarised in what follows:

- The children's accounts about the content of the photographs, the places where they were taken, and the mathematical ideas embedded in these

situations contributed to extending their ideas to include more advanced concepts

- Discussing the mathematical ideas found in some photographs allowed me to not to just to learn more about the children's understanding, but also to correct some of the children's misunderstandings regarding some mathematical ideas.
- Providing more opportunities for the children to talk about their experiences
- Learning more about the mathematical language used by the children: for example most of the children often used the old currency names (e.g. Rupee, Anna) when talking about their experiences about using money. Another issue was that some of the children found difficulties in shifting between the Arabic / Eastern numbers used as the main medium in instruction and curriculum in school, and the Arabic / Western numbers which are widely used in out-of-school contexts
- Learning more about the children's out-of-school mathematical practices: the children took photographs of different everyday situations in different contexts. These photographs and the following explanations provided by the children in the interviews gave a vivid picture about their out-of-school contexts and their mathematical practices there. These included their environments, activities and places which they like, social relationships and cultural resources and their views about mathematics and how they use it in school and out-of-school.

The children's views regarding the project's mathematical activities discussed in the focus group interviews provided interesting opportunities for me to learn more about the children as they talked in the interviews and in the classroom about their learning experiences which emerged during their work on the project's activities. The children provided different views about whether they found any differences between the project's activities and the typical textbook exercises and which type of activities they preferred more. Their accounts about how their parents responded to the project's activities, their interests, skills and their out-of-school mathematical practices were all explored and discussed in detail.

10.3 Implications of the study

The educational implications of this study can be presented as follows:

Teachers should seek parents' help and support and build upon parents' experiences and knowledge. Parents of all different social, cultural, and educational backgrounds should be involved in their children's education and they should be seen as holding different experiences and knowledge and not deficient. Their knowledge and experiences should be identified, acknowledged and utilised in school learning processes. Teachers should exchange their knowledge with parents' knowledge in a two-way mutual manner. Teachers should also learn more about their children's characteristics, out-of-school activities, and their social, cultural and educational backgrounds. Schools should encourage hard-to-reach parents to be more involved through identifying their needs and concerns and building upon their resources instead of viewing them as deficient.

Teachers should also learn more about how parents teach their children at home, and provide parents with more information about how mathematics is taught in school. Teachers should learn more about the importance of children's participation in different social interactions, the different cultural tools they used in their everyday life activities, and the values which they associate with certain cultural tools in certain social contexts.

Teachers and school administrators should provide more opportunities for parents who belong to different social, cultural, educational backgrounds to be involved in school-centred parental involvement activities (e.g. communication, decision-making, volunteering etc.) and also recognise and build upon home-centred parental involvement activities such as utilising parents' close relationships with their children and their shared engagement in authentic out-of-school practices.

The Ministry of Education in Bahrain should work more on developing policies and initiatives which encourage stronger home-school relationships. They also should encourage more collaborative or action research work in schools in order to learn more about the students' and their families' funds of knowledge and utilise this knowledge to extend and enrich children's learning in school. The

Ministry of Education should also organise more in-service and pre-service training for their teachers in the area of home-school relationships and in learning in different contexts.

10.4 Limitations of the study

There are various limitations that need to be acknowledged and addressed regarding the present study. First, my dependence on the teacher in the process of selecting the participant parents led to the problem of mistakenly excluding some groups of fathers (e.g. parents with lower levels of involvement or parents who have children with low-achievement levels) from participating in the interviews. Second, methodological issues related to gender can be seen as an important limitation of this study. I mentioned earlier in Chapter 6 how the female teacher carried out the interviews with four mothers and how I found some problematic aspects such as short responses by the interviewees, few probes, interruptions and leading questions by the interviewer. Although the outcomes of these interviews can be considered as generally adequate, having more detailed answers from the mothers would probably have allowed more in-depth understanding of aspects of home-school relationships and in- and out-of-school children's mathematics learning. The third limitation has to do with the extent to which the findings can be generalised beyond this case study and the limited number of participants. This study has provided one example which hopefully sheds lights on the situation and the circumstances in one school in Bahrain. Further case studies, however, are needed to support the findings in different schools in Bahrain.

10.5 Suggestions for further research

- Focusing on children's understanding of particular mathematical skills (e.g. problem solving or estimation) and how they use it in- and out-of-school
- Finding more about the connections between children's popular culture (e.g. cartoons, movies, songs, video games, mobile phones etc.) and their school learning in different subjects

- Finding more about gender differences in children's out-of-school mathematics practices
- Exploring literacy and science learning practices in the children's out-of-school contexts
- Exploring teachers' epistemological conceptions about mathematics as a subject and about learning in general
- Finding more about the differences between fathers and mothers in their parental involvement practices

10.6 Final remarks

I hope that this study has made some contributions to the general efforts of building better home-school relationships in Bahrain and has encouraged parents and teachers to understand and appreciate the wonderful ideas of the children and the rich resources of their cultural and social environments. As I have just been assigned a full-time teaching position in a teachers' college recently opened in Bahrain, my next plan is to utilise the wide range of ideas and skills which have developed through the process of doing this research in developing new teacher training courses which emphasise the influence of social and cultural factors on children's learning.

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Appendix A: Research context

Information about the researcher

I come from an average socioeconomic background. I completed secondary school (sciences branch) in 1991. After joining a teacher training programme sponsored by the Ministry of Education, I earned a Bachelor's degree in primary education from the University of Bahrain.

I worked from 1995 to 2001 as a classroom teacher mainly in one rural village. During those years I studied IT and joined a primary education Masters programme in the University of Bahrain. My dissertation topic was on using 'IQ' tests in the assessment of children with special learning needs.

I joined the University of Bahrain in 2002 as a teaching assistant. I taught undergraduate and diploma students in teacher training courses. In 2003 I was sponsored by the University of Bahrain to continue my post-graduate studies in the UK. I will continue my pervious career in teacher training after finishing my PhD studies.

Information about Bahrain

The Kingdom of Bahrain consists of small islands (266 sq miles) located near Saudi Arabia in the Persian Gulf. Recent statistics (2007) indicate that the population of Bahrain is around one million. Foreigners, mostly from South Asia, constitute approximately 50% of the total population.

Islam is the official religion in the country. Unofficial resources say that the majority of the Bahraini citizens are Muslims (Shia and Sunni). There is a very small number of Bahraini citizens who are Christian or Jews. Arabic is the official language in Bahrain. English, Farsi, and Urdu are also widely spoken.

The economy of Bahrain is based on petroleum processing and refining plus other industries such as banking, insurance, ship repairing, and tourism. Bahrain

became an important financial and tourism centre and the site of a major U.S. navy base.

The Human Development Index (HDI) shows that Bahrain ranked 39 out of 177 countries included in the HDI report (2004). Bahrain attained positive HDI indicators including: life expectancy at birth equals 74.5 years, 86.5 % of adults (ages 15 and older) are literate, 85.4% of children enrolled in basic and secondary education, and a 'GDP per capita' equals approximately 6000 (£GB).

The history of Bahrain goes back for more than 5000 years. Bahrain was a British-protected state (from 18th century) and gained independence in 1971. Political tensions started in 1975 when the government suspended the constitution and dissolved the parliament. The mid-1990s witnessed the highest point of political violence. At that time, the marginalised Shia groups clashed with the government and demanded the restoration of the parliament, more freedom of speech and better economic conditions.

A new era began in 2000, when the new king promised major political reforms. The legislative council, comprising equal numbers of elected and appointed members, held its first session in 2002. Yet, the amount of power of this council is still limited as it is requires a two-thirds majority of votes and therefore the council function has been restricted to proposing laws. In addition, the State Security Act, a symbol of long years of human rights violations, was abolished. Political societies were allowed to be established. Women won the right to vote and stand for election to municipal and legislative assemblies. One woman was elected in the last parliament election in 2006. In addition, a few women have been appointed as ministers and ambassadors. This political development in Bahrain, although very slow and limited, can be seen as one step forward for achieving more liberty and democracy.

Information about the educational system in Bahrain

In the past, Koran schools were the main source for education in Bahrain. The first formal primary school for boys was opened in 1919 and for girls in 1928. Nowadays there are around 203 schools in Bahrain which take in around 124,000 students and employ 12,000 school staff.

Pre-school education is not included in the educational ladder (Table A.1). It is run by the private sector, requires tuition fees, and is supervised by the Ministry of Education.

Primary education is divided into two phases. The first phase comprises the first three years in which one 'classroom teacher teaches all subjects except music and physical education. This system is called the 'classroom teacher system' (I will use this term throughout the dissertation). The second phase comprises the upper three years where specialised teachers teach individual subjects. There are around 31,152 boys and 31,276 girls in 2,260 classrooms in 114 primary schools. The average number of students per classroom is 28. Almost all children in the age group (6 – 12 years) attend primary schools. Education in basic and secondary public school is free for all.

Since the majority of students in public schools are Muslims, Arabic and Bahraini citizens, there is little diversity in terms of ethnic and language in public schools. Arabic is the main language of instruction. English is a compulsory subject at all educational stages. Children from non-Arabic backgrounds, such as Asians and Europeans, usually join foreign private schools which use different curricula and different language of instruction. There are also national private schools which offer bilingual programmes for Bahraini and non-Bahraini students.

A single-sex system is applied in all educational levels of public schools. Boys and girls attend separate schools where the students and the staff are of the same sex. This approach is based on a cultural and religious view which encourages keeping males and females apart. There is a growing number of primary boys' schools with female staff. The Ministry of Education seems to support this 'feminizing' approach (Al-Sulaiti & Abdul Ghani, 2001). A mixed-gender system is applied in most private schools and higher education in Bahrain.

All candidates for teaching positions in public schools must have university qualifications such as a bachelor's degree in a specialised subject and a diploma in education. The main educational training institute in Bahrain is the College of Education in Bahrain University.

The school year in Bahrain is divided into two semesters. The syllabi of the first primary phases include: Islamic studies, Arabic language, English language, mathematics, science and technology, social studies, physical education, arts, songs and music. The time allocated to mathematics subject is five class periods per week (each period is 50 minutes). Textbooks are designed locally by curricula specialists and university academics. They are printed and distributed free of charge for all students in public schools.

A new evaluation system has been recently introduced to the first primary phase. This system emphasises students' proficiency in pre-specified competencies (similar to behavioural learning objectives) of the subject and is based on cycles of teaching, diagnosis and correction. The teacher is required to use a variety of assessment methods in this process such as: continuous systematic observation, daily training and practising, planned activities, individual and group projects, diagnostic and cumulative tests.

Challenging issues facing education in Bahrain

Unemployment is a big concern in Bahrain. Bahraini workers are concentrated in the public sector, while the bigger private sector is dominated by a large foreign workforce. The latest figures of unemployment stand at 20,200 which is 14% of the total Bahraini workforce of 144,000 (total work force in the country including foreigners is 336,400). In the age group, 20-24, unemployment is about 28%. Expatriates, mainly from South and South East Asia account for large share of the labour force and tend to work in lower paid jobs. The Bahraini government predicts that 100,000 Bahrainis will enter the labour market (from 2003 to 2013). Business and industry sectors justify their dependence on foreign workers by claiming that the educational and training system falls short of providing competent local workers for the expanding market.

As such, contemporary Bahrain is facing a challenge in finding ways to develop, educate and train its people to be able to compete in a rapidly expanding economy. Top government officials and businessmen are demanding more efforts to upgrade and reform the educational system. Fingers are pointed at higher education institutes and secondary schools.

Higher education in Bahrain is provided mainly by public institutes such as the University of Bahrain, the Arabian Gulf University and other specialised institutes. There are also many private colleges which have been opened recently in Bahrain. There are currently 25,000 students enrolled in higher education, 78% of them are in the University of Bahrain. Shockingly, only half of the students currently enrolled in that University are expected to graduate; the rest are likely to drop out during the first two years. Male students seem to do worse than females in all colleges. University officials suggest that the one reason for this problem is generally the very low standards of schools' graduates (Gulf Daily News, 1/12/2005).

Focusing on the quality of school education is seen as an important ingredient for reforming the higher educational system. A senior official in the Ministry of Education openly acknowledged the general low performance of public school students in all major subjects. She proposed two reasons for this: "First, the curricula are not designed to develop the students' talents and skills, but just to teach them information ... secondly, the teaching methodologies used are weak and do not keep the students interested. The teachers themselves are also not very well trained and managed". She also highlighted the low performance of male students compared to females and thinks that "this gap begins from very early on and continues even through university" (Gulf Daily News, 1/12/2005). The above statement highlights three educational issues common in Bahrain: the reliance on the acquisition learning style, problems with teaching training and traditional teaching methods.

Roopnarine and Metindogan's study (2005), which examined primary curricula in several developing countries, indicates that didactic teaching and reinforcing repetition were apparent in the Bahraini curricula. The study noted that children are given few choices within very structured educational settings. Teachers exercise almost total control over the educational process.

Studies which investigated the outcomes of primary education in Bahrain give more evidence that supports the above claims. Findings of a major national study which aimed to evaluate school educational outcomes at Year 3 (Ministry of Education, 2001, in Arabic) indicate a low level of student achievement and a

lack of mastery of basic skills. The grade average of children in mathematics was 44.9%.

Similar findings were also revealed by the International Mathematics and Science Study (TIMSS) 2003 (Mullis, Martin & Foy, 2005). The TIMSS study investigated and compared students' mathematics and science achievement in 46 countries. Bahrain's mathematics test results indicate that children in Year 8 (4119 children from 67 schools) had achieved an average score of 401 which is far below the international score average of 466. The girls have again outperformed boys markedly on the tests (average score for girls= 417, boys = 385).

During the past decade, the Ministry of Education has attempted to improve primary education outcomes through several projects which include: the 'classroom teacher system' programme, improving special education services, improving pre-service and in-service teacher training, and introducing new subjects such as design and technology and ICT. However, more work need to be done for improving the quality of education.

<table>
<tr><td>Class</td><td>Age</td><td colspan="6"></td><td rowspan="14">Religious Education (Primary, Intermediate and Secondary</td></tr>
<tr><td>12</td><td>17</td><td colspan="6">Secondary Education</td></tr>
<tr><td>11</td><td>16</td><td colspan="2">General</td><td rowspan="2">Commercial</td><td rowspan="2">Technical</td><td colspan="2">Applied</td></tr>
<tr><td>10</td><td>15</td><td>Sciences</td><td>Literary</td><td>Textile</td><td>Advertisement</td></tr>
<tr><td>9</td><td>14</td><td colspan="6" rowspan="3">Third Phase of Basic Education (Intermediate)</td></tr>
<tr><td>8</td><td>13</td></tr>
<tr><td>7</td><td>12</td></tr>
<tr><td>6</td><td>11</td><td colspan="6" rowspan="3">Second Phase of Basic Education (Primary)</td></tr>
<tr><td>5</td><td>10</td></tr>
<tr><td>4</td><td>9</td></tr>
<tr><td>3</td><td>8</td><td colspan="6" rowspan="3">First Phase of Basic Education (Primary)</td></tr>
<tr><td>2</td><td>7</td></tr>
<tr><td>1</td><td>6</td></tr>
</table>

Table A.1 The educational ladder in the Bahraini school system

Note: The secondary level consists of three years and includes four branches: general, commercial, technical and applied.

Appendix B: General information about the classroom children and their families (who participated in the mathematical activities in the project)

Introduction

The aim of this appendix is to extend some of the issues which were discussed earlier in Chapter 6. It provides information about the characteristics of the classroom children and their families as a whole. Appendix B focuses on the following issues:
(1) Educational levels, occupations and involvement levels of the parents.
(2) Achievement levels of the children.

