

**SUPPORT SYSTEMS IN THE LEARNING AND TEACHING OF MATHEMATICS**

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## ABSTRACT

This study investigated parental involvement and group work as support systems applicable in the learning and teaching of mathematics. The study determined an association between mathematics achievement and the availability of or lack of parental support.

The research took part in Phuthaditjhaba, a predominantly black residential area, situated in the Free State Province of South Africa. The subjects were grade 7 learners and their parents. Learners frequently fail mathematics, and this challenged the researcher to investigate possible causes in order to suggest solutions which could be used to alleviate this problem. One hundred learners were drawn out of 4 schools among 20 schools in both urban and semi-urban settings.

Parents' questionnaires were used to gather the information about learners. Responses to the questionnaire were associated with learners' mathematics scores. Parents were asked about their involvement with their children's mathematics learning. They completed a self-report questionnaire indicating how often they had engaged in each in each of six variables.

The variables tested for association with performance are family structure, socio-economic status, intactness, parental education and parental occupation on one hand as well as the extent of support systems the parents offer their children in the form of home resources conducive for learning

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## CHAPTER 1

### INTRODUCTION

#### Overview

Children are born and grow in different homes in different environments. Homes differ in their parent configuration, ethnicity, parents' occupation and parents' level of education (Thompson, Entwisle, Alexander, & Sunduis, 1992; Brutsaert, 1998). Children achieve differently in school performance because of various factors such as aptitude, instruction and environment (Fraser, Walberg, Welch, & Hattie, 1987). The home environment, motivation and parental configuration are factors this study wishes to investigate in relation to their impact on school achievement.

We know different types of schools (Catholic and State) compare differently in terms of academic achievement. For example, academic achievement tends to be less dependent on socio-economic status (SES) in Catholic schools than in State schools (Coleman, Hoffer, & Kilgore, 1982; Greeley, 1982; Bryk, Lee, & Hollard, 1993).

This study investigated the impact of home environment, parental configuration and motivation on mathematics achievement amongst black public school pupils in Phuthaditjhaba, a predominantly black residential area, situated in the Free State Province of South Africa. Children spend most of their active day at school and a smaller proportion at home. The school is therefore in a strong position to influence and shape the character and productive capabilities of children.

There is therefore a need for two-way communication between the home and the school in order for the school and the parents together to exert maximum positive influence on the development and the education of the child (Dekker & Lemmer, 1994;

Jantjes, 1995 ). Parents use different styles of interacting with their children. Their style of parenting could positively or negatively motivate their children's school performance. According to Procidano and Fisher (1992), parents' style or methods of parenting are partly learned and partly a reflection of their predisposition and education, which is subject to change through training. Mashishi (1994) contends that training parents may reduce the negative influence and further help parents to assist children in their education and development.

During his 15 years spent as a mathematics teacher in primary and secondary schools and in a college of education, the researcher has observed higher failure rates amongst learners in mathematics than for other subjects. The reason for this phenomenon has remained unclear to the researcher. A comparative study was recently conducted by *Edusource Data News* 24<sup>th</sup> March 1999, analyzing students' performance by subject results and by each province in South Africa in 1998. This study revealed that nationally out of the 51% of the total matric (grade 12) candidates who wrote standard 10 mathematics in 1998, only 21% passed. In the Free-State Province, of the 48% of the total number of candidates who wrote mathematics, only 18% passed.

What are the variables contributing to the high failure rate in mathematics? Could it be attributed to parents not giving support and attention to their children's development and education? Could it be lack of resources or the particular school's philosophy or culture that does not create an environment conducive to improving the children's school performance? Why do some schools perform better than others despite the fact that they belong to the same socio-demographic stratum? These questions have prompted the

researcher to review the literature further to investigate factors that cause the high failure rates observed in mathematics in South Africa.

This study explored a number of support systems to determine their effectiveness for improving children's achievement in mathematics in South Africa. The study focused on home involvement and cooperative group work as two support systems and techniques in learning and teaching mathematics.

This study defines home involvement as both "parental support" and "parental involvement" as in Brutsaert (1998), who defines parental support as behaviour by the parent that gives the child the feeling of being esteemed and valued as a person. On the other hand, parental involvement is determined by the degree of parental interest in school grades and the frequency of parental attendance at school events and meetings.

In 1995 Jantjes conducted research in Cape Town, South Africa, and defined parents as all individuals who provide children with basic care, support, protection and guidance. Jantjes (1995) used subjects from a poor Coloured community from a deprived part of Cape Town. Many of the cultural norms, extended family structures and the demographics of the sampled population are comparable to those found in other South African communities. Therefore, it is reasonable to draw upon the experiences of similar studies relating to Soweto; a black residential area near Johannesburg. In one such study Mashishi (1994) defines parents as including mothers, fathers, guardians, other siblings, aunts, cousins, uncles, grandmothers, grandfathers, (and other extended family members), neighbors and friends who display an active interest in the education of a particular child. The researcher defined parents in the same way in this study because it best describes the South African situation.

Mention was made earlier about group work as the other support method to remedy the deficiency in mathematics achievement. Cooperative group work is assumed in this study to be a method for promoting higher-level thinking skills and problem solving. This method allows participants in learning groups to talk openly, challenge and defend their stance in the learning process. Children learning in cooperative groups are maximally developed because they are fully engaged in the learning process.

Southwood and Spanneberg (1996) defined cooperative learning as a strategy in which students work together in pairs or small groups to accomplish shared goals. They summarized cooperative learning as “ learning collaboration, interaction, cooperation, positive interdependence, individual accountability and active involvement (Southwood & Spanneberg, 1996, p.48). The advantage of this method is that it develops social skills, facilitates the negotiation of meaning and active involvement and it is an efficient and effective way of managing children’s learning.

This study suggests the combination of home involvement and cooperative learning group work as a method for reducing the observed high failure rate.

## Problem Definition

This study seeks to:

1. Determine if there is an association between mathematics achievement of grade 7 learners and
  - ( a ) The structure of the family, the family's socio-economic status, family intactness, parental education and parental occupation.
  - ( b ) The home resources [availability of a quiet study space, a desk or table, books, including a dictionary or other reference material].
  - ( c ) Family visits to museums, libraries, zoos, historical sites and other places of interest.
  - ( d ) The home environment [parents encouraging good speech habits, speaking and listening to children's views].
  - ( e ) Monitoring children's homework, studies and reading their written work.
  - ( f ) Parental involvement/support [does the child feel motivated or esteemed, valued as a person; and to what degree are parents interested in the child's school grades and what is the frequency of parental attendance to school matters and at school meetings?]
  - ( g ) Mathematics achievement with or without group work. [Tests of schools applying traditional method were compared with tests of schools applying group work.]
2. Determine the extent of support systems (parental involvement and group work) in Phuthaditjhaba schools.

## CHAPTER TWO

### Literature Review

One of the challenges facing South Africa is the provision of adequate educational opportunities to its citizens. There are a number of institutions responsible for educating the inhabitants of a country. Some such institutions are the home, the school, and the community. These institutions have different roles to play, but they complement one another. The aim of this research is to investigate the impact of home involvement in the teaching and learning of mathematics.

Research in general supports the view that parents can help the school as supporters who assist teachers in reinforcing the school's initiatives. In their book Dekker and Lemmer (1994) call for partnership between the home and the school in order to help the school become a meaningful and purposeful environment for the child.

In South Africa a number of socio-political and economic problems have resulted from apartheid. Many of these problems are to be found in the education sector and are in part a result of the existence of 17 departments of education during apartheid. This resulted in fragmentation and poor management strategies underlying education administration in this country. It is in part this fragmentation of the education sector that resulted in high failure rates in the sciences, especially in mathematics.

From the government publication *Education Realities in South Africa* (1990) disparities in the per capita expenditure in the education of Blacks is reflected. The publication, for example, reported that in 1986 and 1989 the per capita expenditure in schools as shown in Table 2.1.

Table 2.1

*Per Capita State Expenditure for College/School Education in the Republic of South Africa for 1986 and 1989*

Department	Per capita expenditure (Rand)	
	1986	1989
Education & Culture (Whites)	2 746	3 572
Education & Culture (Indians)	1 952	2 645
Education & Culture (Coloureds)	1 330	2 115
Education & Training (Blacks)	610	927
Self-governing States (Blacks)	347	647

From *Education Realities in South Africa* (1990)

The publication acknowledges that gaps existed between the per capita expenditure for different departments. These differences were often politically exploited by the regime for purposes of racial discrimination and are an indication of the unequal education opportunities that existed in the Republic of South Africa.