As I needed to know more about the participants, I asked teacher (J) (the class teacher whom I worked with during the project) to provide more information about them. I anticipated that this information will be required in the forthcoming stages of the data analysis (this data was collected after the end of the project).

As notable degree of heterogeneity was found among the parents afterwards, I decided to categorise the parents into smaller groups according to the characteristics which they seemed to share (e.g. similar educational level or similar involvement level). As my research question were concerned with learning more about the perspectives of the various groups of participants, I hoped that categorising the participants would produce more interesting themes which can be pursued in the data analysis process.

Exploring the level of accordance or divergence among the views of the different groups of participants (with similar or different backgrounds) would hopefully lead to more in-depth understanding about the research issues. This process was framed by various ideas discussed earlier in Chapters (Section 3.6) such as how the 'one size fits all' approaches of parental involvement were faced with criticism and how there is now a growing interest in acknowledging and responding to the richness and diversity of cultural and social resources of children and their families.

At the beginning of this process I found that were many aspects of variation among the parents (e.g. age, number of children, gender, occupation, level of involvement, and educational level). As exploring all these aspects together would be a complicated task which exceeds the space of this limited study, I decided to focus on two specific aspects: parental gender and educational level. These two aspects consistently emerged throughout the data collection and the initial data analysis. They were often brought up by parents and teachers who participated in the interviews. In addition, these issues were addressed earlier in Chapter 3 by a number of studies which looked into the influence of parental social class on their involvement and relationships with school (e.g. Lareau & Shumar, 1996; Reay, 1999). The term social class tended to be used in these studies as a broad concept which encompassed various dimensions including education and gender.

It is important to say that I focused more – as you will see in the data analysis and findings chapters – on the parental educational level dimension and its relation with parental involvement aspects. I could not reach an adequate depth in investigating the gender dimension due to the difficulties I encountered in interviewing mothers. As I discussed earlier in Chapter 6, in contrast with the fathers' interviews, the mothers' interviews were quite brief and therefore I could not get enough material needed for achieving more in-depth investigation such as exploring and comparing the different perspectives of fathers and mothers.

It is also important to say that throughout the analysis and findings chapters I avoided using the term 'social class' and instead I focused more on using the parental educational level. That was mainly because it seemed that the Western social class rhetoric does not perfectly suits the Bahraini social structure. I think that in Western societies the social classes were created through a prolonged economical, political and social developments and changes. The Western societies has moved through gradual historical developments until it reached its current position (e.g. gradual economical progress from agriculture to industrial to technological based economies, gradual democratic reforms etc.). The different social classes (e.g. working or middle class) were created through these prolonged historical changes. In contrast, the Bahraini society has gone through very different economic, political and social changes. For example the Bahraini society (like other Gulf states) has witnessed very rapid changes in the

last thirty years which had dramatic impact on the social structure (e.g. more oil income, high number of expatriates (40% of the population), and more educational development). These factors accelerated the social mobilisation among the Bahrainis. Therefore, untangling the social classes in Bahrain would be quite difficult. Therefore the people in Bahrain would not talk about the social class and instead they focus more on the income level (high, average and low) or the religious sect. To summarise, I found that the social class rhetoric seemed to be incompatible with the context of this study. I considered the parental educational level as an important element which can be used as a sensible indicator of the social and economic backgrounds of families. I found that some studies (e.g. West et al, 1998) seemed to support this assumption as they suggested that the educational level of parents can be a good indicator of the children's family background.

Fathers' education

There was good amount of variation among the fathers – of all children in the classroom - in terms of their educational level. A general view of this variation is illustrated in Figure B-1. Based on these noticeable differences I assumed that categorising the fathers according to their level of education can be useful in order to get better understanding regarding different perspectives of different groups of fathers.

Therefore, I categorised the 35 fathers into three groups according to their educational level in the following way:

- Most of the fathers were grouped under the category 'average educational level' or (AVEL). This group included fathers who have intermediate or secondary qualifications (they constituted 31% and 39% of the total number of fathers respectively)
- A smaller group included fathers who have primary qualification (9%) or attained basic literacy skills in Koran schools (3%). Those fathers were grouped under the category 'basic educational level' or (BEL)
- The third group was also small and included fathers who continued their education up to the university level (e.g. had a bachelor's or master's degree). They constituted 9% and 3% of the total number of fathers

respectively. Those parents were grouped under the category 'advanced educational level' or (ADEL)

- Finally, there were two died fathers (See Table B-1)

Fathers' occupations

Information about the fathers' occupations can be summarised in the following points (Table B-2):

- Most of the fathers (43%) worked in manual jobs (e.g. drivers, labour, or mechanics in trading or industrial sectors)
- A smaller group of fathers (29%) worked in clerical jobs in public or private sectors
- Three fathers (9%) worked in professional jobs: two in teaching and one in physiotherapy
- Some fathers worked in trading (9%) and some were retired (3%)

The link between level of occupation and level of education was clear among the fathers. For example, fathers with basic or average education often worked in manual or lower clerical jobs, whilst fathers with advanced educational level worked in professional jobs. It is worth noting however that in some cases the income level of the fathers may not necessarily reflects their educational or occupational level. For example a person who has an average education level who worked in a manual job in a large oil company can possibly earn more than a person who holds a university degree and worked in a professional job such as teaching. It is also important to mention a point which was highlighted by father B (AVEL, an inspector in sewage stations). He said, when I asked him about his educational background in the interview, that people can sometimes confine the educational level of a person by focusing only on his or her qualifications obtained from official educational institutes (e.g. school or university). He argued that further education and training provided through in-service courses can make a real difference in terms of the person's education and this should be taken into account as part of his educational background. Despite the fact the in-service training can be an important aspect which worth consideration, this study will focus only on parents' official qualifications. That is because I could not obtain adequate information from the class teacher about who did engage in in-service training and who did not. In addition I think that for

the purpose of this limited study there is little need to go far beyond the official qualifications and occupations of the parents as they can serve as general indicators of their level of education and their economical circumstances.

Mothers' education

The mothers were also diverse in terms of their educational level. Information about their levels of education can be summarised in the following way:

- Most mothers had intermediate (20%) or secondary (43%) school education. They were grouped under the (AVEL) category
- 29% of the mothers had basic literacy or primary education. They were grouped under the (BEL) category
- 9% of the mothers had university degree and were grouped under the (ADEL) category (Table B-3)

Comparing the educational levels of mothers and fathers would suggest that the fathers group had higher educational levels than the mothers group. For example, number of fathers in the (BEL) group was fewer than mothers. The number of fathers in the (AVEL) group was more than mothers. In the (ADEL) group, there were equal numbers of fathers and mothers who have bachelor's degree whilst there was only one father who had a master's degree in all the parents (see Tables B-1 and B-3; Figure B-1). Social and cultural factors had contributed to this visible educational gap between fathers and mothers. In the past, males had more opportunities to reach higher educational levels in comparison with females who tended to leave school earlier to take care of their new families or because of the limited work opportunities available to them (e.g. they prefer single-sex work environment). Nowadays, however, this situation seems to be rapidly changing – perhaps to the opposite direction –. More female students achieve higher grades in secondary school and sometimes they exceed male students in university enrolment and graduation. However, female workers still seem to have fewer opportunities in the labour market.

Mothers' occupations

The most notable difference between fathers and mothers in this sample was located in their occupational positions. The majority of mothers were housewives (91%). Only three mothers worked outside home (two mothers worked in teaching and one worked as a supervisor nurse). This issue was also connected with the social circumstances mentioned above. For example, many people may think that caring for home and family is the main responsibility for women. Working outside home may be considered as an option for the females despite the amount of economic difficulties faced by the family. There are many other influential factors which alienate females from working outside home, such as: lack of training or further education courses, competition between local and foreign workers, little income for lower jobs, mix-gender workplace and social status.

Parental communication with school

The class teacher (J) gave a general evaluation regarding the level of communication between parents and school in his classroom. Most of the parents (65%) were considered by him to have good level of communication with school. Smaller groups of parents were described as having average (26%) or lower (9%) level of communication (Table B-5).

There seemed to be some kind of correspondence between the educational level of the parents and their level of communication (with some exceptions). Parents who were considered to communicate less with the school often belonged to the (BEL) group. Parents in the (AVEL) group were usually showing good or average levels of communication with school. While all the parents in the (ADEL) group were showing good level of communication. This generally indicated that more educated parents seemed to be considered by the teacher to be more communicative with school and vice versa. This point will be investigated more in the data analysis and findings chapters. In those chapters I will also explain how parental communication was considered by the participants as the most common type of parental involvement.

Children's achievement

The class teacher reviewed the children's grades and gave a general estimation of their achievement level (Table B-6). Standard national tests were not applied in Year 2 and therefore this information was based on children's performance in regular classroom tests and on the personal teacher rating. Most of the children (74%) were considered to have good level of achievement. Smaller groups of children were regarded to be on average (14%) or on lower (11%) levels of achievement. My impression that these grades were quite inflated; unfortunately I did not ask the teacher about them. My interpretation was that this kind of grade inflation was quite common in primary classrooms. Teachers often give higher grades to children either because of problems related to the assessment process (e.g. using very easy tests which concentrate on basic competencies) or because teachers wants to reward children with higher grades to encourage them and to make their parents happy.

Again there seemed to be some relationship between the children's academic achievement and the educational and communicational levels of their parents (with some expectations). Children of (BEL) parents (lower education and lower communication levels) were also considered by the teacher to have lower achievement levels. In contrast children of (ADEL) parents (with higher education and higher communication levels) seemed to have better achievement level. Finally, children of (AVEL) parents had mixed achievement levels but in general most of the children in this group were good achievers.

Again this suggested that there was a pattern between parental educational level, parental level of communication and their children achievement. This will be investigated and discussed further in the findings chapter.

	Education	Frequency	Percent
Basic educational level (BEL)	Basic literacy	1	3%
	Primary	3	9%
Average educational level (AVEL)	Intermediate	11	31%
	Secondary	14	39%
Advanced educational level (ADEL)	Undergraduate	3	9%
	Masters	1	3%
	Died	2	6%
	Total	35	100

Table B-1 Fathers' educational level

Occupation	Frequency	Percent
Manual	15	43%
Clerical	10	29%
Professional	3	9%
Business	3	9%
Retired	2	6%
Died	2	6%
Total	35	100

Table B-2 Fathers' occupation

Category	Education	Frequency	Percent
Basic educational level (BEL)	Basic literacy	3	9%
	Primary	7	20%
Average educational level (AVEL)	Intermediate	7	20%
	Secondary	15	43%
Advanced educational level (ADEL)	Undergraduate	3	9%
	Total	35	100

Table B-3 Mothers' educational level

Occupation	Frequency	Percent
Housewife	32	91%
Working	3	9%
Total	35	100

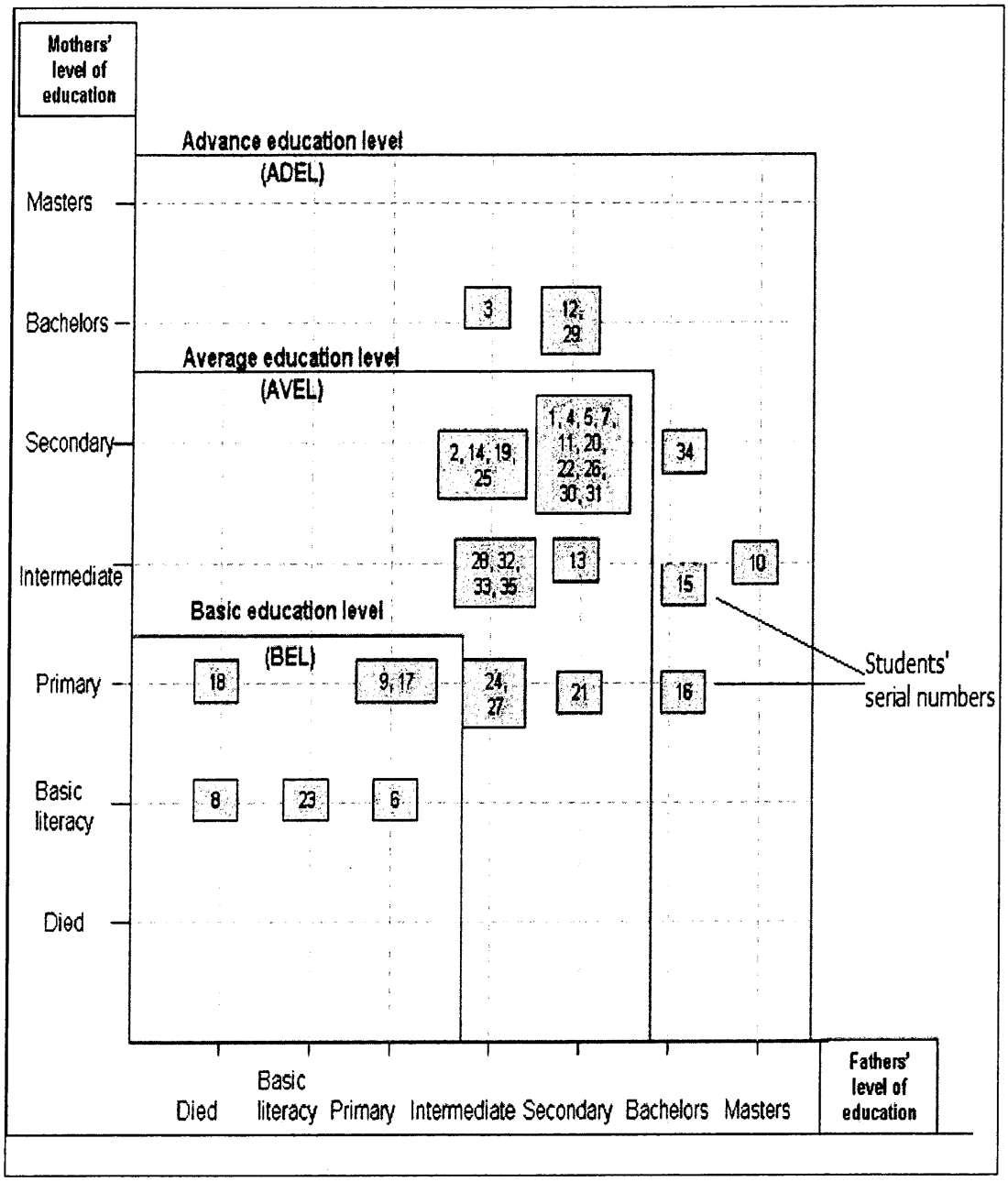
Table B-4 Mothers' occupation

Level of communication with school	Frequency	Percent
Low	3	9%
Average	9	26%
Good	23	65%
Total	35	100

Table B-5 Parental involvement level

Level of achievement	Frequency	Percent
Low	4	11%
Average	5	14%
Good	26	74%
Total	35	100

Table B-6 Children's achievement level



FigureB-1 Grouping the classroom children according to their parents' level of education

Appendix C: Information about the photographs based on focus group interviews with the children

Table C-1 The photographs taken by Group 2

The content of the photograph taken by Group 2	The main mathematical ideas which the children thought about at the time of taking the pictures	Additional ideas which emerged through the discussion with the children in the interviews
Kitchen: Deep freezer, window and a pile of clothes (for laundry)	Food has different prices The freezer is rectangular or square	Geometrical shapes in the window Clothes' sizes and prices Time needed for washing the cloths and speed numbers on the washing machine
Kitchen: rubbish bin and floor tile	Rubbish bin has cylindrical shape Floor tiles are square and have different prices	
Kitchen: Oven	Numbers as indicators (in knobs) The knobs are round and the oven is square The oven handle is cylindrical	Discussing the difference between square and rectangle shapes Using the timer to know the cocking time Time variation for cooking different types of food (e.g. rice and egg). The idea of the activity mathematics in the kitchen emerged from this photo
Car registration plate	Rectangle shape Numbers	A child said "we learned that everything has numbers even in the Koran, each page has a rectangle shape and has numbers in it"
Car tire (BMW)	The tire has a round shape, the car model logo is also round	The tire has some numbers on it which indicate its size
Floor tile	Geometrical shapes	
Children playing	The children have different heights (some tall and some short)	Floor tiles design
Water meter	Numbers (the more water you consume, the higher the number will appear in the meter) A cylindrical shape	

Empty water glasses	Cylindrical shapes	Glasses have different sizes (big, small, long, and short) Glasses with similar sizes can hold the same quantity of water
Whiteboard	Rectangle shape	The children argued about whether the whiteboard is square or rectangle How to differentiate between square or rectangle shapes
TV	The difference between a square and a cube	Talking about TV channels numbers, remote control numbers, before and after and programme times
A little foot on a floor tile	Patterns in geometrical shapes (in tiles) Feet have different sizes The foot can be long or short (we can use it to measure the ground e.g. football field, measuring by small feet will give higher number of units and vice versa)	Explaining the pattern of horizontal and vertical shapes The children used hand signs and their own words to describe the concept of horizontal and vertical (e.g. they used the words standing and falling to explain this idea); the children used the new learned terms (vertical and horizontal) in subsequent photos
Curved floor tiles	Descending and ascending numbers	
Empty barrel	Cylindrical shape	
Paint container	Cylindrical shape	Price Measurement (different sizes, full, empty, heavy and light) How much do we need to paint one wall or one room approximately?
Brick on floor tiles	Geometrical shapes with different sizes (rectangle, triangle and square)	
Garage door	Geometrical shapes	
Drain metal cover	A big square which contains medium squares and smaller	

	squares	
A juice container on floor tile	Cylindrical shape with one end wider then the other	
A lemon box	Rectangle and circles	

Table C-2 The photographs taken by Group 3

The content of the photograph	The main mathematical ideas which the children thought about at the time of taking the pictures	Additional ideas which emerged through the discussion with the children in the interviews
Kitchen (microwave and wall tiles)	Numbers for different temperature (more and less) Numbers and shapes of the wall tiles	
An Asian tailor measuring the length of a child's body using the measurement tape	Numbers in the measurement tape Measurement plates	The tailor's hand watch
Different shoes with small and big sizes	Numbers Arranging numbers from the biggest to the smallest	The children checked their shoes' numbers
Local shop (cheese cans, biscuits cans, sweets, pickles and chilli jars on shelves)	Expiry date Cylinder shapes (cans) Prices: expensive, cheap, many and few	Discussing more about children's experiences in shopping from the local shops
Vegetable shop (different types of vegetable and fruits) and a weighing scale with indicator)	Weighing process, more and less, heavy and light	The idea of the activity "mathematics in the vegetable shop" emerged from this photograph
Money (coins)	More and less Buying things from the local shop	Using the Indian names for money (rupee, bayzat (=money), 4 Annas, 12 Annas, half rupee etc) Discussion about how the vendor can cheat by giving less change Discussion about how much money did the children get as gifts in the Eid days (the religious festival) Discussion about saving money and buying different things which the children liked (e.g. buy foods, drinks, toys etc)
Hair pins	Addition (2 + 4) or	

	(2+2+2)	
Calculator and electronic dictionary	Numbers	
Hand watches	Have numbers To know the time (to return back home on time, praying, school time)	Discussion about how the children used time in their everyday activities
Computer screen and speakers	Low and high noise Geometrical shapes	
Hand watches	Time Small and big watches	
Paintings (wall frames)		The difference between a rectangle and a square
Tissue paper box	Price Shape (rectangle)	Number of tissues in the box
Weighing scale	Heavy and light	
Traffic sign (stop)	Cylindrical shape	Octahedron shape
Shoes with different sizes	Shoes arranged from small to big	Ascending and descending

Table C-3 The photographs taken by Group 4

The content of the photograph	The main mathematical ideas which the children thought about at the time of taking the pictures	Additional ideas which emerged through the discussion with the children in the interviews
Car	Car number Inside the car: clock, fuel gauge, 6 lights etc.	
Address plate (on wall)	Numbers Rectangle shape	Discussion about why do we need addresses? To order food, for emergency calls etc.
Wall (window and pipes)	2 pipes Geometrical shapes	Shapes and numbers seemed to be the main mathematical concepts which were more visible to the children (sometimes the children repeated the same words automatically (e.g. numbers, shapes) without really giving enough thought about what they were saying
A car parked beside a traffic sign (50 "maximum speed")	Numbers Clock Number of lights	Speed limits to avoid accidents
Wall clock	Numbers and shapes	To know the time, whether we are late
Sheet of paper with 3+4= 7 written on it	addition	
Money	How to exchange 1 Dinar to 'Rupees'	Using the Indian names for the Bahraini money (Rupee, half, 4 Anna) 10 Fils, 5 Fils Bigger and smaller values (ascending)
4 spoons	Arranged from the smallest to the biggest	Because the picture was taken by the mother of the child, he did not know the mathematical idea in the photo
Mathematics textbook	An example of adding 'hundreds'	
Balls and balloons in a shop	Counting Ball shape, cylinder and cubical	
Weighing device (with	Weighing can help us to	

some fruits in it)	avoid vendors' cheat	
Asian tailor taking measurement of the child's height	Measurement Calendar on the wall (to know the date of delivering the cloths)	
Clothes shop	Prices	The children made some mistakes in reading the prices (written in Arabic / Western and Hindi numbers) e.g. 9.500 were read as 900 and 500.

Table C-4 The photographs taken by Group 5

The content of the photograph	The main mathematical ideas which the children thought about at the time of taking the pictures	Additional ideas which emerged through the discussion with the children in the interviews
Wall clock	Numbers To know the time	When do we need to know the time? When going out, TV programmes
Money	Change, whole (Bizat)	We use it to buy things from the local shop, How much money did they get in Eid (religious festival)? How did they spend the money?
Wall clock	To know the time of going out and coming back, school time,	
Mecca	Cube shape	Going around the Ka'aba (a building in the centre of Mecca) for seven times as part of the Hajj ceremony
Cheese jars with price tags	To know the prices	They use price tags in the supermarket, but not in the local shop So they need to ask the vendor about the prices What do you usually buy from the local shop? I asked some questions (e.g. if you pay 500 Fils to buy two cans of Pepsi (each cost 100 Fils) how much change will you receive? The children convert the Fils to Rupees and easily gave the correct answers Collection box
Balloons	3 balloons (counting)	Ball shape
Shoes with different sizes on stair	Ascending and descending Size Counting	How many steps in the stairs? 13
Weighing scale with some fruits (balance weighing device)	To weigh fruits and vegetable Heavy, light The relation between weight and price	Where can we find the weighing scale? In the vegetable, fish, meat shop

		Prices per kilo Differences between weighing devices (some has one bowel with indicator and numbers, others use metal weights and two bowels, and also digital scale)
Shelves with different items in a local shop	Prices	The children used 'rupees' instead of Fils The children knew the approximate prices of different items The remembered the prices of some of these items or asked the vendor about them Expiry dates Discount on items which will expire soon (the idea of prices activity)
Fruits in a plate	Oranges have ball shape	The difference between a ball shape and a circle
Wall clock	To know the time	The times of their favourite TV programmes
Praying rug (Islamic designs)	Geometrical shapes (circle and rectangle)	Praying has some mathematical ideas, e.g. how many times we need to was our hand, how many body movements, beads, etc.
Tea thermos	Two Small and large Their prices	How many cups of tea they can probably take Which one hold more tea
Cups	Price Counting (2)	Fractions: one, one and half, three quarters
Electricity wire (folded on a cylindrical cardboard)	Number of meters Round shape	
Ceiling fan	Each number indicates different speed (e.g. 1 = slow, 5 = very fast)	
Car registration plate	Reading number	The use of car number (in accidents, to distinguish the car from other similar cars)
Mobile phone	Numbers on buttons	
Shoes	Prices	His dad took this photo

	Long or short (i.e. small or big) Shoes number (size)	while he was sleeping

Table C-5 The photographs taken by Group 7

The content of the photograph	The main mathematical ideas which the children thought about at the time of taking the pictures	Additional ideas which emerged through the discussion with the children in the interviews
Two plates: 2 bananas + 4 bananas	Addition (combining groups) Plate + plate	
Microwave	Numbers To know how many minutes we need to heat the food To increase or decrease the numbers	Higher number leads to over heating Electricity switch buttons 2+1 Smaller and bigger
Three round cushions (big, medium and small)	Bigger to a 'little bigger' and then smaller	Subtraction and addition
Address plate (on a wall)	Road numbers	The use of address: for emergency Adding the components of the number (2639) 6+3=9 Windows 1 + 1 = 2 Bus number
Weighing device (two bowels)	5 oranges + 3 apples (putting the higher number in "the head" and counting the rest on fingers	The weighing device help us to know how much to pay for the vendor To know how many kilos, to know items' weight Weighing devices is used in shops which sell vegetable, meat Tailors do not use weighing device they use measuring tape
Temperature / speed controllers for air conditioner and fans (in a mosque)	Numbers – used to (increase or decrease the temperature or speed) to high or low levels The electrical switch has geometrical shapes (square and circle)	When we feel warm we chose higher number, when we feel cold we chose lower number A child asked (what is an electricity bill?); the more you consume electricity the more you pay

Calligraphy of some verses of the Koran (in a mosque)	Numbers of verses and pages	To organise the text To know where did we stopped last time
Plate in a cemetery (has some texts for praying)	Geometrical shape (square)	
2 + 4 = 6 small flowers (in a cemetery)	Addition (from left to right) It can be subtraction (right to left)	Number of lights
Mosque dome (from inside) with Islamic designs (three overlapping squares) and (eight windows with sun light going through some of the windows and reflected in the wall) and the names of the 12 Imams	Counting windows Circle shape (the base of the dome) Geometrical shapes	
Mosque chancel (geometrical designs on ceramic (with some calligraphy)	Square Small squares (patterns) Lines	Praying time "how many hand spans" non standardised measurements
Mosque minaret	Cylindrical shape	
Fan	How many rounds?	
Front of a house	Geometrical shapes	Electricity meter (numbers) to know how much electricity we used
Water meter	Numbers used to know how much water we used (little or much)	
Spicy sauce bottle (with a price tag)	Price	
Keyboard	Letters and numbers (in English)	
Telephone	Numbers	
Money	From the lowest to the highest (5, 10, 25, 50, 100, 500 Fils and 1 Dinar)	Using money to buy different things (knowing mathematics help to avoid cheating by the vendor) The children used 'rupee' and other Indian names

Table C-6 The photographs taken by Group 8

The content of the photograph	The main mathematical ideas which the children thought about at the time of taking the pictures	Additional ideas which emerged through the discussion with the children in the interviews
Cloths in Mothercare shop	Prices	Expensive and cheap Different prices
A child measuring the length of another child using a measuring tape	Measurement	Using the measuring tape in the tailor shop is important (clothes should fit perfectly) Longer and shorter
A child working on a computer	Geometrical shape Numbers in the keyboard	Hard disk, CD, scanner, keyboard, speakers Internet usage time
A child standing next to another child	Short and long	Lines in the child t-shirt Human body has geometrical (head=ball, leg = cylinder) Lines in the carpet
Two pair of shoes	Big and small Long and short Size numbers (the relationship between the number and the size)	Looks like a cylindrical shape
Carpet	Lines (patterns) Geometrical shapes (rectangle)	Some of the designs looks like mosque dome
Ceiling fan	Speed	
Calendar (with car picture)	Date	The car has geometrical shapes, speed meter, gear numbers, temperature meter, petrol meter
Big cage (for birds) Bike	Geometrical shapes (square and rectangle)	Many and few (one cage has more and the other has fewer birds) Counting birds Geometrical shapes in the bicycle Buying and weighing bird

		food (some types of food are sold in packs) Machine used for automatic pricing
Small tricycles (in mother care)	Prices	Reading the prices in 'Arabic' numbers
Weighing scale (in vegetable shop) with some pumpkins inside it	Heavy and light Describing the weighing process using metal weights (these weights have different numbers 100 is very heavy, 1 is very light)	Different metal weights are used for different types of fruits or vegetables (e.g. watermelon needs heavier weights compared to parsley) Children talked about their experiences in buying vegetables and fruits (buying oranges or cucumber, 1 KG, 2 KG, 15 KG)
Play station	Numbers (e.g. football game: how many goals, how many points) Ball = geometrical shape Car racing (e.g. rank, time, speed,	TV and receiver channel numbers

Appendix D: Mathematical activities introduced by the project

Contents

Introduction

Activity No. 1: Let's look for mathematics!

Activity No. 2: Mathematics in the street

- Information about the activity
- The feedback sheet
- The follow-up classroom work
- Feedback sheets analysis

Activity No. 3: Mathematics in the vegetable shop

- Information about the activity
- The follow-up work in the classroom
- Feedback sheets analysis

Activity No. 4: Mathematics and food

- Information about the activity
- The follow-up classroom work
- Feedback sheets analysis

Activity No. 5: Mathematics in the human body

- Information about the activity
- The follow-up classroom work
- Feedback sheets analysis

Activity No. 6: Mathematics in the grocery shop

- Information about the activity
- The follow-up classroom work
- Feedback sheets analysis

Activity No. 7: Weight measurement

- Information about the activity
- The follow-up classroom work
- Feedback sheets analysis

Activity No. 8 Mathematics in the kitchen

- Information about the activity
- The follow-up classroom work
- Feedback sheets analysis

Introduction

The weekly shared activities and the follow-up classroom work focused mainly on two issues which seemed, in my point of view, to be overlooked by schools: involving parents in their children's mathematics learning through engaging them in shared everyday activities, and to explore and connect children's mathematical practices in the two sites of home and school. There were different questions in my mind when I worked on designing the mathematical activities in collaboration with the classroom teacher. I wanted through these activities to explore parents' and children's understandings about mathematics in their everyday life activities and to learn more about how they view the relationship between this type of mathematics and school mathematics. I also wanted to find out about parents' and children's reaction to this type of activities and if the everyday mathematics approach adopted in this project would be practical in the existing circumstances of classroom and home. The activities also aimed to encourage the children to explore their surrounding and to identify different objects or situations which involve diverse mathematical ideas. They also attempted to promote children's awareness about the connection between their classroom mathematics learning and their mathematical practices in everyday life activities.

This appendix presents the weekly shared activities and the following work in the classrooms. It also includes a quantitative analysis regarding parents' and children's views about each activity included in the activities' feedback sheets. Later on, a number of patterns which emerged from the quantitative analysis will be explored and interpreted qualitatively with reference to the interviews held with parents, children and the classroom teacher.

Activity No. 1: Let's look for mathematics!

Information about the activity

The structure and the purpose of activity 1 were quite different from the later activities (2 to 8) because it was used in the first stage of the project as a pilot activity. For example, the design of this activity was quite similar to the typical classroom activities and it did not include a detailed feedback sheet. Therefore, the analysis of this activity will be shorter compared to the follow-up activities which were implemented in the third stage of the project (project stages were fully discussed in the methodology chapter).