The legacy of Apartheid with its many laws, for example, the Group Areas' Act, Separate Development Act, and the racial policy of the exclusion of Blacks, Coloureds and Indians from jobs in the South African labour market caused the majority of black people to feel inferior and to lose their self worth. This is reflected in the continuously poor performance of Blacks in the school system.

*Edusource Data News* (1999) reported an 18% pass rate in mathematics in the Free State, compared to the South African pass rate of 42% of all candidates who wrote mathematics. This compared to a pass rate of 66% in physical science, 57% in biology and 88% in English as a second language.

The development of the child is dependent on two interrelated factors: heredity and experience. These factors cannot be excluded from any study of the child's development. Parents play a major role in creating the environment within which the child's experiences are determined. This study examined the involvement and impact of parents in the learning and teaching of mathematics. The researcher acknowledges that a democratic South Africa implies equal opportunity and competition as the effective and efficient allocator of educational "goods" among all South African peoples. Hence parents need to be empowered to exercise effectively the role that they can play in their children's education. This notion of equal opportunities is embodied in a mathematics syllabus as some of the aims and objectives for which teachers must strive. In other words, it is South Africa's post-apartheid policy to redress the imbalances of the past.

There are several approaches in formulating the problem relating to the impact of the home on school achievement. Two such approaches formed the basis of argument for this study, the structuralist approach and the non-structuralist approach. Some researchers argue in favour of a model that takes into account the structure of the family including demographic and sociological variables. This group of researchers (i.e., structuralists) focus on the socio-economic status of the family such as size, birth order of the child, type and quality of housing, ethnicity, income, parental education and prestige of the father's occupation. The other groups of researchers (i.e., non-structuralists) put the focus on what parents do to assist and motivate their children.

The literature surveyed either argues for the structure of the family and SES, or the assistance available at home and the motivation this produces in the child as factors in achievement in mathematics. Following Jantjes' definition (1994), this study refers to the



first group as “structuralists” because of their emphasis on the explanatory power of the structure of the home, and its SES. The second group is referred to as “non-structuralists” because of their emphasis on home environment variables. Jantjes (1994) argues that the SES variables advocated by structuralist models play an important part in explaining the child’s development. It is against that background that she acknowledges that disparities in the distribution of income, opportunities, status, and the like affect parents, causing those that have these capabilities, resources and connections to be more effective.

Jantjes (1995) further encourages the school and the community to play a part in training parents to motivate and enhance the educational achievement of their children as reflected in improved school performance.

Thompson et al. (1992) studied the influence of parent configuration (two parents, mother-extended or solo mother) on children’s conformity to the student role. They selected a multivariate model using a randomized block design. They applied logistical regression techniques to block out the effects of “nuisance” variables. These nuisance/control variables were identified as ethnicity, sex, kindergarten attendance, parents’ education, family economic standing and mother’s age. This allowed the authors to measure the net effect of the influence of the test variables (mother-father, mother-extended and mother alone) on the child's adjustment to the role of student in the school. The indicators of the success or failure were absences, tardiness and conduct marks.

Thompson et al. (1992) used a stratified random sample drawn from a population of white and African American children. The sample was drawn to represent both strata. The overall sample was representative of all socio-economic levels in the school systems. A sample of 484 students from 20 Baltimore schools was studied for a period of a year.

The methods of data collection were parent interviews, which provided data on status, and parents' performance expectations. The results show that those African American children with more siblings were absent more frequently than Whites. Both white and African American children with more siblings scored higher on conduct mark.

Brutsaert (1998) conducted a study in Belgium to investigate the influence of the home and the school on academic achievement. In his study, he investigated whether schooling at state versus private (Catholic) schools would affect the quality of schooling with respect to pupils' academic achievement. His variables were gender, family intactness, maternal employment status, parental support and parental involvement in children's education. Respondents were asked to indicate the intensity of the following behaviours with respect to the school: (a) the degree of parental interests in school grades and (b) the frequency of parental attendance at school meetings. A 4-point Likert scale was used to score the two questions. An average score close to the minimum of 1 indicated low parental involvement, and an average score close to or equal the maximum of 4 indicated high parental involvement. The results show no statistically significant correlation between the SES and children's achievement.

In South Africa, Jubber (1994) conducted a longitudinal study on standard 4 (Grade 6) pupils in 1986 and on the same sample of children again in 1992, when most of them were in standard 10. A sample of 15 schools was drawn from white primary schools in the Cape Town education district. The study used chi-square analysis to determine whether there is an association between home variables and school performance. Variables used were SES, mother's level of education, father's level of education, mother's occupation and father's occupation, family structure and family size. The

findings of the study indicated that the family income (SES), parental education and parental occupation are strongly associated with school performance both in standard 4 and standard 10, while family structure and family size are not so strongly associated with school performance.

All three groups of these researchers are structuralists. Their central purpose was to test the structure of the home and its impact on school performance. Jubber (1994), however, is important to this study in so far as he identifies important contributing variables and is in the context of the South African experience. Jubber's study addresses a South African school population; and the SES variables are adapted to the South African socio-demographic situation.

According to Jubber (1994) the home is the most important institution in the development of the child from birth up to ten years. The legacy of apartheid in South Africa caused serious problems such as lack of equity in the distribution of educational services and opportunities. This crippled the quality of life among the majority population. These problems contributed to a home environment that lacked the educational resources in order to meet children's educational needs adequately. Notwithstanding the presence of these structural problems, this study argues that, if schools include parents as members of the educational process, children can improve their achievement in mathematics. Thus, a non-structuralist as opposed to a structuralist approach was used to develop the theoretical framework for this study. The work of Jantjes (1995) reviewing structuralist and non-structuralist methodologies is very informative in this regard.

In her article entitled “The influence of home environment and parental support on school achievement”, Jantjes (1995) explored the impact of the home environment and parental support on school achievement. She distinguished between structuralist and non-structuralist models, though this researcher would classify her as a non-structuralist. Her explanation of the structuralist model further includes the immediate physical characteristics of the home believed to exert their influence indirectly on the child’s performance. She called these characteristics macro-variables and argued that they exerted their influence by way of parental attitudes and values.

In her review, she points out that contrary to the structuralists’ perspective; the non-structuralists concentrate on what parents do to assist and motivate their children’s academic growth. The non-structuralist model includes variables measuring parental interests and involvement in the child’s educational activities. Jantjes argues that changes in the home environment in the form of the introduction of positive attitudes and behaviours can bring about significant improvements in the child’s learning when the school involves parents in a systematic manner. Jantjes (1995) investigated the impact of these home environment variables in her Action Research study, conducted at Helderberg primary school. The school was situated in the socio-economically-deprived community of Bishop Lavis, a victim of the Group Areas Act of South Africa. The following factors were included in her study as an instrument to investigate the impact of home environment variables on school performance:

**1. Parental Pressure for Achievement defined as:**

**( a ) parents’ aspirations for their child(ren);**

**( b ) parents’ interest in and knowledge of their child’s educational achievement and**

- ( c ) parents' standards or reward for educational achievement.
- 2. Language level and exposure:
  - ( a ) the quality of language used by parents; and
  - ( b ) the quality of language taught directly or indirectly.
- 3. Academic Guidance, which refers to the availability and quality of help parents provide for school related tasks.
- 4. Intellectuality, which includes the family's intellectual interests and activities, such as:
  - ( a ) the types of reading done in the family;
  - ( b ) the nature of and conversations among members of the family about ideas;
  - ( c ) the intellectual environment parents provide.
- 5. Activity in the home, which refers to the degree to which parents encourage children and stimulate them to explore the environment.
- 6. Work habits:
  - ( a ) structure and routine in the home management; and
  - ( b ) emphasis on educational activities over other pleasurable things

Another non-structuralist, Mashishi (1994) examined Soweto parents' perceptions of their role in their children's education. Her research aimed at changing parents' attitudes to learning by forging links between parent and child and home and school. Her research supports the argument that the existing expertise among parents can be utilized to enhance parental involvement in the education of their children

Mashishi (1994) studied Parental Involvement (PI) initiatives and trends in other countries. These are (a) PI initiatives established in opposition to the kind of education offered in schools; (b) PI initiatives that focused on reading and learning; (c) PI initiatives that focused on school governance and (d) PI initiatives established in response to social problems. She showed that those initiatives had positive effects on the development of children's reading and influenced their attitudes to learning. Mashishi (1994) underlined the need for parents to be trained in the techniques of facilitating children's learning. She encourages the establishment of parents' Learning Clubs, which operated in 10 Soweto schools. She concluded by taking the position that PI helps in the following ways. PI ( a ) counters some negative viewing of Television, ( b ) increases parent awareness of the need to be actively involved in their children's education, ( c ) transforms learning from being a solitary activity to being a collaborative activity in which the society at large is involved, ( d ) acts as an instrument to create the targeted culture in schools.