Activity No 1: Let's look for mathematics!

Date: 3/January/2005

Instructions

1) Look for mathematical ideas in different places around you, for example, in the kitchen, bedroom, living room, mosque, street, shop, and in any other place you like.

2) Draw or 'cut and paste' some pictures of items or situations which you think can have interesting mathematical ideas. Write some explanations about these mathematical ideas beside the pictures.

Notes to parents: Different examples and photographs were presented to the children in the classroom prior to introducing this homework activity. The classroom presentations and this activity both attempted to introduce a new approach which encourages children to identify objects and situations which involve mathematics in their out-of-school environment. We aim to integrate these everyday mathematical concepts and practices in the classroom mathematics lessons.

Parents' feedback (please write any suggestions or comments regarding the activity)

Child's feedback about the activity: What do you think about this activity?

(1) I liked it a lot.
(2) I liked it.

(3) OK.
(4) I didn't like it.
(5) I didn't like it at all.

General information about the activity

- 84% of the children (28 out of 33) completed this activity and returned it back to the teacher. The teacher thought that this number was higher than the average return rate of the typical activities provided before implementing the project
- Most of the parents did not include any comments (65%) in the feedback sheets they returned. Comments written by some parents were mainly about thanking the teacher for his efforts in teaching and for providing this activity. They did not write any suggestions or give clear ideas which could be directly used in the development of the next activities
- Most of the children who had returned the feedback sheets said they liked the activity (64%) or liked it a lot (35%). No one indicated that they did not like it
- Most of the children drew or pasted pictures of home items (e.g. fans, lights, animals). Some children used these pictures to illustrate mathematical operations (e.g. one of the children wrote: in the sitting room there are two fans and three lights). Other children used these pictures to illustrate counting (e.g. 1 boy, 2 cars, 3 plates etc). These illustrations were quite similar to those available in the text book. Other children just drew pictures and did not explain the mathematical ideas involved

The initial analysis of this activity raised our attention (me and the teacher) to a number of issues which we thought that we should take into account in the later activities.

- We should motivate the children to return the activity sheet as soon as possible. For example the teacher suggested that we may give stickers to the children in each group when all its members handed the activity sheets on time. If one child forgot to bring it back then the whole group will not be given the stickers
- Each activity should provide more opportunity for two-way communication (See Hughes & Greenhough, 2006). On the one hand, each activity should include school-to-home flow of information (e.g.

information about the activity, its aim and procedures as well as information about teaching strategies used in the classroom regarding a particular mathematical concept). On the other hand, using feedback sheets to elicit parents' opinions (similar to the one used in the IMPACT project activities), meeting parents in school, and interviewing some of them can provide a chance for more home-to-school flow of information. For instance, the feedback sheets would help in investigating parents' and children's views about the activity in terms of its difficulty, learning outcomes, enjoyment and encourage parents to write comments or suggestions about the activity in order to let the teacher know more about parents' needs, concerns, interests and experiences (e.g. funds of knowledge). Interviewing the children and some parents would provide more chances for them to 'speak up' about the activities especially as we were faced with the problem of the lack of parents' comments

- The next activities should depend less on the content and design of the typical mathematics textbook activities (what Street et al 2005 called school numeracy practices taking place at the home site) and we should try to find out and focus more on other types of numeracy practices especially home numeracy practices taking place in the home site. We should think about possible ways of integrating this latter type of numeracy practices in the classroom in a more meaningful way

Activity No. 2: Mathematics in the street

Information about the activity

The main aim of this activity was to give the children an opportunity to work on tasks which involved collecting, categorising and interpreting data related to their everyday life. Another aim was to encourage children to work with others (parents at home and peers in the classroom) and to give them more space to express their ideas and talk about their experiences in the classroom. The teacher mentioned on several occasions that the above skills and concepts were highlighted as important targets in the new assessment system – which also gave more attention to mental calculation, problem solving, research and innovation; however they often tended to be overlooked in the actual teaching practice for different reasons. For example, these targets were introduced recently and they were probably seen as ambiguous concepts which need more effort in planning and teaching. At the same time, teaching basic concepts (e.g. numbers and arithmetic operations) were always seen as a priority and therefore allocated more time and efforts in the tight schedules at the expense of the 'new skills'.

The idea of the activity was taken from an IMPACT book (Merttens & Vass, 1990; 1993). It was introduced to accompany the statistics unit in the textbook.

Activity No. 2: Mathematics in the street

Name ---------- Class 2/2

Date: 18/March/2005

Instructions

Would you like to be a traffic officer this weekend? Ask an adult from your family to go with you to a nearby street. Stand on the pavement (be careful of the fast cars). You will need to take paper, pencil and a watch.

(1) Stand on the pavement and record how many vehicles pass in the street during a 15 minutes period (1/4 hour).
(2) The other person should watch the time and say when to start and when to end counting the passing vehicles.
(3) Fill this table with your observations about the passing vehicles.

Vehicle type	How many vehicles of this type passed in 15 minutes (draw lines)	Total
Car		
Small truck		
Big truck		
Bicycle		
Motorcycle		
Small bus		
Big bus		

Questions:

Which type of these vehicles is the most frequent? And which is the least frequent?

Did you see other types of vehicles that were not included in the table?

Which type of vehicles do you like? Why?

Notes to parents:

- Dear parent, this activity focuses on the topic of data collection and analysis. This topic was introduced in the classroom today and we wish to extend its ideas to the out-of-school environment. Please take your child to the street and help him in carrying out this activity as instructed above. You can add to this activity by talking with the child about other interesting topics such as road safety (e.g. showing the child how to cross the road safely, talking about different road signs and their meanings). Further, you can motivate the child by asking other questions of his - and your own- interest and experiences. We are looking forward to your feedback. Thank you for your cooperation.

- Everyday mathematics: Understanding mathematics and using it successfully in different situations needs more than just routine processes of manipulating numbers and applying mathematical operations such as (+, -, ×, ÷). Mathematics is an important tool in our everyday life activities. We use mathematical ideas in shopping, paying bills, estimating amounts in cooking, and many other activities. Therefore, we should provide opportunities for our children to see the links between the mathematics taught in school and the mathematics used in everyday life activities.

The feedback sheet

The weekly shared activities (2 to 8) each included a feedback sheet adopted from the IMPACT project (Merttens & Vass, 1993). The feedback sheets began with a short introductory paragraph and included two sections:
(A) Parents' section which included 4 multiple-choice and 3 open-ended questions.
(B) Child's section which included 3 multiple-choice questions and one open-ended question.
Finally the children were asked to draw or paste a picture related to the activity topic. Parents and children were also asked to sign the activity. Parents' signatures were always requested in the regular activity sheets provided by the classroom. This signature was basically used to encourage the children to show their homework to their parents and to ensure that the parents would look at the sheets and get a general idea about their children's work and progress.
Similarly, in the feedback sheets attached to the project's mathematical activities we requested the parents' signature. Firstly, because we wanted to ensure that the comments and views were written by the parents and not the child.
Secondly, we hoped that this would somehow encourage them to give more attention to the feedback sheets and hopefully increase the number of returned activities and feedback sheets.
The descriptive statistical figures for parents' and children's multiple-choice answers are presented in tables (D-2 and D-3) placed at the end of this appendix.

Feedback sheet for activity No. [ ]

Dear parent,
School and family do their best to achieve a better education for your child. Your supervision and support to the child in studying and doing homework is very important. We always appreciate your efforts in this respect. Thus, we would like to know more about your opinions regarding this activity. Please answer the following questions.

How much time was required to do this activity? ----------
Who helped the child in doing this activity? ----------

Questions to parents

1. How difficult was the activity for the child?

(1) Very difficult (2) Difficult (3) Easy (4) Very easy

2. How much help did the child need from parents or other adults when carrying out the activity?

(1) A lot of help (2) Average help (3) Little help (4) No help

3. How much do you think the child has learned from the activity?

(1) A lot (2) Something (3) Little (4) Nothing

4. To what extent this activity was interesting to the child?

(1) Very interesting (2) Interesting (3) Not interesting (4) Boring

5. Did you or the child encounter any problems while carrying out the activity? Please explain.

--

6. From your point of view, what did the child learn from this activity?

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7. Do you have any other comments or suggestions? *(This question was change in activities (4 to 8) to: what are your suggestions for the next activities? your ideas are important for us!)*

Thank you for your cooperation

Parent's signature ----------

Questions to children

8. Did you like doing this activity?

(1) I liked it a lot (2) I liked it

(3) I did not like it (4) I did not like it at all

9. How difficult the activity was?

(1) Very easy (2) Easy (3) Difficult (4) Very difficult

10. How much did you learn from this activity?

(1) A lot (2) Something (3) Little (4) Nothing

11. What did you learn from this activity?

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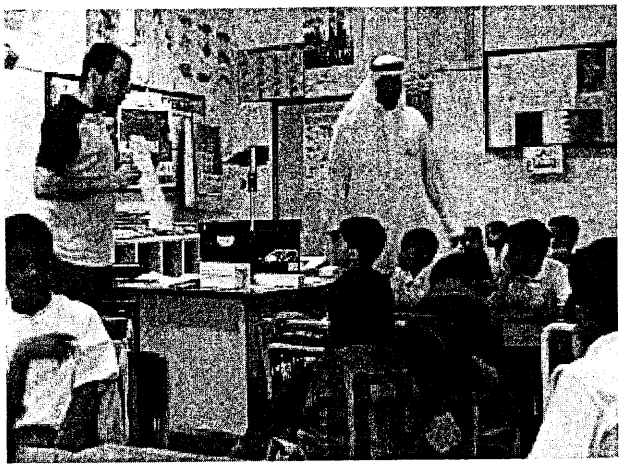
12. Write or draw something related to the activity

Child's signature ----------

The follow-up classroom work

After collecting and marking the activities, the children were invited to talk about their experiences and to present their work in the classroom. Then I worked with the teacher on explaining how we can use column charts as a useful way for presenting, understanding and comparing different sets of data. We used examples from the data collected by the children in this process and assisted the children in reaching interesting conclusions. For example, the children talked about their assumption of why small cars were used more frequently in comparison to other types of cars such as ambulance or trucks. Then the children worked in groups in presenting, discussing and comparing their different charts. The activity sheets for each child were included in a folder dedicated especially for the project.

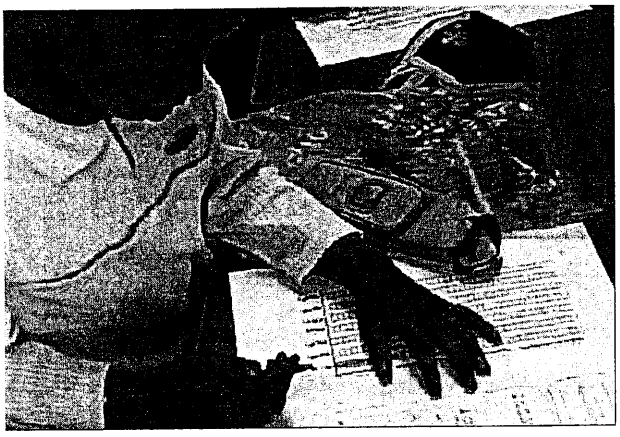
Photographs of the follow-up work of activity 2 in the classroom



Discussion about the activity in the classroom



Explaining to the children how to present their data in charts



One of the children working on presenting his data in columns chart

Feedback sheets analysis

General information

- 31 children returned their activity sheets, 30 returned the feedback sheets and 31 returned the classroom activity (in activities 2-8 the number of children in the classroom was 32)
- Time required for carrying out the homework activity ranged from 5 to 60 minutes (mean = 20 minutes)
- Most of the children (54%) were helped in this activity by male family members, especially fathers (39%), whereas (33%) were helped by female family members (Table D-1)

Parents' opinions in the short questionnaire (Table D-2)

- The majority of parents thought that the activity was very easy (52%) or easy (39%). Only one parent thought that it was difficult.
- The majority of parents said that the child needed little help (48%) or no help (21%). (18%) said that the child needed average help.
- The majority of parents thought that the child had learnt a great deal (58%) or average amount from the activity (30%). Only few parents (6%) thought that the child had learnt a little.
- Nearly all the parents either thought that the activity was very interesting (48%) or was interesting (45%).
- Most of the parents did not sign the feedback sheet (55%), whilst (39%) did sign.

Children's opinions in the short questionnaire (see Table D-3)

- Nearly all the children either said that they liked the activity (21%) or liked it a lot (70%).
- Most of the children thought that the activity was easy (30%) or very easy (61%).
- A high percentage of the children said that they learned a lot (45%) or learned something (33%). (12%) of the children said that they learned little.
- The majority of children included their signature (79%). Only (15%) did not sign.

Parents' answers to the open ended questions (Table D-4)

Most of the parents (85%) indicated that the children did not encounter problems when carrying out the activity. One parent said that the child had some difficulties in counting and recording of fast cars.

Most of the parents (94%) wrote some comments about aspects of learning connected with the activity. Parents' views about their child's learning can be summarised in the following three main points:

1. Mathematical concepts which involved correct and quick counting and addition, comparison e.g. big and small, few and many, and fast and slow. Some parents mentioned concepts related to time and using a stop watch. Others mentioned data collection and analysis.
2. Mental abilities: Some parents thought that their children learned from this activity quick thinking, mental calculation, concentration on more than one thing at a time and precise observation.
3. Skills related to everyday life which focused on health and safety issues e.g. instructions for crossing the road, traffic signals and its meanings, types and functions of different cars, and car registration plates.

Most of the parents (64%) did not include additional comments or suggestions and left the answer box empty. Only (30%) of the parents wrote comments. These comments focused mainly on thanking the teacher for his efforts and wishing for more activities of this type in future. One of the parents asked the teacher to concentrate more on the basic reading and number skills.

Children's answers to the open ended questions (Table D-4)

Most of the children (79%) wrote their opinions about what they learned from the activity. Their responses focused on the following points:

1. Learning more about different types of vehicles, their sizes, colours and shapes, and their purposes (e.g. ambulance, police car and cement mixer).
2. Learning about time, using the stop watch, and counting down.
3. Quick counting, recording and comparison of data.

4. Knowing about traffic rules, traffic signals, safe road crossing and pedestrian lines.
5. One of the children said that this activity helped him to take responsibility because following the traffic instructions can help in keeping him and others safe.

Activity No. 3: Mathematics in the vegetable shop

Information about the activity

The idea of this activity came from children's interviews regarding their photographs (e.g. photos taken in different shops). The activity was connected with different units in the mathematics curriculum (e.g. statistics, money, measurement and word problems) and a plants unit in science.

Activity No. 3: Mathematics in the vegetable shop

Name ---------- Class 2/2

Date 23/March/2005

Objects:

The aim of this activity is to help children to learn about how to:

- Collect and categorize data according to specific characteristics.
- Use the language of mathematics in everyday life activities.

Instructions

This weekend ask one of your family members to take you to a nearby vegetables and fruits shop.

(1) Ask the seller about the price of one kilogram of the different types of vegetables and fruits written in the table below.

(2) Write the prices in the table.

(3) Discuss and compare the prices with your family at home and decide whether these prices were expensive or cheap

Fruits	Price of one kilogram	Expensive or cheap	Vegetables	Price of one kilogram	Expensive or cheap
Apple			Carrot		
Banana			Cucumber		
Limon			Onion		
Orange			Green pepper		
Mandarin			Tomato		
Pomegranate			Potato		
Cantaloupe			Iceberg lettuce		
Fig			Local lettuce		
Grape			Cauliflower		

Kiwi			Cabbage		
Date			Parsley		

Notes to parents:

- Dear parent, Today's lesson is related to different subjects. Mathematics: Buying and selling, writing and reading numbers, weight measuring and the concept of cheap and expansive. Social sciences: Bahrain's local agriculture products (fruits - vegetables). Science: plants (fruits – vegetables). Please take your child to the vegetable shop and help him to do the activity. Ask the child additional questions (e.g. good manners when buying and selling).