Setati (1996) in her paper about how parents can help children learn mathematics, like Mashishi, made the important point that parents need to be trained. She argued that parents and other family members are children's first and most influential "teachers". She further reported on the pilot study done by her non-governmental organization in Gauteng on the establishment of family mathematics groups, which helped parents to learn about their children's mathematics curriculum, practice problem-solving skills and encourage them to continue learning once mathematics had become optional. This family mathematics pilot-study involved children from grades 1 to 5. Parents attended classes with or without a child, but no child was allowed to attend without an adult. The reason

for this was to empower parents to help their children and not just to conduct another tutorial for those children needing extra help.

Setati (1996) advanced the research in this area by extending the non-structuralist approach to cooperative group initiatives. Cooperative learning is a method of study which involves monitored group learning. In this approach children alone are allowed to belong to a cooperative group. Parents or capable adults can participate as monitors. This approach teaches learners to critique, challenge and understand the classroom ethos (Jarworski, 1996). In addition, mathematics learners learn to meet a requirement to observe, analyze, infer conclusions and generalize discoveries (Kruger, 1992).

Bennie (1996), Spanneberg and Southwood (1996) stated the following advantages of cooperative learning group work:

- Students learn effectively in small cooperative groups;
- Students are actively involved in learning;
- Each student has the opportunity to provide help and to receive help;
- Individuals build confidence in their ability to do mathematics, thereby relieving the mathematics anxiety experienced by many;
- It emphasizes working together and learning together;
- Students tend to be friends with their group members;
- The teacher-student relationship tends to be more relaxed, pleasant and closer.
- Students check one another to complete the homework and cooperatively do that homework together;
- If a student misses a lesson , he/she can easily catch up when he/she meets the group;

- When students are given their test scripts back, they can compare answers and help one another with corrections;
- Students plan their work together,
- Students work out a revision timetable and monitor one another to stick to it.

In this research both the use of cooperative learning groups and the PI approach were combined to create the theory and implementation for understanding and developing strategies for reducing high failure rate in mathematics. This researcher contends that PI plus cooperative groups results in high pass rates.

Bennie (1996) reported that, after experimenting with working in pairs as an introduction of cooperative groups in her standard six classes, the atmosphere of her class changed dramatically. She observed interactions in the classroom, monitored the pupils' progress and gauged their reactions. She further contends that she found every lesson enjoyable and enjoyed tackling challenges.

This study takes the position that parents could be trained in order to change their attitudes towards helping their children's learning. Thus their interest, motivation, participation, and capacity for guiding children and language proficiency would improve. This study considers cooperative learning groups as transformation structures that can be used to reduce parental illiteracy and assist families in their quest to improve the achievement of their children. This study acknowledges that little can be done about the existing family structure. The researcher would argue that the absence of parental intellectual interest, lack of motivation, lack of capacity to guide the child effectively, and language deficiency can be changed and used as an instrumental variable to prevent



children failing mathematics and other subjects essential to their development and progress.

It should further be noted that parents' occupation, parents' education, parents' income, parents' age, parents' sex, ethnicity and family size are fixed and can be regarded as dependent variables, whilst parents' motivation, intellectual interest, guidance capacity and language use are dynamic and can be independent variables.

The aim of this study was to gain insight about the association of these dynamic home environment variables and the achievement of children.

## CHAPTER 3

### METHODOLOGY

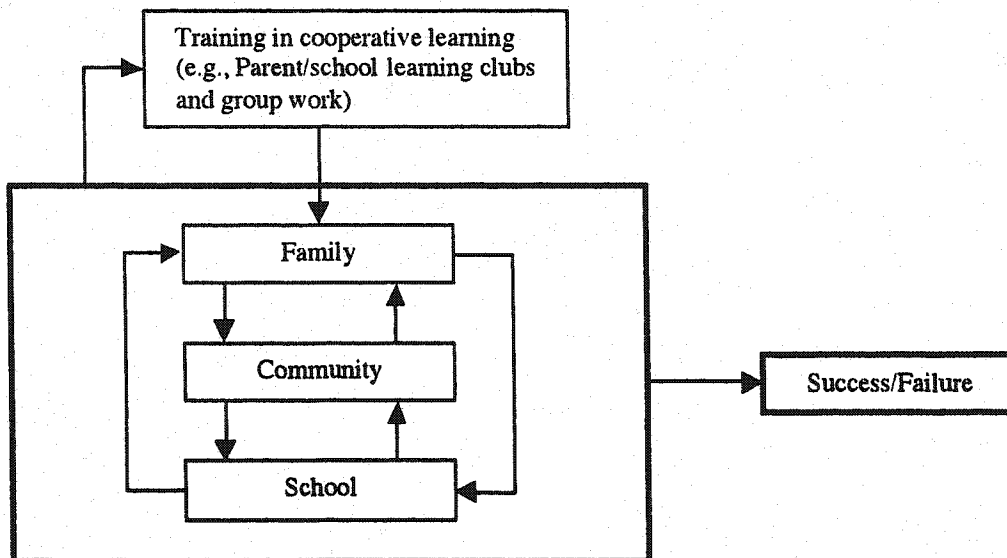
#### Background

This study investigates the impact of the family on the school achievement of learners. The family may influence the school either positively or negatively. If the influence is positive it would be possible to measure it by the success attained by learners; if the influence is negative it would be indicated and hence measurable by the failure rates among learners. Learners represent their families in institutions of learning that they attend. Therefore their culture and work habits at home may be expected to be reflected by their work at school.

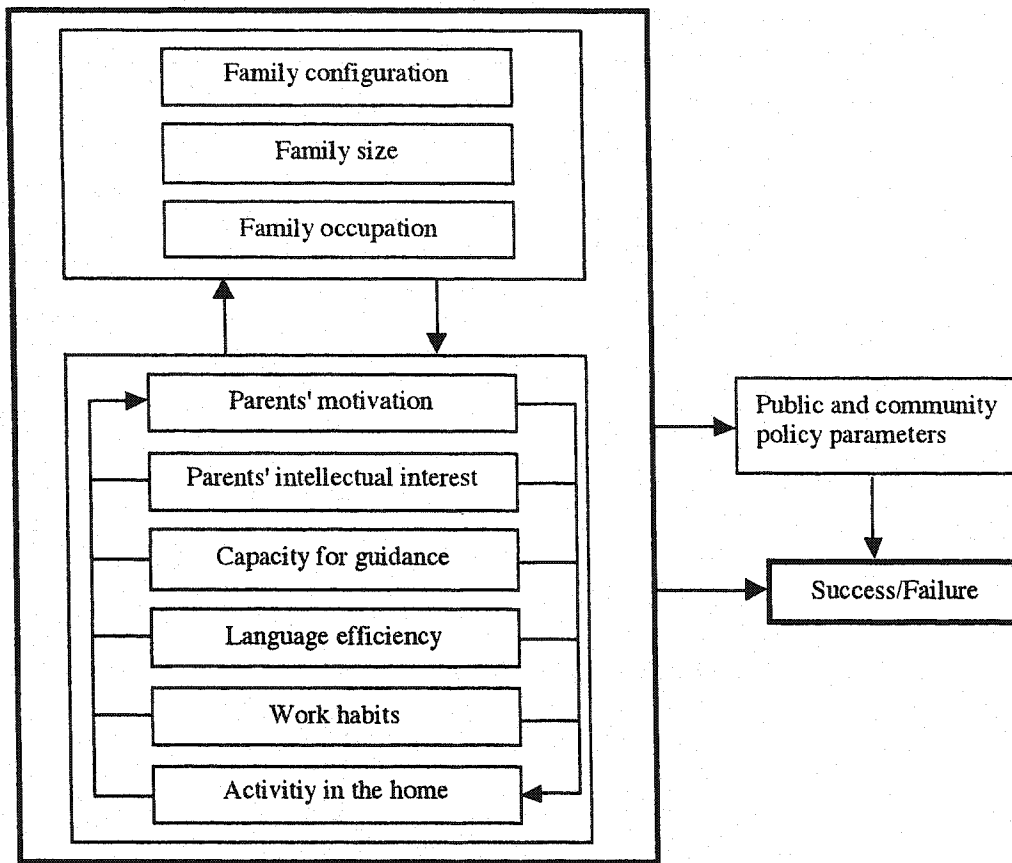
The family and the school are institutions existing in a community. The family impact, that is, the way in which parents help and put pressure on their children to perform, takes place through the community which acts as a macro filter for the interactions between the family and the school and vice versa. This process is illustrated in the schematic diagram in Figure 3.1. The diagram shows that the community may be enlisted to help the family through training programmes that would engage families to take part effectively in their children's education by way of active participation. Non-governmental organizations and parents/school learning clubs can be organized and given the mandate for training parents (families). This type of institution may function to bring about change in attitudes and make parents aware that educational matters are not the sole responsibility of teachers. Families need the awareness that they have a stake in the education of their children. If given the opportunity for constructive involvement, parents can exert a positive influence on their children's learning and development.