- Learning ideas: Children like to investigate and ask questions about what they see. Encouraging the child to talk about his everyday experiences and linking these experiences to school experiences can have positive effects on thechild's abilities and skills. Remember to take your child with you when you go shopping. Talk with him about the prices of different goods and encourage him to use mathematics in different situations.

We are looking forward to your feedback. Thank you for your cooperation.

The follow-up work in the classroom

After returning the activity sheets to the classroom, the children used the collected data to answer a number of questions. During their work we encouraged the children to talk about their results and to elaborate more about their experiences of their visit to the vegetable shop with their parent. The teacher referred to the children's learning experiences of this activity when he taught other subjects such as science, social sciences. The classroom work and discussion were based on the following task:

What kind of vegetables was the most expensive? ----------
What kind of vegetables was the cheapest? ----------
What kind of vegetables do you like? ----------
What kind of fruits was the most expensive? ----------
What kind of fruits was the cheapest? ----------
What kind of fruits do you like? ----------
How can we measure the weight of fruits and vegetables? ----------

Write names of three fruits planted in Bahrain? ----------

Write names of three vegetables planted in Bahrain? ----------

What are the benefits of eating fruits and vegetables? ----------

Do you regularly eat fruits and vegetables? ----------

Use the prices written in your table to answer these questions:

One kilogram of carrots costs ------- One kilogram of cucumbers costs -----

To buy the two items we pay to the seller --------

One kilogram of oranges costs ------- One kilogram of apples costs --------

To buy the two items we pay to the seller --------

One kilogram of onions costs ------- One kilogram of potatoes costs --------

To buy the two items we pay to the seller --------

One kilogram of tomatoes costs ------- One kilogram of cabbages costs ----

---

To buy the two items we pay to the seller --------

Feedback sheets analysis

General information

- 30 pupils returned their activity sheets, 29 returned the feedback sheets
- Time required for carrying out the homework activity ranged from 3 to 90 minutes (mean = 14 minutes)
- Most of the children (54%) were helped by a male family member, mainly fathers (45%), whereas (25%) were helped by a female family member (Table D-1)

Parents' opinions in the short questionnaire (Table D-2)

- Most of the parents thought that the activity was easy (35%) or very easy (48%)

- 28% of the parents said that the child needed average help, the same percentage said that there was a need for little or no help
- A high percentage of parents thought that the child had learned a lot from the activity (50%) or an average extent (25%). Only a few parents (9%) said their child had learned little
- Most of the parents viewed the activity as interesting (41%) or very interesting (44%)
- More of the parents signed the activity (69%) compared with the previous activity. only 15% did not sign.

Children's opinions in the short questionnaire (Table D-3)

- Most of the children said they liked to activity (31%) or liked it a lot (47%)
- Most of the children thought the activity was very easy (47%) or easy (31%)
- (31%) of the children said they learned a lot from the activity, while (19%) thought they learned something. 22% of the children said they learned little or learned nothing (6%)
- The majority of children signed the activity (59%), while 25% did not sign it

Parents' answers to the open ended questions (Table D-5)

The majority of parents (72%) said their children did not encounter problems in the activity. Two parents mentioned that their children faced some difficulties because they lacked the writing skills necessary for recording the information in the tables.

Most of the parents (81%) wrote their opinions about the learning outcomes of the activity which can be summarised in the following points:

1. Learning 'directly' about different types of vegetable and fruits: their prices, their tastes, how certain types of fruits (e.g. dates) can be available during a particular season and how importing fruits from other countries can make some fruits (e.g. oranges) available for the whole year, and it gave the children a chance to learn about types of fruits and

vegetables which the children might never saw at home (e.g. vegetables used in Indian cuisine and fruits imported from South East Asia)

2. Learning about prices, how to read prices and how to come to a decision of whether an item is expensive or cheap and whether the price is reasonable and affordable. The activity also provided an opportunity for the children to 'use money in real purchase situations'. This process involved counting, calculating and bargaining (because the prices are usually not fixed in the small shops and open for negotiation)
3. Learning about the weighing process and the different types of scales and units used in this process. In the activity the children also learned about the relationship between weighing and other mathematical concepts (e.g. money, counting and operations).
4. The activity helped in developing personal skills in some children (e.g. feeling more confident when dealing and talking with the seller). Some children were encouraged to do shopping by themselves in the future.

Most of the parents (56%) did not include other comments or suggestions for the next activities. Some parents (28%) wrote comments which were mainly about expressing their appreciation for the teacher and wishing for more activities of this type which they described as 'interesting' and 'good resource for learning'.

Children's answers to the open ended questions (Table D-5)

Most of the children (75%) wrote their opinions about what they learned from the activity. Their responses focused on similar points mentioned by their parents as stated above. One of the children wrote 'mathematics is not just like addition 1 + 1, everything in our life has mathematics'.

Activity No. 4: Mathematics and food

Information about the activity

The idea of this activity was introduced by the teacher through a personal experience. He noticed that parents often send their children to buy milk or bread and always ask them to buy the freshest one or what they called 'today's date'.

Activity No. 4: Mathematics and food (Food expiry date)

Name ---------- Class 2/2

Date: 3/April/2005

Objectives

The purpose of this activity is to help the student to learn about:

- Collecting and analysing data related to a particular experience.
- Using mathematics in everyday life activities.

Instructions

(1) Ask one of your family members to help you with this activity.

(2) Look at the expiry date written on different food products such as milk, juice, bread etc.

(3) Write the production and expiry dates in the table.

Food product	Production date	Expiry date	Consumable or not

If it is expired, don't buy it!

Notes to parents:

Dear parent, Today's lesson is about routine everyday activities which can involve very useful mathematical concepts. Reading production and expiry dates on food products is something that we do whenever we buy milk, bread and canned food. This process involves different mathematical skills such as correct reading of the two dates, comparing the dates and deciding: Is this food consumable or not? Is it expired? How many days left until it expires? Can I consume it in this period of time?

Learning ideas: Take your child to the kitchen and show him different food products such as: canned food, rice, milk, beverages, juice etc. Discuss with him the production and expiry date idea.

The follow-up classroom work

Children's homework activities were discussed in the classroom. The children talked about their experiences and how they carried out the activity at home. Next, another activity which focuses on the theme of mathematics and food (like the homework activity) was given in the classroom. The idea of this activity was taken from children's interviews about their photographs where they mentioned how they spent their pocket money on buying snacks from a cafeteria. In this activity, the children brought menus leaflets from the cafeterias and restaurants in the village which included different types of foods and their prices e.g. pastries, pizza, sandwiches, and some local foods. Some of the popular items were included in a simpler menu for an imaginary 'Year 2 Restaurant'. Children were asked to play with each other by making different orders of their choice and calculating the prices. The evaluation of this activity was done by asking the children to complete a set of ready-made orders.

Year 2 Restaurant

Food menu

Pizza	
Vegetable pizza	500 Fils
Beef pizza	600 Fils
Chicken pizza	600 Fils
Mixed pizza	900 Fils
Sandwiches	
Chicken burger	250 Fils
Beef burger	250 Fils
Liver	200 Fils
Falafel	150 Fils

Pastries	
Beef dough	350 Fils
Beef and cheese dough	350 Fils
Cheese and thyme dough	300 Fils
Spinach dough	400 Fils
Starters	
Vine leaves (6 pieces)	600 Fils
Humus	300 Fils
Tabula salad	300 Fils
Chips	300 Fils

Any beverages 100 Fils

Free home delivery – Please visit us

Orders

Mohammed	**Miriam**
Liver sandwich ------ Fils Beef and cheese pastry ------ Fils Juice ----- Fils Total ----------	Vegetable pizza ------ Fils Humus ------ Fils Juice ------ Fils Total ----------
Mahdi	**Zainab**
Chicken Pizza ------ Fils Salad ------- Fils Cold drink ------- Fils Total ----------	Beef burger ------- Fils. Cheese and thyme pastry----- Fils. Cold drink ----- Fils Total ----------

Feedback sheets analysis

General information

- 31 pupils completed their activity sheets, 29 completed the feedback sheets, and 29 completed the classroom activity
- Time required for carrying out the homework activity from between 3 to 30 minutes (mean = 8 minutes)
- In contrast with the two previous activities, high percentage of children (56%) were helped by a female family member, especially mothers (40%), while (20%) were helped by a male family member (Table D-1)

Parents' opinions in the short questionnaire (Table D-2)

- Most of the parents thought that the activity was very easy (47%) or easy (34%). Only 3% said it was difficult
- Half of the parents said the children needed little help while doing the activity, 25% said 'average help', and (12%) said 'no help'

- Over half of the parents (59%) thought that the children learned to a high degree from the activity. As smaller number of parents thought that the activity caused average learning (22%) or little learning (6%)
- Almost all the parents thought that the activity was interesting (47%) or very interesting (41%)
- Nearly two thirds of the parents signed the activity (66%), while only (22%) did not

Children's opinions in the short questionnaire (Table D-3)

- Most of the children said they liked the activity (28%) or liked it a lot (53%). Only one child said he did not like it.
- Nearly third the children thought the activity was easy (34%) or very easy (50%). No one said it was difficult.
- The majority of children said they learned a great deal from the activity (34% said 'a lot' and 31% said 'something'). 19% of the children said they learned 'little'.
- Three quarters of the children have signed the activity (75%), while (12%) have not.

Parents' answers to the open ended questions (Table D-6)

It seems that most of the children did not find difficulties in this activity as (38%) of the parents wrote 'no problem' and (34%) did not provide answers and left the box empty. Only 4 parents (13%) wrote about some problems encountered when carrying out the activity. They mentioned for example that their children faced difficulties in reading the expiry dates of some imported products. These dates were written from the left to the right side in Arabic / Western numbers while in the classroom the children used to write the date from right to left in accordance with the Arabic script system and in Hindu / Arabic numbers. The children also found difficulties in understanding abbreviation such as P (for production) and E (for expiry). The expiry dates of products made in Saudi Arabia used two dates (the official Islamic calendar along with the Gregorian calendar) which caused some confusion for the children.

The majority of parents (78%) wrote their opinions about the learning outcomes of the activity. These opinions can be summarised in the following points:

1. Learning generally about reading and writing expiry and production dates, and particularly about dates written in left-to-right Arabic / Western digits.
2. The activity encouraged the children to ask questions which can lead to reaching a decision e.g. is this food product edible? Can we consume this amount of food before it expires? Does it worth buying?
3. Engaging children in everyday activities can develop their personal skills. For example this activity raised independence in the children as it taught them how to read the expiry dates and not depend on others (e.g. the seller or other customers) to read it for them.

Most of the parents (69%) did not provide further suggestions. Five parents (16%) wrote some comments which mainly thanked the teacher for his effort and praised the idea of the activity which 'helped the children to be more familiar with different aspects of everyday life and encourage the children to ask questions and learn more'.

Children's answers to the open ended questions (Table D-6)

The majority of children (75%) wrote about their opinions regarding what they learned from the activity. Most of their writings were short and quite similar to their parents' ideas. In brief, most of the children wrote that they learned from this activity that it is important to read expiry and production dates before buying or consuming food products because failing to do so can affect their health. Some children added that this activity raised their independence skills.

Activity No. 5: Mathematics in the human body

Information about the activity

The idea of this activity came from previous discussions with the children about their photographs (e.g. some children took photographs of a tailor while he was taking measurements of a child). The activity was linked with the measurement unit in mathematics and body parts in science.

Activity No. 5: Mathematics in the human body

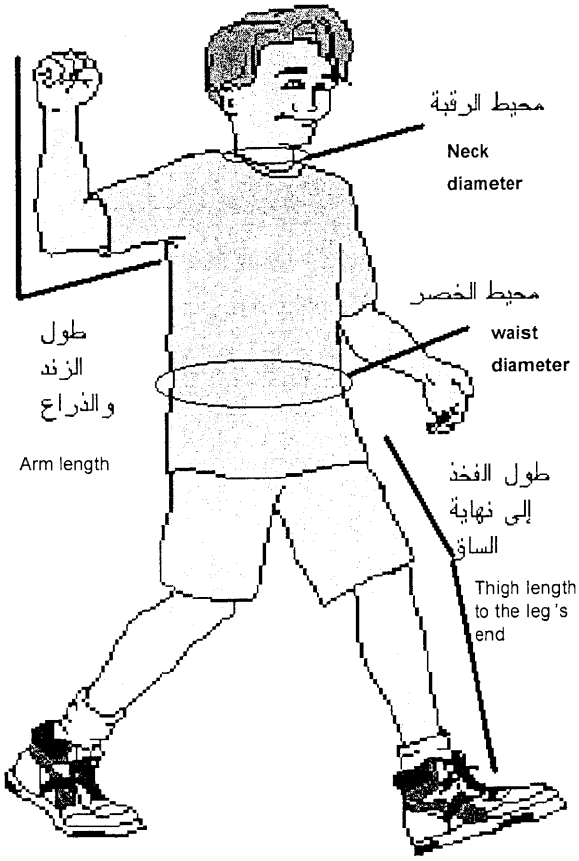
Name ---------- Class 2/2

Date 13/April/2005

Objectives

The aim of this activity is to help the children to learn about:

- Collecting and analysing data related to a particular experience.
- Using mathematics in everyday life activities.
- Measuring different lengths by using measurement tools.



Instructions

You will need a tape measure like the one used in the tailor shop.

Dear parent, please help your child to measure different parts of his body. Encourage him to record the numbers by himself and engage with him in the process of asking and answering questions. Discuss with him any other related issues of your interest e.g. human body is an ingenious gift created by God, how can we take care of this gift?

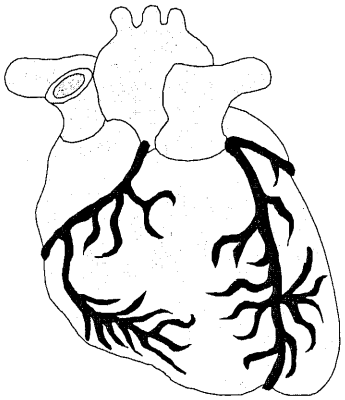
Body measurements

Ask one of your family members to help you in using a measuring tape to measure the following parts of your body.

(1) Neck diameter equals ------- centimetre.
(2) Waist diameter equals ------- centimetre.
(3) Arm length equals -------- centimetre.
(4) Thigh and leg length equals ------ centimetre.

Heartbeats

(1) Ask someone in your family to count your heart beats in one minute time (put your ear or hand on the child's heart and use a watch with digital numbers to count time).
(2) My heart beats ----- times in one minute.
(3) Run or jump for another one minute and repeat step (1).
(4) Now, how many heart beats can you hear in one minute? ----- beats.
(5) What did you notice? ----------
(6) In which situations does your heart beat very fast?
A) ---------- B) ---------- C) ----------



Notes to parents:

Dear parent, Today's lesson is about mathematics in the human body. In this activity we like to draw children's attention to the idea that mathematics can be found everywhere and in everything around them, even in their bodies. We can see evidence of God's creatively by looking carefully at the miracles and amazing secrets incorporated in our body. For example, we can find in our bodies different mathematical ideas such as the variation of heart beats, temperature, lengths, weight, and many other examples. Our aim is to help the child to discover how mathematics is important in our life and how we can utilise it in our daily activities. Through these activities we hope that the children will realise that mathematics is more than just numbers and exercises to be memorised in textbooks, but more importantly it is an essential part in our everyday life.