The family has both stable variables [fixed characteristics] and dynamic variables [characteristics]. Fixed characteristics describe the family configuration, family size, and parents' occupation. Dynamic variables represent parents' motivation, parents' intellectual interest, and parents' capacity for guidance, language efficiency and work. They are classified as dynamic because they can be changed through training programmes. On the other hand fixed characteristics are not easily changed at any given point or in any given interval of time. Dynamic variables lead to policy formulation because through manipulations they can be changed to desirable behaviours if training programmes are successful.

The study investigates the position of parents regarding the dynamic variables enumerated. This investigation aims at helping parents to help their children in order to combat the high failure rate in mathematics. The study could reveal trends and patterns of why children perform so poorly in mathematics. For the schematic model of this study refer to Figures 3.1 and 3.2.



*Figure 3.1* Schematic diagram of factors leading to student success or failure in school.



*Figure 3.2.* Schematic diagram of family factors leading to student success or failure in school.

### Research Design

This study has two aspects because it is both a correlational study and descriptive research. It is correlational because it investigates the association between parental support and learners' performance; and between parents' motivation to assist their children and the pressure applied at home for learners to achieve success in their mathematics test scores. On the other hand it is descriptive because it searches for the main features of the relationships that describe the present status of parental support. It investigates the current situation of parental practices and their children's performance.

The fact that this study explores the conditions and procedures existing in different homes makes it a descriptive study.

### Set of hypotheses

This study proposes the following set of hypotheses:

- ❖ The availability of home resources [study space, desk, table, dictionary or other reference material] leads to high mathematics score achievement.
- ❖ The home environment [parents encouraging good speech habits, speaking and listening to children] leads to high self esteem hence to high scores.
- ❖ If parents monitor children's homework and motivate them, their children will in turn achieve high mathematics score.
- ❖ The educational level of parents [primary and less, secondary or tertiary education] is related to parents' ability to support their children.
- ❖ If the mathematics learners' test scores are low in achievement that appeals for parental support.

### Procedures

Permission was sought from the Education Department in Bloemfontein to allow the researcher entry into schools (see Appendix A). Principals allowed the researcher to call parents through invitation letters (see Appendix B) given to children stipulating the date, time and venue for the meeting. Parents' meetings were scheduled as shown in Table 3.1

Table 3.1 *Schedule of Meetings to Complete Questionnaire*

School name	Date	Time	Venue
M	08 / 09 / 1999	17h00	School Hall
S	09 / 09 / 1999	17h00	School Hall
W	14 / 09 / 1999	17h00	School Hall
P	18 / 09 / 1999	09h00	School Hall

### Administration

Four final year students at the researcher's college were trained and later helped interpret the questionnaire for groups of illiterate parents. The questionnaire was first tested on four parents and adjusted accordingly. Some problems from the piloting of the questionnaire were in the wording, for example in item 6 the item read "Father employment" and was adjusted to read "Father/stepfather employment"; in the same manner items 7, 9 and 10 were adjusted in the same way. During the parents' meeting the researcher explained the purpose of the study and then requested that parents honestly participate in filling out the questionnaire. They were told that the four trained assistants would gladly help in case they needed assistance.

The procedures required getting parents of grade 7 learners. The researcher therefore obtained learners' names from school principals involved in the study. The sample was drawn from this list, and the plan was that the study would take a period of 8 months after which the questionnaires would be administered.

Stratified sampling, to ensure representation, was the main sampling procedure. Schools' strata differed on the basis of the demographics and status. Inclusion of different geographical areas as well as socio-economic status were specified and taken care of.

### Population and sample

The population, for the purposes of this research, consisted of parents of grade 7 learners in 20 senior primary schools in Phuthaditjhaba Magisterial Territory. This included both the urban area and semi-urban population in QwaQwa; situated in the eastern part of the Free State Province of South Africa. A senior primary school consists of learners from grade 5 to grade 7. Grade 7 is the exit point into secondary education. The total population in these 20 schools is approximately 1 200 grade 7 learners.

### Sample

It is strenuous and time-consuming to work with 1200 learners, hence the researcher decided to take a sample as the acceptable scientific way to study a population. The sample taken is representative of the strata found in this population. According to Frankel and Wallen (1993) a sample of 100 is enough for descriptive studies and 50 for correlational studies. Following these guidelines, four schools with an average of 25 learners from each school were selected for the research, for a total of 100 parents.

Four senior primary schools were selected using a completely randomized sampling method. These four schools are identified in this study as 'M', 'P', 'S' and 'W' for ethical and confidentiality reasons. The researcher selected grade 7 learners in each of these schools and, because two of them had about 25 learners in a class, the researcher randomly selected 25 from each of the remaining two schools in this sample. These schools were sent written letters to ask for permission to collect data for the research. In brief these four schools are described below:

At school 'M' there were two grade 7 classes with 60 learners in both classes. The principal gave the researcher the list of 60 names of learners; the researcher then selected 25 learners using random sampling design. The researcher was given time by the principal to explain to them the importance of their parents/guardians attending the meeting. The researcher then gave all 25 learners invitation letters to invite parents to a meeting. Eleven parents came and after a short explanation filled out the questionnaire.

At school 'P' the principal allowed the researcher to explain to learners about the importance of parents attending the meeting. Learners were given invitation letters. There were 48 learners and the researcher gave 25 of them invitation letters. Sixteen parents came and filled out the questionnaire. To get the rest of the 50 parents needed for the analysis, the researcher visited their homes, using the initial attendance list.

As in other schools, school 'W' had only one class of grade 7 with 25 learners. The researcher addressed them and gave them invitation letters. Twenty parents came and filled out the questionnaire.

At school 'S' there were two grade 7 classes with a total of 30 learners. As in the other school, the researcher was given permission to address learners and then distributed the invitation letters. Eleven parents came to the meeting to fill out the questionnaire. Again the researcher had to get the rest of the parents from their respective homes.

The four schools in the sample were categorized further into two school types. Schools under school type 1 are S and W. These are schools in the upper stratum with better facilities. Historically these schools were known as model C schools and they represented schools that were highly funded by the government, and teachers at such schools were advantaged by equipped laboratories, advanced textbooks and mechanisms



for involving parents to some extent. Schools under school type 2 are M and P. They are schools in the lower stratum where classes are overcrowded with no facilities and little funding from the government.

### Measures and materials.

#### Parent questionnaire:

The parent questionnaire (see Appendix C) consisted of 16 categories. The researcher and his supervisor (Dr. Bayne) adopted a questionnaire used by Mashishi (1994) with few modifications. Sekaran (1992) was used as a guide to modify the questionnaire. There was no need to worry about content validity and reliability because the items in this questionnaire had been successfully used in previous research.

The 16 items in the questionnaire were:

1. Relationship with the child
2. Gender
3. Age
4. Marital status
5. Number of members in a family
6. Father/stepfather employment
7. Mother/stepmother employment
8. Guardian employment
9. Father/stepfather level of education
10. Mother/stepmother level of education
11. Guardian level of education

12. Total number of children in the parent's care
13. Number of children at pre-school (children under 7 years)
14. Age of the eldest child
15. Number of sisters younger, sisters older, brothers younger and brothers older than the child in question.
16. A 5-point Likert scale (1= strongly disagree, 2= disagree, 3= neutral, 4= agree and 5= strongly agree) to test the parents' commitment and attitudes towards their children's learning.

The following factors were included in the study as an instrument to investigate the impact of home environment variables on school performance. The respective and relevant numbers of the statements on the questionnaire are indicated in brackets. These statements investigated distinct and manageable activities for parents.

Parental Pressure for Achievement defined as:

- ( a ) parents' aspirations for their child(ren);
- ( b ) parents' interest in and knowledge of their child's educational achievement and
- ( c ) parents' standards or reward for educational achievement.

[Refer to numbers: 3, 4, and 5 on questionnaire]

Language level and exposure:

- ( a ) the quality of language used by parents; and
- ( b ) the quality of language taught directly or indirectly.

[Refer to numbers: 6, 8 on questionnaire]

Academic Guidance: the availability and quality of help parents provide for school related tasks.

[Refer to numbers: 10, 11, 12, and 15 on questionnaire]

Intellectuality, which includes the family's intellectual interests and activities, such as:

- ( a ) the types of reading done in the family;
- ( b ) the nature of and conversations among members of the family about ideas;
- ( c ) the intellectual environment parents provide.

[Refer to numbers: 5, 7, 9, and 13 on questionnaire]

Activity in the home: the degree to which parents encourage children and stimulate them to explore the environment.

[Refer to numbers: 1, 6, 7, and 14 on questionnaire]

Work habits:

- ( a ) structure and routine in the home management; and
- ( b ) emphasis on educational activities over other pleasurable things.

[Refer to numbers: 2, 3, and 13 on questionnaire]

### Principal interviews

The researcher interviewed the four principals whose schools are included in the sample about each school's philosophy. This served as a basis for interpreting the performance of the school in question.

The interview contained open-ended questions about activities in the mathematics classroom and how parents participated in their children's learning of mathematics. The

principals' responses were recorded in the form of notes and the interview lasted for approximately one hour.

#### Mathematics test scores

The researcher obtained mathematics test scores from the principals. These were the scores of tests written from January 1999 through August 1999. These scores were used to compare the philosophy of the school as spelled out by the principal and the two (i.e., principal interviews and children's test grades) were correlated with parents' responses as found in the questionnaire.

## CHAPTER 4

### RESULTS

This chapter presents and the findings of data from a sample of 100 parents compared with 100 mathematics grade 7 learners from the four schools as mentioned in chapter 3.

#### Demographic Information

Table 4.1  
*Parental Relationship of Students According to School*

School	n	Mother	Father	Grandparent	Guardian	Other
S	25	12 (48%)	11 (44%)	1 (4%)	1 (4%)	-
W	25	23 (92%)	1 (4%)	-	-	1 (4%)
M	25	11 (44%)	6 (24%)	1 (4%)	7 (28%)	-
P	25	13 (52%)	5 (29%)	3 (12%)	4 (16%)	-
Total	100	59	23	5	12	1

*Note.* Percentages within parentheses are calculated within each school.

Table 4.1 compares the relationship between the child and the parent supporting him or her and shows that the majority of parents helping their children are mothers. Fifty-nine per cent of those who came to fill the questionnaires were mothers, 23% were fathers, 5% were grandparents, 12% were guardians and 1% indicated other. Analyzed by school, the data showed that 12 mothers, 11 fathers, 1 grandparent and 1 guardian came from school S. Twenty-three mothers, 1 father and 1 of the other category came from school W. Eleven mothers, 6 fathers, 1 grandparent and 7 guardians were from school M. Lastly from school P 13 mothers, 5 fathers 3 grandparents and four guardians came to fill out the questionnaires.

The researcher decided to determine the extent to which the participation in the labour force might be preventing parents from giving adequate academic assistance to

their children. Table 4.2 is the crosstabulation of the categorical variable “parents employment” in the four schools involved in this investigation.

Table 4.2  
*Employment of Parents According to School*

School	n	Unemployed	Professional/ Semiprofession al	clerical	salesperson
S	22	3 (13.6%)	13 (59.1%)	1 (4.5%)	-
W	25	6 (24.0%)	8 (32.0%)	2 (8.0%)	-
M	14	3 (21.4%)	3 (21.4%)	2 (14.3%)	-
P	21	8 (24.4%)	5 (23.8%)	1 (4.8%)	1 (4.8%)
Total	82	20/24.4%	29/35.4%	6/7.3%	1/1.2%

School	n	manufacturing	services	self-employed	Labourer
S	22	-	3 (13.6%)	2 (9.1%)	-
W	25	-	1 (4.0%)	4 (16.0%)	4 (16.0%)
M	14	2 (14.3%)	1 (7.1%)	-	3 (21.4%)
P	21	-	2 (9.5%)	3 (14.3%)	1 (4.8%)
Total	82	2/2.4%	7/8.5%	9/11.0%	8/9.8%

*Note.* Percentages within parentheses are calculated within each school.

Table 4.2 indicates the employment of parents according to school and in a sample of 100 participants 82 who came to fill out the questionnaires were parents. The remaining 18 were either grandparents, guardians or others. Out of 82 parents 20 were unemployed, 29 worked as professionals/semiprofessionals, 6 were in clerical jobs, 1 was a salesperson, 2 worked in manufacturing, 7 in services, 9 self-employed and 8 were labourers. According to Table 4.2 one realizes that 60 parents out of 82 were employed the previously mentioned categories. In that 60; 29 were employed either as professionals or semiprofessionals. Twenty-one of the 29 parents belonged to school type 1 whilst 8 belonged to school type 2. The remaining 33 were employed in categories ranging from clerical, salesperson, manufacturing, services, self-employed and Labourer.

Table 4.3  
*Education of Maternal Parents According to School*

School	n	No formal Education	Primary	High school (std5-std10)	College (pre std10)	College (post std10)	Technikon	University
S	22	1 (4.5%)	2 (9.1%)	2 (9.1%)	1 (4.5%)	8 (36.4%)	-	8 (36.4%)
W	25	1 (4.0%)	-	17 (68.0%)	-	4 (16.0%)	-	3 (12.0%)
M	14	-	2 (14.3%)	6 (42.9%)	-	5 (35.7%)	-	1 (7.1%)
P	21	2 (9.5%)	3 (14.3%)	9 (42.9%)	1 (4.8%)	3 (14.3%)	1 (4.8%)	2 (9.5%)
Total	82	4/4.9%	7/8.5%	34/41.5%	2/2.4%	20/24.4%	1/1.2%	14/17.1%

*Note.* Percentages within parentheses are calculated within each school.

The education of parents by school as presented in Table 4.3 indicates that 4 parents had no formal education, 7 had primary education, 34 high school education, 22-college education, and 1 technikon and 14 had university education. This by school type reflected that 2 with no formal education, 2 primary, 19 high school, 9 college and 11 university education belonged to school type 1. In school type 2 were 2 parents with no formal education, 5 with primary, 15 high school, 4 college, 1 technikon and 3 with university education.

Table 4.4  
*Marital Status of Parents According to School*

School	n	Single	Married apart	Married together	Divorced	Guardian
S	25	1 (4%)	4 (16%)	19 (76%)	1 (4%)	-
W	25	3 (12%)	1 (4%)	19 (76%)	2 (8%)	-
M	25	4 (16%)	2 (8%)	9 (36%)	4 (16%)	6 (24%)
P	25	6 (24%)	-	14 (56%)	3 (12%)	2 (8%)
Total	100	14	7	61	10	8

*Note.* Percentages within parentheses are calculated within each school.

Parents marital status according to school is showed in Table 4.4 as follows: 14 parents were single parents, 7 were married but staying apart, 61 married and stayed together, 10 were divorced parents and 8 were guardians. School type 1 had 4 single

parents, 5 married but staying apart, 38 married and staying together, 3 divorced parents and no guardians. School type 2 had 10 single parents, 2 married but staying apart, 23 married and staying together, 7 divorced and 8 guardians.

### Six Dynamic Variables

One hundred parents filled out questionnaires intended to measure the degree of parental support provided in the learning process of their children. This support is measured by six factors previously presented in Jantjes' study (1995): parental pressure for achievement, language and level of exposure (called language models), academic guidance, intellectuality, activity in the home and work habits. In investigating the parents' position with regard to these factors the statements in the questionnaires were regrouped to capture information that would measure them. These factors were then used to test the hypotheses outlined.

To determine whether the two school types were statistically different on these six factors, the Kruskal Wallis test was used (see Table 4.5). Only the factor "Activity in the home" showed a statistically significant difference between the two school types.

The quality of language model is determined by the quality of language used by the parents and the quality of language taught directly and indirectly. The parents' responses reflected high quality of language models.