The follow-up classroom work

In the classroom, each group of children talked briefly about their experiences when carrying out the activity and presented their work to the other groups. Then we asked the children to work in groups on a task which included measuring their weights and heights, comparing results and reaching some conclusions (e.g. which child was the heaviest / lightest? Which child was the tallest / shortest? Which group of children has the largest / lowest sum of weights? etc.) The children played the 'doctor game' and used stethoscopes to measure heartbeats and used thermometers to measure body temperature. Children's work in the classroom was videoed and photographed. All their work was included in their folders.

Photographs of the follow-up work of activity 5 in the classroom



Weight measurement



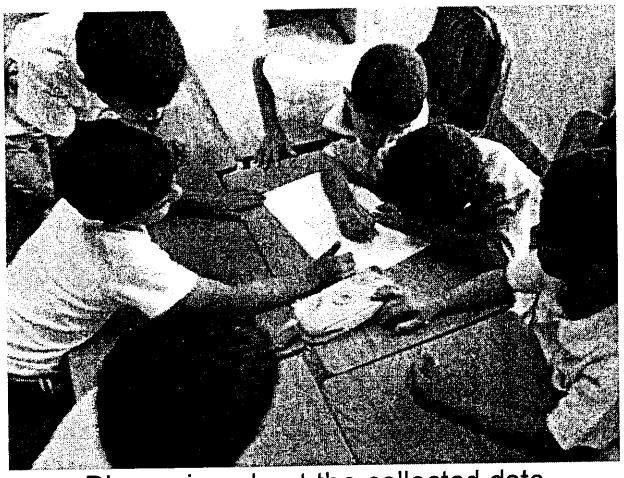
Heartbeats measurement



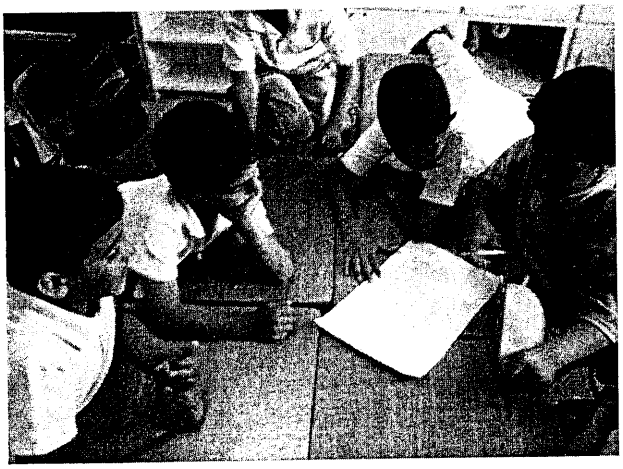
Height measurement



Temperature measurement



Discussion about the collected data



Discussion about the collected data

Feedback sheets analysis

General information

- 30 pupils competed their activity sheets, 29 competed the feedback sheets
- Time required for carrying out the homework activity from 3 to 60 minutes (mean = 10 minutes)
- High percentage of children (63%) were helped by a female family member, especially mothers (33%), while (23%) were helped by a male family member (Table D-1)

Parents' opinions in the short questionnaire (Table D-2)

- Most of the parents said the activity was easy (25%) or very easy (56%). Few parents (6%) said the activity was difficult
- More than half of the parents said the child needed little help (56%) or needed average help (19%). Only one parents indicated that the child needed lots of help, while (9%) said no help was needed
- Most of the parents thought that their children have learned from the activity (50% said 'a lot', and 34% said 'average'). Only one parent thought that the child learned little from this activity
- Most of the parents thought the activity was interesting (44%) or very interesting (38%). Only one parent though the activity was 'not interesting' and another one thought that it was 'boring'
- A high number of parents signed the activity (75%), while only (12%) did not

Children's opinions in the short questionnaire (Table D-3)

- Nearly all the children said they liked the activity (44%) or liked it a lot (47%).
- Most of the children though the activity was easy (31%) or very easy (53%). Only two children (6%) thought it was difficult.
- A high percentage of children said they 'learned something' (41%) or 'a lot' (38%) from the activity. Only some children said they learned 'little' (13%).
- The majority of children signed the activity (81%), while (9%) did not.

Parents' answers to the open ended questions (Table D-7)

It appears that most of the children did not find difficulties in this activity as almost all the parents (91%) either wrote 'no problems' or left the answer box empty.

A high number of parents (75%) wrote their opinions about learning aspects which the activity may have developed. These aspects can be summarised as follows:

1. The activity provided an opportunity for the children to familiarise themselves with different measurements tasks, tools and units related to authentic situations. They also learned about collecting, analysing and comparing data in the first part of the activity (body measurements) and observing the variation between different measurements in the second part of the activity (heart beats measurements).
2. The children learned more about the names and sizes of their body parts. They also learned that God created people with different sizes and shapes and therefore we must not mock other people because of their size.

The majority of parents (72%) did not answer the question which required their additional comments or suggestions for the next activities. Only five parents (16%) wrote comments which mainly included their thanks to the teacher. One of the parents wrote an additional comment which says 'the child likes to ask questions and this activity increased his curiosity to reach the final result'.

Children's answers to the open ended questions (Table D-7)

Most of the children (88%) wrote their views about what they learned from the activity which included (for part 1 of the activity): learning about the measurement process and its tools and units, learning about concepts such as width and height and the importance of measurement in our life (e.g. knowing about sizes is important when we buy clothes). Some children said that they learned that people have different sizes and weights and we should respect all people regardless of the shape of their bodies. Regarding part 2 of the activity, some of the children indicated that they learned more about the heart, its

function and how to measure heart pulse. They also learned that heart beats at different speeds which may increase or decrease depending on certain conditions. By looking at the handwritings I found that some parents (22%) wrote the answers on behalf of their children in the feedback sheets. I do not know exactly whether the parents wrote what the children said (e.g. because their children had difficulties in writing) or they made up the children's comments.

Activity No. 6: Mathematics in the grocery shop

Information about the activity

The idea for this activity emerged from interviews with the children when using money was often mentioned as one of their main everyday activities. The activity was merged with the teaching plan of the money unit provided by the text book.

Activity No. 6: Mathematics in the grocery shop

Name ---------- Class 2/2

Date: 6/April/2005

Objectives

The purpose of this activity is to help students to learn about:

- Collecting data according to specific characteristics.
- Using money in everyday activities.

Instructions and questions:

Part1: Money, Money !!

1. Visit a grocery shop nearby your house with a family member.
2. Ask the shop keeper about things that you can buy with the following amounts of money.

What can you buy if you have

25 Fils? ----------

50 Fils? ----------

100 Fils? ----------

500 Fils? ----------

1 Dinar? ----------

5 Dinars? ----------

3. Ask the shop keeper about the cheapest things sold in the shop

The cheapest thing sold in the shop is -------- and it costs --------

4. Ask the shopkeeper about the most expensive thing sold in the shop
5. The most expensive thing sold in the shop is -------- and it costs --------
6. Draw things you like to buy from the store. Write down their prices.

Part 2 : the shopping list

You need: scissors, glue, paper, empty food packages.

1. Search for empty packages of different drinks, foods, etc.
2. Cut one side of each package and stick it on the paper.
3. Write down the name of each item and write its price next to it.

Notes to parents:

- Dear parent, today's lesson is about using money in everyday activities. This activity aims to encourage children to learn more about the prices of different goods in the grocery shop, to distinguish between expensive and cheap goods, and to learn about different types of money (coins and notes with different values). Please ask your child other questions related to your interests and experiences (e.g. buying and selling, comparing prices, discussing trading manners such as honesty and trust) and you can also talk with the child about health issues such as the importance of healthy nutrition and the effect of eating junk foods. We wish you a good and useful time. Your suggestions are always welcomed.
- **Learning idea:** So when you take your child to the supermarket* ask him to read the price tags of different things. For example: 1.550 is one Dinar and five hundred and fifty Fils. Ask the child to say 100 Fils instead of 'Rupee'. **

Note to the reader:

*Goods in the grocery shop are usually not priced.

**The Indian currency (Rupee) used in Bahrain a long time ago before independence. This old currency consists of Rupee and Anna while the relatively new one consists of Dinar and Fils

10 Rupees = 1 Dinar = 1000 Fils

1 Rupee = 16 Anna = 100 Fils

Half Rupee = 50 Fils

4 Anna = 25 Fils

12 Anna = 75 Fils

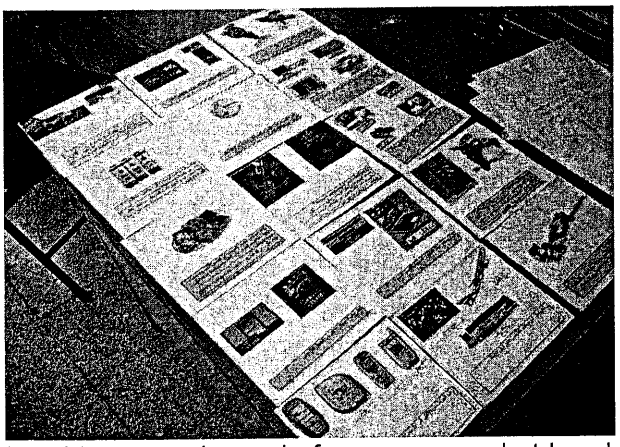
Most people still use the old Indian words and other Indian names such as 'paisas' – which means money – along with the new Arabic names (Fils and Dinar) in their daily activities. Here I made a mistake of asking parents to avoid using the Indian system and depend more on the Arabic system. However, as

we will see later in the finding chapters, children seemed to shift between the two systems depending on the context and its actor (e.g. teacher in school, parent at home and Asian or Bahraini seller in the shop).

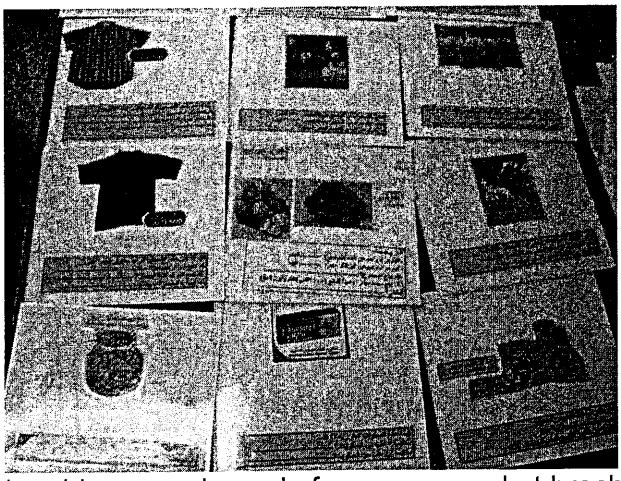
The follow-up classroom work

1. Children's homework activities were discussed and presented in the classroom.
2. Word problem cards were made using shopping brochures brought by the children. Each card has a word problem about some purchases and prices taken from the brochures. However, this activity was quite difficult for many children because of their limited reading skills. So the teacher decided to make a small shop in the classroom. The children brought empty packs of food, drinks, toys, etc. Big price tags were placed on each item. The shop idea was interesting fo the children as well as the teacher.
3. World currencies game was introduced in the classroom. The game idea was to link the country name with its correct currency.

Photographs of the follow-up work of activity 6 in the classroom



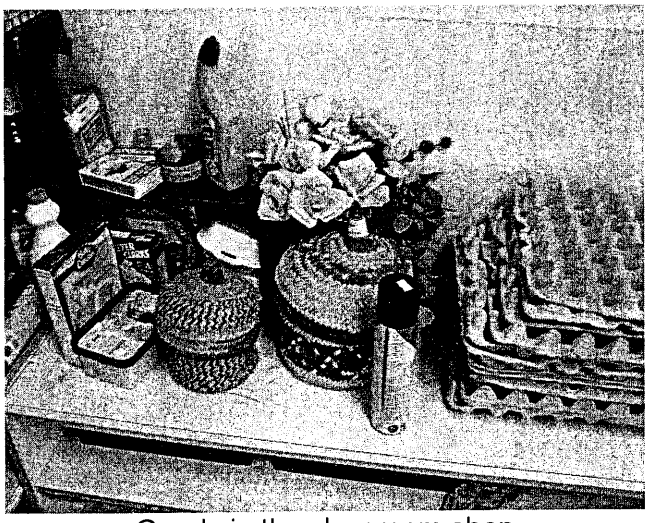
Word problems cards made from supermarket brochures



Word problems cards made from supermarket brochures



Goods in the classroom shop



Goods in the classroom shop



The classroom shop

Feedback sheets analysis

General information

- 30 pupils completed their activity sheets, 29 completed the feedback sheets, and 18 carried out the classroom activity
- Time required for carrying out the homework activity ranged from 3 to 60 minutes (mean = 18 minutes)
- Just over half of the children (53%) were helped by a female family member, especially mothers (31%), while (28%) were helped by a male family member (Table D-1)

Parents' opinions in the short questionnaire (Table D-2)

- Almost all parents indicated that the activity was easy (50%) or very easy (34%). No one wrote that it was difficult or very difficult.
- Most of the parents said that the children needed little help (47%), while few chose 'average help' (16%) or 'a lot of help' (6%). 12% said that no help was needed.
- Most of the parents thought their child had learned a lot (56%) or to an average (22%) degree. Only 6% said the children learned to a little degree.

- Almost all the parents indicated that the activity was very interesting (38%) or interesting (47%).
- The majority of parents (78%) signed the activity, while 6% did not.

Children's opinions in the short questionnaire (Table D-3)

- Most of the children said they liked the activity (41%) or liked it a lot (44%).
- Most of the children indicated that the activity was easy (44%) or very easy (41%).
- Most of the children said they learned something (38%) or learned a lot (34%) from the activity. Only 13% indicated they learned 'little'.
- All the returned feedback sheets were signed by the children (84%).

Parents' answers to the open ended questions (Table D-8)

It seems that most of the children did not encounter problems when carrying out the activity as most of the parents either wrote 'no problem' (28%) or did not write an answer (47%). Only two parents (6%) mentioned mainly two difficulties. First, items in the grocery shop were not priced (i.e. not labelled and sometimes can be negotiated). Second, some children could not communicate well with the Asian sellers. The interesting thing is that in the purchase process both sellers and customers often speak a mix of broken Arabic and Indian languages.

A high number of parents (81%) wrote their comments regarding learning aspects developed in this activity which can be summarised in the following points:

1. The children became more familiar with the prices and types of different food products and goods in the grocery shop. They also had the chance to learn about some new products which they did not buy before or see at home.
2. They learned about counting, carrying out different mathematical operations in order to know how much they should pay and how much they should get as change, about different prices, about concepts such as expansive, reasonable and cheap, money units and what can we buy with each of these units. For example the most expansive items

were a large bag of rice or a calling card (each worth 25 BD) while the cheapest items were a box of matches or piece of chewing gum (each worth around 25 Fils).

Most of the parents (63%) did not write any suggestions or provide ideas for the next activity. Comments written by some parents (19%) centred on thanking the teacher for his efforts and asking for more activities of this type. Some parents wrote that the children have learned a lot from this activity and that they felt encouraged to ask more questions about the activity's topic.

Children's answers to the open ended questions (Table D-8)

Most of the children (78%) wrote their views regarding what they learned from the activity. Their views were quite similar to their parents' opinions mentioned above (e.g. learning about different prices of different products available in the grocery shop, reading prices correctly, and different concepts such as expansive and cheap). Some children wrote that they learned to depend on their selves through engaging in the purchase process and dealing with the seller.