Parents motivation and monitoring of homework is higher in school type 1 than in school type 2. However, both types of schools reflected a support and involvement of parents with regard to this item. Parents sometimes use guardians and elder children to represent them fulfilling the task of signing homework books.



Table 4.5  
*Kruskal Wallis Test Comparing the Two School Types on the Six Dynamic Variables*

Variable	Mean Rank: School type 1	Mean Rank: School type 2	chi-square
Academic guidance	50.20	50.80	.011
Activity in the home	44.22	56.78	4.828*
Intellectuality	47.88	53.12	.838
Language models	46.19	54.81	2.453
Parental pressure for achievement	50.52	50.48	.000
Work habits	47.58	53.42	1.061

\* $p < .05$ .

#### School performance on the mathematics scores and parental involvement

Learners' June test scores were used in this study to measure the performance of children and to investigate the school type that performs higher. This will help determine which school type receives more support from parents. It would answer to the hypothesis that the higher the parental involvement the higher will the maths scores be.

For school type 1 the mean score for learners' math test is 57.7% and the histogram in Figure 4.1 indicates this scenario.

For school type 2 the mean score on the maths test was 35.9%. The histogram (Figure 4.2) shows negative skewedness. Thus schools M and P are achieving at lower levels than schools S and W (see Figure 4.1). This school type calls for more support by parents. In school type 2 most parents could not read and write, hence the skewed results. Parents filled out their questionnaires with the help of trained assistants. These parents had also requested that the researcher open extra classes for their children to be helped in mathematics. The extra classes were opened as part and parcel of a program for training in cooperative learning. Such classes were attended every Saturday from September 1999

until the time learners wrote their examinations. For the purpose of this research, the results of the June examinations were used, it would be of interest to investigate the effects of the intervention in their December examinations.

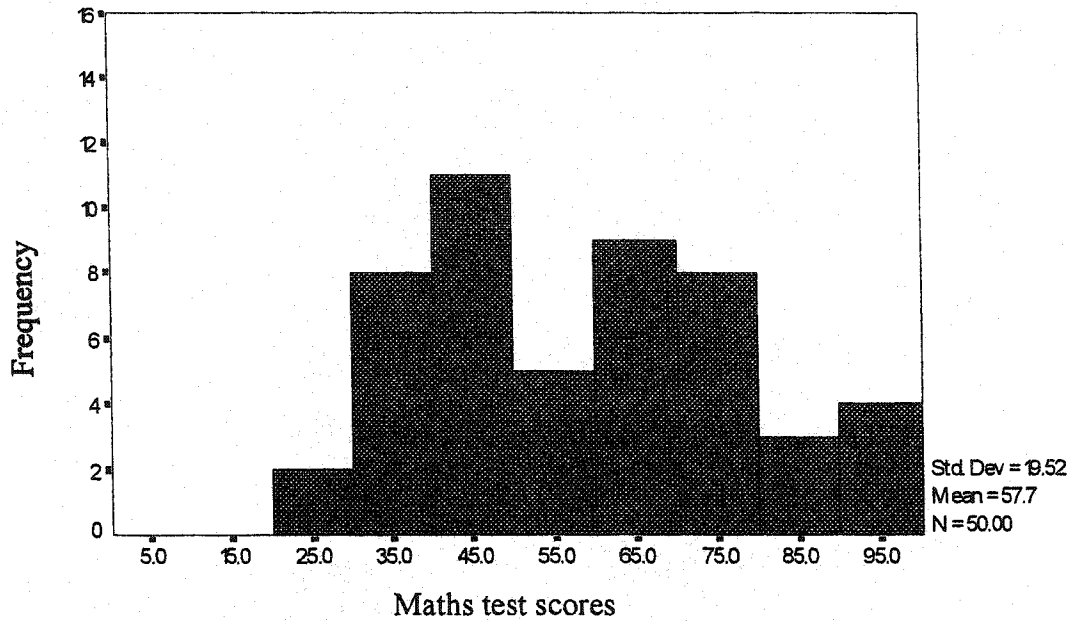


Figure 4.1. Distribution of learners' maths test scores for school type 1: S and W

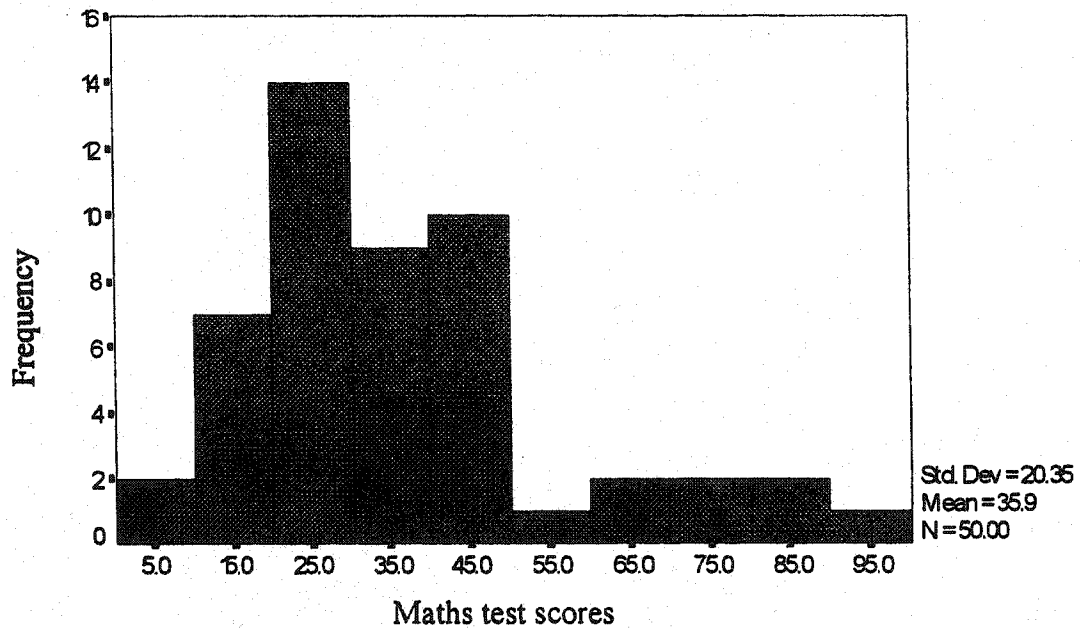


Figure 4.2. Distribution of learners' maths test scores for school type 2: M and P

The difference between the two school types on the maths test was significantly different statistically, favouring school type 1,  $F(1, 98) = 28.76, p < .05$ . This difference can be noticed by the ANOVA test of the two school types. The mean of the school type 1 is 57.66 (SD=19.51) whilst that of school type 2 is 35.94 (SD=20.34). It does tend positively to support the hypothesis that school type 1 is supported better than school type 2.

#### Principals' interviews.

The researcher interviewed two principals from the four schools in this study. One principal represented school type 1 and the other represented the school type 2. The interviews investigated the philosophy of the school as well as the type of support that parents gave the school. The following key is used in presenting the interview transcripts: "Q" represent the question that the researcher asked principals and "T1" represent the responses of school type 1 principal while "T2" represent the responses of school type 2 principal:

Q: What is the average attendance of parents at parent visits?

T1: Parents attend satisfactorily at an average of 60 to 70 percent.

T2: The attendance is fairly poor mostly ranging between 20 and 40 percent.

Q: How often does the school call such visits?

T1: There is a school visit once per term (meaning four visits per year).

T2: Parents are expected to visit the school once per term.

Q: What are parents expected to do at such visits?

T1: They visit the child's teacher in class to discuss the child's progress and some difficulties that the child might encounter.

T2: They collect the child's report mostly at the end of the term and are given chance to ask the teacher questions in case they need clarifications pertaining to the progress of the child.

Q: What mechanism does the school follow to encourage attendance?

T1: The school keeps registers of all parents who attended the visit.

T2: We do speak with children to encourage their parents to attend school visits.

These interviews indicate that school type 1 is more structured in approach than school type 2. There seems to be definite procedures that the school follows, for example, keeping attendance registers for parents and following-up those who never attended. School type 2 never mentioned this kind of follow-up procedure. School type 2 calls visits for parents to collect learners' reports. Congestion occurs in this type of visits and parents may not have enough time to ask teachers some questions.

## CHAPTER 5

### DISCUSSION AND CONCLUSION

Parents studied in this research demonstrated a range of patterns with regard to their role in the education of their children. Most parents are pressured to assume a role of supporting children with school-related matters. The pressure takes the form of signing homework, making sure children read and study. Children in turn are pressured to solicit the help of their parents in these and other related tasks.