Activity No. 7: Weight measurement

Information about the activity

The idea for this activity came from the children's interviews about the photographs (e.g. different types of weighing scales at home and shops). The activity was included as part of the measurement unit in the textbook.

Activity No. 7: Weight measurement

Name ---------- Class 2/2

Date 20/April/2005

Objective

The purpose of this activity is to help the student to learn about weight measurement in relation to everyday situations.

Instructions

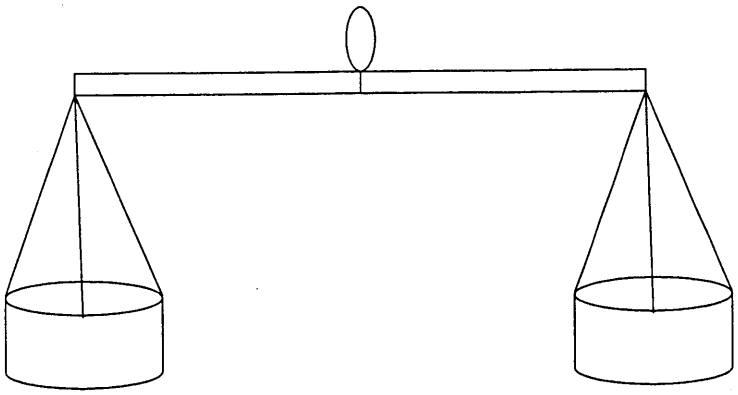
We can find many mathematical examples in vegetable, meat, and fish shops. Visit one of these shops with an adult from your family and find some information about weight measurement.

We use weight scale to ...? ----------

What are the measuring units used in the shop?

Part 1: How to make weight scale?

1. In order to make a weight scale you need
- Two empty cans or packs (e.g. beans can or yogurt pack).
- Strings.
- Long ruler.
2. Make your weight scale as shown in the picture.
3. Compare weight of different things (key and pen, small toy with eraser etc.)
4. Bring the weight scale to the classroom.



Part 2: Look for pictures of things with different weights and stick it in a sheet of paper as instructed below:

1. A very heavy thing which you can not carry with two hands.
2. A less heavy thing which you can carry with two hands.
3. A light thing which you can carry with one hand.
4. A very light thing which you can carry with your fingers.

Notes to parents:

1. Dear parent, today's lesson is about weight measurement. We measure many things in our everyday activities (e.g. buying food and cloths, cooking and in hospital). Children in their everyday activities also deal with weights and use terms like heavy, light, heavier, and lighter to compare things with different weights. Taking your child to the vegetable, meat or fish shops would be a good opportunity for him to learn and talk about weight measuring. Please assist the child in using the kitchen weight scale (if available) to measure and record weights of different things. Thank you.
2. **Learning idea:** Cooking can be a useful activity to teach your child about weights and amounts. Ask the child to join you when preparing dinner. Discuss with the child, for example, the weights or amounts of ingredients used when cooking rice. How many cups of rice? How many glasses of water? How many minutes for cooking? How many spoons of salt or spices do we need?

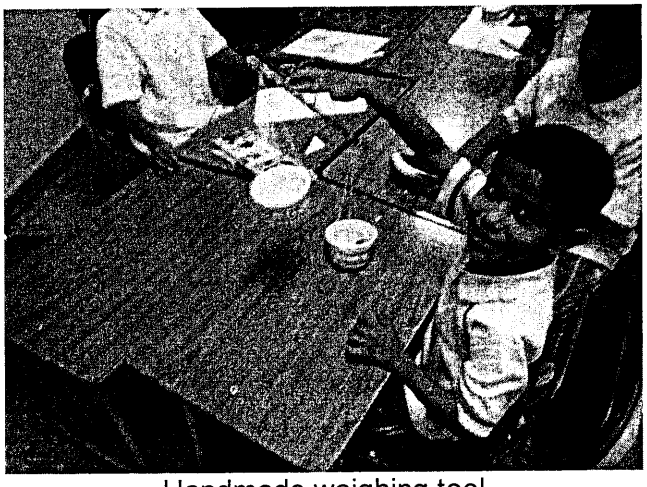
The follow-up classroom work

1. The children talked about their experiences and discussed their homework activity in the classroom.
2. The children showed great deal of enthusiasm when they presented their hand made weight scales. They used it to measure and compare weights of different things. Different amounts of seeds used as bird foods were measured by using small metal weights used in fishing (with different gram numbers) . This activity was very useful to introduce the idea of standardized weights.
3. The children were shown how to make a sand clock by using empty water bottle, salt and tape.

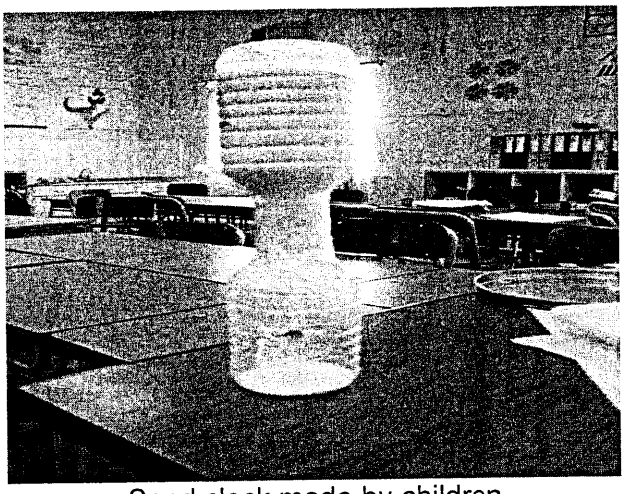
Photographs of the follow-up work of activity 7 in the classroom



Handmade weighing tool



Handmade weighing tool



Sand clock made by children

Feedback sheets analysis

General information

- 27 pupils completed their activity sheets, 28 completed the feedback sheets.
- Time required for carrying out the homework activity ranged from 5 to 90 minutes (mean = 16 minutes)
- Female family members provided relatively more help than male members in this activity (47% and 31% respectively) (Table D-1)

Parents' opinions in the short questionnaire (Table D-2)

- Most of the parents said the activity was easy (50%) or very easy (28%). A small number of parents (6%) thought it was difficult
- Most of the parents said the child needed average (38%) or little help (34%) in this activity. Some said 'no help was needed' (12%)
- High percentage of parents indicated that their children have learned a great amount from the activity (66%) or an average amount (16%). Only one parent said his child learned little
- Almost all the parents thought that the activity was interesting (38%) or very interesting (41%). Only one parent thought that it was not interesting
- Most of the parents (72%) signed the activity, while (12%) did not

Children's opinions in the short questionnaire (Table D-3)

- Most of the children said they liked the activity (31%) or liked it a lot (53%). Only one child said he did not like it.
- A high number of children said that the activity was easy (31%) or very easy (53%). Only one child thought it was difficult.
- Most of the children indicated that they learned something (28%) or a lot (41%) from the activity. Few (13%) said that learned little and 6% said they learned nothing.
- The majority of children signed the activity (75%) while few (12%) have not.

Parents' answers to the open ended questions (Table D-9)

Most of the parents (69%) did not answer the question about whether there were any problems encountered while doing the activity and some (16%) wrote 'no problem'. Only two parents (6%) noted two problems, the first problem was the difficulty of determining the precise 'balance point' when they made the weighing scale, the other problem was that making the scale was above the child's abilities and therefore the father did all work while the child was just watching.

Most of the parents (78%) wrote some comments about the learning value of this activity. One parent indicated that his child did not learn anything because the task (making a weighing scale) was done completely by the father. Other parents indicated that the activity provided the chance for their children to learn about the weighing process and to compare the weights of different things (heavier, lighter or equal). The children also learned about the components of the weighing scale, how it works and its importance in purchasing some items. One of the parents indicated that this activity encouraged the child to ask questions about the different weight and length units. Another one wrote that his child has learned that every aspect of life can have mathematical ideas.

In the previous activates we found that most of the parents tended to overlook the third open-ended question which asked them for their suggestion for the next activity or any other comments. Therefore we decided to change the

wording of this question in a way which showed more emphasis on the importance of parents' suggestions and the high importance for their ideas and expertise. The number of parents who answered this question was not markedly changed after this modification as most of the parents (63%) were still reluctant to offer their suggestions. Eight parents (25%) gave different suggestions for the next activity which included: reading water and electricity meters and comparing their readings between different days, counting household items). Many of these suggestions raised different interpretations in our minds as they were very short or lacked clarity (e.g. 'group work' or using 'money in selling food'). Some parents wrote that their children were interested in this type of activities and asked for more of this work. A child's sister wrote 'please don't give any more activities'.

Children's answers to the open ended questions (Table D-9)

Most of the children (81%) wrote about their learning experiences resulting from this activity. They wrote, for example, that they learned about different aspects of the weighing process, that everything has a certain weight which can be measured by different tools, and that weighing is important and useful. Some children wrote about the components of the weighing scale, how it is made, what type of units can be used and in which activities it can be used for. One child said that he learned that mathematics is essential in every life activity.

Activity No. 8 Mathematics in the kitchen

Information about the activity

The idea of this activity – and the following UNO game - came from discussion with the teacher. The rug design idea came from the children's visit to the traditional craft centre.

Activity No. 8: Mathematics in the kitchen

Name ---------- Class 2/2

Date 7/May/2005

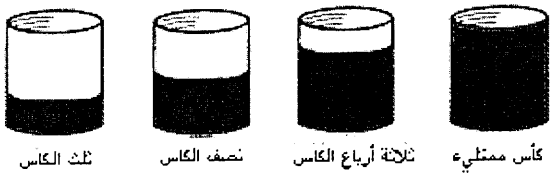
Objective

The purpose of this activity is to help the student to learn more about the concept of fractions (½, ⅓, ¼, ¾) in everyday contexts.

Activity 1: Sounds game

Ask someone in your family to help you with this activity.

1. Bring four identical glasses.
2. Fill the glasses with different amounts of water as shown in the picture (full, three quarters, half, third).
3. Knock the glasses gently with a small spoon.
4. Listen to the sounds and write your observations.



Third Half Three quarters Full

Activity 2: Grill potato

Ask someone in your family to help you with this activity.

Ingredients: 2 potatoes - butter or sour cream.

1. Wash your hands properly.
2. Wash the potatoes.
3. Put each potato in aluminium foil and then put it in a medium heat oven.
4. After half an hour check if the potatoes are ready.

5. Put the potatoes on a plate, you can add some butter or sour cream. Enjoy your meal.

Do you need any mathematics in this cooking process? Explain.

Activity 3: Cut and paste pictures for the following questions.

What is your favourite food?

What kinds of food take a long time in cooking?

What kinds of food take a short time in cooking?

Give an example of an electronic device used in cooking?

Notes to parents:

- Dear parent, today's lesson is about using mathematics in kitchen. Many mathematics ideas available in the kitchen can be useful for the child's learning. For example, weight scale and cups used in measuring, using time when preparing food, estimating food amounts needed for different numbers of guests, and whether a recipe ingredients cost a lot or little money. Please supervise the child during this activity. You can also talk with the child about other issues such as safety instructions when cooking, and keeping the kitchen clean and tidy.

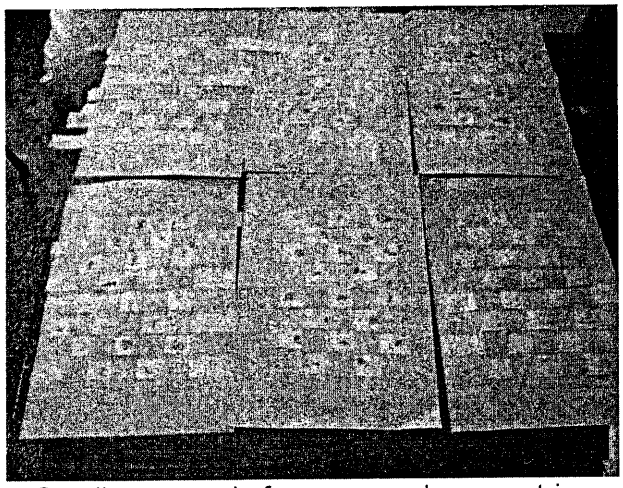
- **Learning idea**: Encourage your child to help you in some housework such as cleaning or arranging dinner. Supervise the child when arranging his bag, books and cloths. Give the child a chance to talk and express himself.

The follow-up classroom work

- Children's homework activities were discussed in the classroom. The children were invited to talk about their experiences when they carried out the activity.
- In the last week of the project we arranged for many classroom activities which included ideas that we could not implement as homework due to time pressure. These activities were also seen as a reward for the hard work of the children.

- In the 'fractions and art design' activity we asked the children to make geometrical designs similar to those seen in mosques and traditional houses.
- We arranged for the children to visit a Traditional Craft centre in order to highlight some ethnomathematical ideas found in local culture (e.g. patterns and geometrical designs in textile weaving, measurements in ship building, baskets and rugs made from palm tree leaves and fishing traps weaved in dome shapes). On another day children worked on designing small rugs made of paper strips which have the same pattern found in the traditional weaving of palm tree leaves.
- The children worked on designing different three dimensional shapes by using clay and plastic straws.
- We found that many children were not very familiar with the Arabic/ Western numbers printed for example in expiry dates, price tags and digital clocks. Children mainly use Arabic / Hindu numbers in the textbook. The UNO game was used as a way to overcome this difficulty (This game is a card game which includes four sets of cards: blue, green, red and yellow. Each set has ten cards (0 to 10) plus Joker cards and 'penalty' cards, see picture 7 below).

Photographs of the follow-up work of activity 8 in the classroom



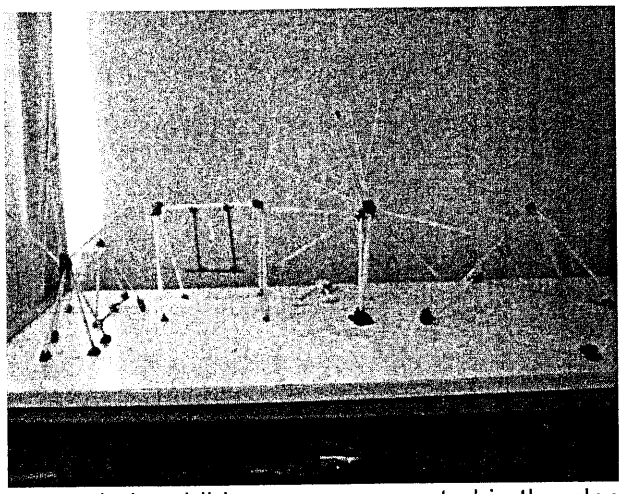
Small rugs made from weaved paper strips



A geometrical shape made from clay and straws



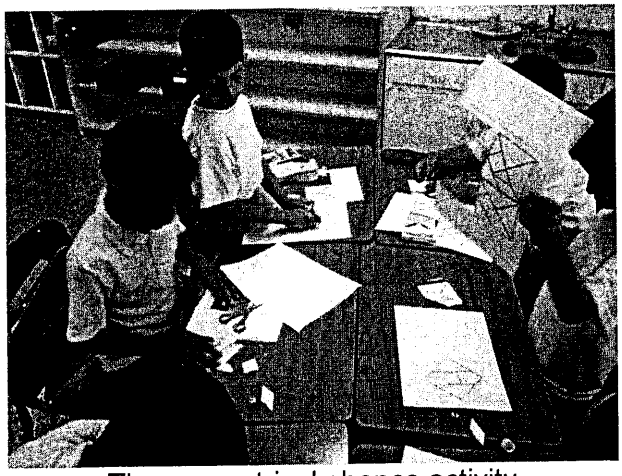
The children working together on the clay and straws activity



Products made by children were presented in the classroom



The geometrical shapes activity



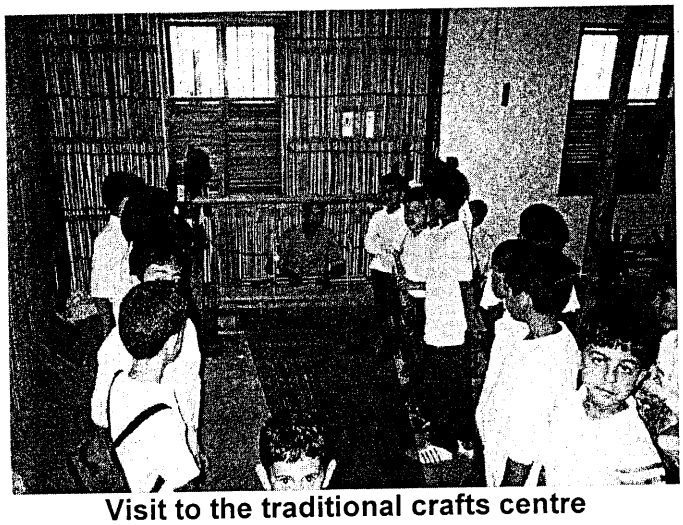
The geometrical shapes activity



The UNO game



The UNO game



Visit to the traditional crafts centre

Feedback sheets analysis

General information

- 27 pupils completed their activity sheets, 27 completed the feedback sheets, and 32 completed the geometrical shapes classroom activity.
- Time required for carrying out the homework activity ranged from 5 - 60 minutes (mean = 18 minutes)
- The majority of children (65%) were helped by female family members (mainly mothers 44%). Only 9% of the children were helped by male family members (Table D-1)

Parents' opinions in the short questionnaire (Table D-2)

- Most of the parents said the activity was easy (41%) or very easy (31%). Only 12% thought that it was difficult.
- Most of the parents said their children needed little help (25%) or average help (37%). A few parents said that the child did not need help (16%). One parent said that the child needed a lot of help.
- Most of the parents said that their children learned to a high (50%) or average (25%) degree from the activity. 9% of the parents thought that their children learned a little.
- Most of the parents thought that the activity was interesting (31%) or very interesting (44%). Only two parents (6%) thought it was not interesting.
- The number of parents who signed the activity decreased to some extent (66%) compared with the rate of the previous activities. 19% of the parents did not sign.

Children's opinions in the short questionnaire (Table D-3)

- Most of the children said they liked the activity (31%) or they liked it a lot (47%).
- A high number of children thought the activity was easy (28%) or very easy (47%). Few children thought it was difficult (9%).
- Most of the children said they learned something (25%) or a lot (47%) from the activity. Some children said they learned little (13%).
- The majority of children signed the activity (72%), while a small number (12%) did not.

Parents' answers to the open ended questions (Table D-10)

Most of the parents (53%) did not answer the question about whether there were any problems encountered while doing the activity and some (22%) wrote 'no problem'. Some parents (9%) indicated that their children encountered problems such as the unavailability of the oven in their house and incorrect steps in the activity itself (e.g. the real time needed for cooking the potato was markedly different than what the instructions said). It is worth saying that I found it quite hard to understand precisely what the parents wanted to say because their comments were basically short sentences which lacked details.

Most of the parents (75%) wrote comments about the learning value of the activity. Some of them said that the activity provided new learning ideas and interesting knowledge through engaging in different tasks such as using the oven, managing time, measuring food amounts and time required for cooking them, and learning about different temperatures on the oven. Other parents focused on the development of some personal skills through engaging in this activity. For example some of them said that involving children in cooking can encourage them to be more self-independent, attentive and quick. Shared work between the parents and their children were also highlighted by some parents as a joyful experience for them both. Other parents said that their child became more aware of the importance of mathematics in daily life activities and he became more and more interested to learn other things in similar approach. One father had different view about the activity as he said that the child did not learn anything from this activity. Further, I noticed that the same parent complained about the activities in the parents meeting (e.g. although we emphasised parents' supervision of their children when carrying out the activities, he criticised the activity of counting vehicles in the street because it can cause danger to the children) and also gave unconstructive comments when I and the teacher failed to run the projector device in the presentation. I discussed this with the teacher. He explained that he knew that father very closely as they were both playing in the same football team and thought that his criticism was not based on real understanding because the mother not him was the one who assisted the child in the activities.

Almost half of the parents (44%) did not write any suggestions for the next activities. The other group of parents (41%) wrote suggestions which can be summarised in the following points:

- A few parents gave suggestions which could feed directly into the current project. These suggestions included: repeating the cooking activity with a task of boiling egg instead of grilling a potato, and investigating numbers and measurements in cloths, and finally looking for mathematics in books and magazines
- Some parents suggested that we adopt our new approach used in mathematics subject to design new activities for other subjects (e.g. to look for ideas related to Arabic language in the everyday context)

- Other parents praised the project and its activities. One parent wrote 'excellent idea' and another one wrote 'please give more of these useful activities'. One also wrote 'now the child learn about mathematics wherever he goes'
- One mother wrote a note which indicated a preference for individual work. She said 'we wish that you give activities which the child can do by himself without asking help from others'

Children's answers to the open ended questions (Table D-10)

Most of the children (75%) wrote their views regarding aspects learned from this activity. They generally said that they learned about measuring time and amounts. They also learned from the 'musical water glasses' activity about fractions and the relationship between the different levels of water in glasses and its sounds. Some children indicated that they learned self-independence from this activity. Others said that they learned that mathematics is essential in our life and even in cooking.

Items	Details	Activity 2 Mathematics and vehicles		Activity 3 Mathematics in the vegetables shop		Activity 4 Mathematics and food		Activity 5 Mathematics in the body		Activity 6 Mathematics in the grocery shop		Activity 7 Weight measurement		Activity 8 Mathematics in the kitchen	
Who helped the child in doing the activity?		N	%	N	%	N	%	N	%	N	%	N	%	N	%
Father		13	39	14	45	4	13	6	20	7	22	9	28	2	6
Mother		4	12	4	13	12	40	10	33	10	31	9	28	14	44
Brother		5	15	2	6	2	7	0	0	2	6	1	3	1	3
Sister		5	15	2	6	5	17	8	27	5	16	6	19	7	22
Other (Aunt, uncle, grandmother, brothers' wife)		2	6	3	10	0	0	2	7	2	6	0	0	0	0
Nobody		2	6	2	6	3	10	0	0	1	3	1	3	2	6
Missing data		2	6	4	13	4	13	4	13	5	16	6	19	6	19
Total		33	99	31	99	30	100	30	100	32	100	32	100	32	100
Help provided by male family members (fathers + brothers + uncles)		18	54	17	54	6	20	7	23	9	28	10	31	3	9
Help provided by female family members (mothers + sisters + aunts + grandmother)		11	33	8	25	17	56	19	63	17	53	15	47	21	65

Table D-1 People who assisted the child in performing the weekly activities

Items	Details	Activity 2 Mathematics and vehicles		Activity 3 Mathematics in the vegetables shop		Activity 4 Mathematics and food		Activity 5 Mathematics in the body		Activity 6 Mathematics in the grocery shop		Activity 7 Weight measurement		Activity 8 Mathematics in the kitchen	
Questions to parents		N	%	N	%	N	%	N	%	N	%	N	%	N	%
How difficult the activity was?	Very difficult	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Difficult	1	3	0	0	1	3	2	6	0	0	2	6	4	12
	Easy	13	39	11	35	11	34	8	25	16	50	16	50	13	41
	Very easy	17	52	15	48	15	47	18	56	11	34	9	28	10	31
	Missing data	2	6	5	16	5	16	4	13	5	16	5	16	5	16
	Total	33	100	31	99	32	100	32	100	32	100	32	100	32	100
How much help the child needed?	A lot of help	2	6	0	0	0	0	1	3	2	6	0	0	1	3
	Average help	6	18	9	28	8	25	6	19	5	16	12	38	12	37
	Little help	16	48	9	28	16	50	18	56	15	47	11	34	8	25
	No help	7	21	9	28	4	12	3	9	4	12	4	12	5	16
	Missing data	2	6	5	16	4	12	4	13	6	19	5	16	6	19
	Total	33	99	32	100	32	99	32	100	32	100	32	100	32	100
How much does the child learn through doing this activity?	A lot of learning	19	58	16	50	19	59	16	50	18	56	21	66	16	50
	Average learning	10	30	8	25	7	22	11	34	7	22	5	16	8	25
	Little learning	2	6	3	9	2	6	1	3	2	6	1	3	3	9
	No learning	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Missing data	2	6	5	16	4	13	4	13	5	16	5	15	5	16
	Total	33	100	32	100	32	100	32	100	32	100	32	100	32	100
How enjoyable the activity was?	Very interesting	16	48	14	44	13	41	12	38	12	38	13	41	14	44
	Interesting	15	45	13	41	15	47	14	44	15	47	12	38	10	31
	Boring	0	0	0	0	0	0	1	3	0	0	1	3	2	6
	Very boring	0	0	0	0	0	0	1	3	0	0	0	0	0	0
	Missing data	2	6	5	15	4	12	4	12	5	15	6	18	6	19
	Total	33	99	32	100	32	100	32	100	32	100	32	100	32	100
Parent's signature	Signature included	13	39	22	69	21	66	24	75	25	78	23	72	21	66
	No signature	18	55	5	15	7	22	4	12	2	6	4	12	6	19
	Missing data	2	6	5	15	4	12	4	12	5	16	5	16	5	16
	Total	33	100	32	99	32	100	32	99	32	100	32	100	32	100

Table D-2 Parents' answers to the multiple choice questions on the feedback sheets of the weekly activities

Items	Details	Activity 2 Mathematics and vehicles		Activity 3 Mathematics in the vegetables shop		Activity 4 Mathematics and food		Activity 5 Mathematics in the body		Activity 6 Mathematics in the grocery shop		Activity 7 Weight measurement		Activity 8 Mathematics in the kitchen	
Questions to children		N	%	N	%	N	%	N	%	N	%	N	%	N	%
Did you like working on the activity?	Liked it a lot	23	70	15	47	17	53	15	47	14	44	17	53	15	47
	Liked it	7	21	10	31	9	28	14	44	13	41	10	31	10	31
	Did not like it	0	0	0	0	1	3	0	0	0	0	1	3	2	6
	Didn't like it at all	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Missing data	3	9	7	22	5	16	3	9	5	15	4	13	5	16
	Total	33	100	32	100	32	100	32	100	32	100	32	100	32	100
How difficult the activity was?	Very easy	20	61	15	47	16	50	17	53	13	41	17	53	15	47
	Easy	10	30	10	31	11	34	10	31	14	44	10	31	9	28
	Difficult	0	0	0	0	0	0	2	6	0	0	1	3	3	9
	Very difficult	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Missing data	3	9	7	22	5	16	3	9	5	15	4	13	5	16
	Total	33	100	32	100	32	100	32	99	32	100	32	100	32	100
How much did you learn from this activity?	A lot	11	33	10	31	11	34	12	38	11	34	13	41	15	47
	Something	15	45	6	19	10	31	13	41	12	38	9	28	8	25
	Little	4	12	7	22	6	19	4	13	4	13	4	13	4	13
	Nothing	0	0	2	6	0	0	0	0	0	0	2	6	0	0
	Missing data	3	9	7	22	5	16	3	8	5	15	4	12	5	15
	Total	33	99	32	100	32	100	32	100	32	100	32	100	32	100
Child's signature included	Signature included	26	79	19	59	24	75	26	81	27	84	24	75	23	72
	No signature	5	15	8	25	4	12	3	9	0	0	4	12	4	12
	Missing data	2	6	5	16	4	12	3	9	5	16	4	12	5	16
	Total	33	100	32	100	32	99	32	100	32	100	32	99	32	100

Table D-3 Children's answers to the multiple choice questions on the feedback sheets of the weekly activities

Activity 2			
Parents' section			
Question	**Answer**	**Frequency**	**%**
Problems	No problem	28	85
	Problems	1	3
	Empty	2	6
	Missing	2	6
Learning aspects	Written	31	94
	Missing	2	6
Suggestions	No suggestions	21	64
	Written	10	30
	Missing	2	6
Children's section			
Learning aspects	Written	26	79
	Empty	5	15
	Missing	2	6

Table D-4 Parents' and children's feedback in the open-ended questions of activity 2

Activity 3			
Parents' section			
Question	**Answer**	**Frequency**	**%**
Problems	No problem	23	72
	Problems	2	6
	Empty	2	6
	Missing	5	16
Learning aspects	Written	26	81
	Empty	1	3
	Missing	5	16
Suggestions	No suggestions	18	56
	Written	9	28
	Missing	5	16
Children's section			
Learning aspects	Written	24	75
	Empty	3	9
	Missing	5	16

Table D-5 Parents' and children's feedback in the open-ended questions of activity 3

Activity 4			
Parents' section			
Question	**Answer**	**Frequency**	**%**
Problems	No problem	12	38
	Problems	4	13
	Empty	11	34
	Missing	5	16
Learning aspects	Written	25	78
	Missing	7	22
Suggestions	No suggestions	22	69
	Written	5	16
	Missing	5	16
Children's section			
Learning aspects	Written	24	75
	Empty	1	3
	Missing	7	22

Table D-6 Parents' and children's feedback in the open-ended questions of activity 4

Activity 5			
Parents' section			
Question	**Answer**	**Frequency**	**%**
Problems	No problem	29	91
	Problems	0	0
	Missing	3	9
Learning aspects	Written	24	75
	Missing	8	25
Suggestions	No suggestions	23	72
	Written	5	16
	Missing	4	13
Children's section			
Learning aspects	Written	28	88
	Missing	4	13

Table D-7 Parents' and children's feedback in the open-ended questions of activity 5

Activity 6			
Parents' section			
Question	**Answer**	**Frequency**	**%**
Problems	No problem	9	28
	Problems	2	6
	Empty	15	47
	Missing	6	19
Learning aspects	Written	26	81
	Missing	6	19
Suggestions	No suggestions	20	63
	Written	6	19
	Missing	6	19
Children's section			
Learning aspects	Written	25	78
	Empty	1	3
	Missing	6	19

Table D-8 Parents' and children's feedback in the open-ended questions of activity 6

Activity 7			
Parents' section			
Question	**Answer**	**Frequency**	**%**
Problems	No problem	5	16
	Problems	2	6
	Empty	22	69
	Missing	3	9
Learning aspects	Written	25	78
	Empty	3	9
	Missing	4	13
Suggestions	No suggestions	20	63
	Written	8	25
	missing	4	13
Children's section			
Learning aspects	Written	26	81
	Empty	2	6
	Missing	4	13

Table D-9 Parents' and children's feedback in the open-ended questions of activity 7

Activity 8			
Parents' section			
Question	**Answer**	**Frequency**	**%**
Problems	No problem	7	22
	Problems	3	9
	Empty	17	53
	Missing	5	16
Learning aspects	Written	24	75
	Empty	1	3
	Missing	7	22
Suggestions	No suggestions	14	44
	Written	13	41
	Missing	5	16
Children's section			
Learning aspects	Written	24	75
	Empty	1	3
	Missing	7	22

Table D-10 Parents' and children's feedback in the open-ended questions of activity 8