In this research the largest group of those who came to fill out questionnaires were mothers (59%). Fathers represented 23% and the remaining 18% came from other categories. Of the two school types in this research, 35 mothers who came to fill out the questionnaires were from school type 1 and 24 mothers came from school type 2. Twelve fathers came from school type 1 whilst 11 came from school type 2, making a total of 23 fathers out of a sample of 100. This reflects that mothers are more available and supportive than fathers are of their children.

This highlights the problem faced by parents in this area where the majority of fathers work outside Phuthaditjhaba in far away cities in factories that offer them opportunities for better paying jobs. Because they have to travel long distances to and from work, they tend to arrive home late when their children are tired and ready for bed. As a result, the responsibility for assisting the children with homework falls to the mother. If mothers are responsible for helping their children with their homework, it means they can only do so after they have completed their household duties, which is usually after preparing supper. By this time most children are tired and have lost interest in receiving academic assistance from their parents.

The information in Table 4.2 gives an indication that the rate of unemployment in this region is high. Twenty out of 82 parents responded that they were unemployed. This means 24.4% of the parents in the region cannot feed their children properly and adequately further suggesting that they are unable to pay their school fees. It is an indication that they would not support their children to the fullest because of starvation and poverty. Table 4.2 indicates that school type 1 with 21 (44.7%) parents in professional/semiprofessional employment has parents with a high potential and economic power to support their children. The SES of school type 1 is above that of school type 2 as indicated by the parents' employment history. This kind of work (professional and semi-professional) in Phuthaditjhaba means they either work as teachers or nurses. The Free State government decreed in 1999 that teachers should work until 15h00, meaning that parents arrive home by 17h00 if they are fortunate enough to get transportation home early. Most parents must use a taxi because buses are often delayed. As Jantjes (1995) stated, this variable of work cannot be changed in the short term, it therefore does affect the child's performance and is inflexible to policy strategies for change.

Job classification (SES) is one of the structural variables that cannot be easily changed in the short run. This is particularly true in the black South African context. However, the researcher believes, based on a non-structuralist methodology, that notwithstanding the socio-economic status of the household, mothers can also help children if they have adequate training themselves in the subject area.

The education of parents presented in Table 4.3 provides proof that the school type 1 belongs to a higher education stratum than school type 2, for example, of the 34

parents who had high school education, 19 (55.9%) came from school type 1. There were 13 parents with college education from the total of 22 parents and 11 were in possession of a university education out of 14 parents all belonging to school type 1.

The marital status of parents according to schools showed that school type 1 had 38 parents staying together whilst school type 2 had 23 such parents (see Table 4.4). This indicates the degree of family intactness as measured by the percentage of both parents living together. In school type 2 there were 10 parents staying apart, 7 parents who were divorced and 8 guardians. The social intactness of children is crucial for the age group of learners in this research. Younger children need both parents to support them. It would seem that parents with children in school type 1 are in a better position to provide such support based on information provided in Table 4.4.

In a way one would assume that mothers are more supportive or that they are more available because they work in local industries. Mothers were also investigated on their employment pattern. Fathers mostly work outside Phuthaditjhaba in jobs with better wages; hence they may not be able to support their children. Even when fathers are around, because of cultural attitudes, they do minimal work. Thus, most house jobs are done by mothers and not fathers in the black culture. Grandparents are in a better position to support their grand children and this is common with the Blacks. They assume more responsibility than the parents would do. The pattern of support depended on the type of work in which the parents are employed. The type of work serves as an indicator of the kind of commitment that parents give and would determine the support given to children. Professionals, semiprofessionals and other categories of literate parents are by virtue of their education expected to be able to help their children in a better way than the illiterate

would do. Even if they are unable, because of work related commitments, one tends to expect that they would hire private tutors to help their children. On the other hand parents who are unemployed, as many of the participants in this research were, have time to support their children, although they live under severe anxiety of finding a job in order to feed their families.

This research aimed at determining the present involvement of parents with respect to their support of their children and found that parents are involved in supporting their children although the way they do differs from one school type to another. The research concentrated on the parents of grade 7 learners, and this might be one of the reasons why parents showed more concern. After grade 7 learners in South Africa have to go to another institution to start a new phase of their education. Most parents put pressure on their children to get a good school report for easy access to their new grade and phase of development.

Parents aim at giving their children the best. Children may wish to achieve to further satisfy their parents. But learners in turn at this stage are faced with numerous challenges because of their experiences at different developmental stages. These stages may either contribute positively or negatively to their learning, depending at least in part on the kind of support they obtain from home.

In this study four schools were selected and subdivided under two school types. School type 1 included two schools and belonged to the high achievement stratum, that is, part of those schools that were said to have more resources and to have as students those who are better achievers based on their academic performance. School type 2 is represented by two schools that have fewer resources and was made up of students who



performed less well academically than school type 1. The schools were selected to investigate which school type involves parents more and what those schools' results are in terms of the mathematics scores. Mathematics was chosen because it proved to be the most failed subject in schools' performances. The hypothesis was that the higher the stratum the higher the support the school gets from parents. The study also aimed to demystify the stereotype that mathematics is a difficult subject.

#### Six dynamic variables

Of all the four schools, there seemed not to be a clear and distinct difference among schools as far as the six dynamic variables that were tested are concerned. Moreover, the significance tests for the six dynamic variables for the two school types showed almost no differences (see Table 4.5). In both school types there seems to be a systematic pattern of parents supporting their children. This is revealed through the parent questionnaires discussed in the previous chapter.

#### Mathematics test scores

The learners' mathematics test scores are reported in Figures 4.1 and 4.2. In Figures 4.1 and 4.2 learners in school type 1 scored high than those in school type 2. School type 1 may not be rated as one with high support because the six dynamic variables showed no significant differences between school types. High maths scores may be attributed to other factors like group work. It was reported in the principals' interviews that school type 1 already uses group work techniques similar to those recommended in Outcomes Based Education.

### Limitations of the research

The researcher has noted the following limitations for this research. The research needed a longitudinal type of study. Learners need to be followed up until the end of a school phase. In this research the performance of learners might not be attributed to the parental support as indicated by Kruskal Wallis Test that there is no significant difference in the two school types.

Parents reported that they support their children but the monitoring system in this research cannot assure us whether such a support really existed. The data taking was a once-off one and the parents' report was not specific to the June maths test as used in this research.

Parents were not videotaped to justify the difference of learners with support and those without support. A series of observations could best address this and is thus recommended for the future research.

### Recommendations for further research.

I would like to conclude this research by making some recommendations that I believe could be helpful. These recommendations are part of the experience I gained during the time I did this research. They are also in part statements forwarded to me by parents and colleagues who took part in this study. It has been a very enriching experience for me and I deem it fit to share it with others, especially with those who participated in this study.

Jones and Rowley (1988) in their article: "What does research say about parental participation in children's reading development?" stipulated that there are three categories of parental participation, namely: (1) description of parental involvement

programmes, (2) studies of the attitudes of parents, teachers and teacher educators to the involvement programmes and (3) studies of the outcomes that result from parental participation, particularly in the area of academic achievement.

I have investigated the third category in this research, specifically in the academic achievement of mathematics. This study confirms that mathematics is frequently failed by learners in South Africa. My investigation of the present situation confirms that there is some involvement done by parents in the Eastern Free State schools. Why mathematics is failed in the manner and at the rate observed has not been adequately answered by this research. A more in-depth research, which will follow up this one, will be needed to be able to follow an individual learner throughout all of his or her school phases. That might help answer the question better. I would therefore not conclude that learners fail mathematics because of lack of parental participation. That might be one of the reasons but there are numerous other reasons that need to be investigated further.

I have learned a lot from this research, though I am unable to come to a firm conclusion about the contribution of different types of interaction to improving mathematics scores. Group work and parents' mathematics clubs as suggested in the schematic diagram could not be fairly investigated due to time constraints. Much longer time will be needed to implement these strategies and techniques to investigate whether they lead to improvement in children's mathematics scores.

The recommendations that emerge from my study are a starting point for anyone wishing to replicate this research. Environmental differences existing in South Africa, particularly in Phuthaditjhaba where this research was conducted, are different from those

mentioned in my literature review. This must be taken into account when using these recommendations which follow.

First there is general agreement that there should be parent – teacher partnership in education in Phuthaditjhaba. Most parents in this research were willing to take part in such partnerships. They, however, raised a concern that there should be a planned – purposeful and structured partnership initiated by the education department. Thus it is recommended that it be entrenched in the departmental policy for public schools. Parents alluded to the fact that some schools invite parents while others do not, and it is against such a background that I urge that there is a compelling need for such a policy. Parents need a structured involvement with precise guidance instructing them in what to do and how it should be done.

Secondly there should be parenting education in the curriculum of Adult Basic Education (ABET). Parents, who are professionals in the sample of this study, recommended that the future parents and others with children in schools should receive education about parenting, which could include parents' role in the education of their children. According to these parents it is difficult for parents to come to school without the school's invitation. They perceive that it is an interference in the task of the teachers for parents to visit the school uninvited. They believe there should be training in this regard to assist parents to assume their rightful roles in the education of their children.

Thirdly, I would recommend that mathematics clubs be investigated as pilot programmes in schools to enable parents to help their children adequately. There are projects like “family maths”, mentioned earlier; which could be tried in the Eastern Free State.

The full implementation of Outcomes Based Education could further the group work strategy as a positive impact on the learning and teaching of mathematics.

## REFERENCES

- Bennie, K. (1996). An experiment with cooperative learning in a standard six class. *Association for Mathematics Education of South African: Congress '96 proceedings.*
- Brustsaert, H. (1998). Home and school influence on academic performance: State and Catholic elementary schools in Belgium compared. *Educational Review*, 50(1), 37-43.
- Bryk, A. S., Lee, V. E., & Hollard, P. B. (1993). *Catholic schools and the common good.* Cambridge: Harvard University Press.
- Coleman, J. S., Hoffer, T., & Kilgore, S. B. (1982). *High school achievement: Public, Catholic and private schools.* New York: Basic Books.
- Dekker, E. I., & Lemmer, E. M. (1994). *Critical issues in modern education.* Durban: Butterworth.
- Educational Realities in South Africa* (1990)
- Edusource Data News No. 24/* March 1999.
- Frankel, J. R., & Wallen, N. E. (1993). *How to design and evaluate research in education.* 2nd ed. New York: Mc Graw-Hill.
- Fraser, B. J., Walberg, H. J., Welch, W. W., & Hattie, J. A. (1987). Syntheses of educational productivity research. *International Journal of Educational Research*, 11, 147-247.
- Greeley, A. M. (1982). *Catholic high schools and minority students.* New Brunswick: Transaction Books.

- Jantjes, E. (1995). The influence of home environment and parental support on school achievement. *Perspectives in Education*, 16(2), 289–304.
- Jarworski, B. (1996). *Investigating mathematics: A constructivist enquiry*. London. The Falmer Press.
- Jones, M., & Rowley, G. (1990). What does research say about parental participation in children's reading development?. *Evaluation and Research in Education*, 4(1), 22–36.
- Jubber, K. (1994). The early home environment and its influence on standard four and standard ten-school performance. *South African Journal of Education*, 14(3), 135–141.
- Mashishi, L. (1994). Parental involvement in Soweto primary schools: Parents' perceptions. *Perspectives in Education*, 15(2), 219–236.
- Procidano, M. E., & Fisher, C. B. (1992). *Contemporary families: A handbook for school professionals*. New York: Teachers College Press.
- Setati, M. (1996). Family maths: Parents can help children learn mathematics-COUNT. *AMESA Conference proceedings*, 276-279
- Southwood, S., & Spanneberg, R.(1996). *Rethinking the teaching and learning of Mathematics*. Goodwood: Via Africa.
- Thompson, M. S., Entwisle, D. R., Alexander, K. L., & Sundius, M. J. (1992). The influence of family composition on children's conformity to the student role. *American Educational Research Journal*, 29(2), 405–424.

APPENDIX A

**FREE STATE PROVINCIAL GOVERNMENT**

**Education**

Private Bag X20565 • Bloemfontein • 9300 • South Africa  
55 Elizabeth Street • CR Swart Building • Bloemfontein  
Tel. : +27 (0) 51 - 4074911 • Fax : +27 (0) 51 - 4074036

Enquiries : Mr W.B. van Rooyen/LB  
Reference no. : 0.1/11/3/3

Tel. : 051-405 5504  
Fax : 051-407 4032

22 September 1999

Mr T I Makume  
Director (South Africa): Uniqwa / Concordia Project  
University of the North  
Qwa Qwa Campus  
Private Bag X 13  
PHUTHADITJHABA  
9866

OFFICE: ACADEMIC ADMINISTRATION

RECEIVED

SEP. 30 1999

DATE

Dear Mr Makume

**REQUEST TO CONDUCT RESEARCH IN THE FREE STATE DEPARTMENT OF EDUCATION**

1. Your request dated 2 September 1999 and the detailed research requests for five students refer.
2. Research titles applied for:

Name:

Titles:

Ms Tankiso Mokoena:

Strategies for preventing the sexual abuse of children in schools.

Mr Moroke Zacharia Sematle:

An analysis of common errors in the written English of black learners in secondary schools in Phuthaditjhaba District of the North-eastern Free State.

Mr Paul Mofokeng:

School based INSET as one tool (change) to improve teachers' and learners' performance in schools through normalising collegiality among teachers.

Mr Noa Komako

Support systems in the learning and teaching of mathematics.

Ms Marnokhele Julia Mami Maduna

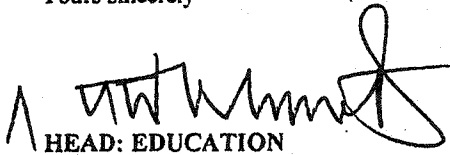
Supporting curriculum change in the classroom:  
An analysis of the impact of the use of teaching aids in mathematics teaching and learning in Qwa Qwa primary schools.



3. Permission is granted for the above students to conduct research in the Free State Department of Education under the following conditions:
- 3.1 The names of teachers/learners (where applicable) must be provided by the principals.
  - 3.2 Officials / Principals / HOD's / Teachers / Learners (where applicable) participate voluntarily in the projects.
  - 3.3 Where applicable, the names of schools and respondents involved remain confidential in all respects.
  - 3.4 Completion of questionnaires by teaching staff and learners must take place outside normal tuition time of the school.
  - 3.5 This letter must be shown to all participating persons.
  - 3.6 Individual reports on the 5 projects must be donated to the Free State Department of Education after completion of the projects where it will be accessed in the Education Library, Bloemfontein.
  - 3.7 You must address a letter to the Head: Education, for attention  
W.B. van Rooyen  
Room 1211  
C.R. Swart Building  
Private Bag X20565  
BLOEMFONTEIN  
9301  
accepting the conditions as laid down.

4. We wish the students every success with their research.

Yours sincerely

  
HEAD: EDUCATION

APPENDIX B

P.O. Box 5588  
PHUTHADITJHABA  
9866  
01 September 1999

Dear Parent(s) / Guardian

You are cordially invited to a Mathematics Support System initiative scheduled as follows:

**Date** : .....

**Time** : .....

**Venue**: .....

I am a masters student with Concordia / UNIQWA project and am expected to conduct a research for my thesis. The purpose of my study is to examine the impact of the parental support and home environment in the achievement of your child / children. This investigation will later inform parents / guardians as to how best can they help children in their school work.

I therefore request your involvement and cooperation in this initiative. Please, fill and return the response slip below to your child's class-teacher.

Thank you.

Yours truly

.....  
NJ Komako (Researcher)  
Tel: (058) 713 5594

.....  
Principal

..... Cut here and send back to the class-teacher.....

I, ..... the parent/ guardian of.....  
Parent / Guardian's names child's name

Cross with [ X ] in the appropriate block below to indicate your choice

Will come [ ]

Will not come [ ] to this meeting

Tel:..... (Home)..... (Work)

Parent / Guardian's Signature : .....

## APPENDIX C

P.O. Box 5588  
PHUTHADITJHABA  
9866  
Tel : (058) 713 5594  
Fax : (058) 713 5388

Dear Parent(s) / Guardian

I, Noa Jacob Komako hereby invite you to participate in filling out this questionnaire. It is a study of parental involvement in the learning and teaching on Mathematics.

The purpose of my study is to examine the impact of parental support and the home environment in the achievement of the child / children. This study will provide information that can later be used to show parents/guardians how best they can help children with their school-work and their education.

This questionnaire will provide information that will help me complete my study and thesis for as part of my masters degree for Concordia University (Canada) and UNIQWA, Free State Province.

Your cooperation in completing this questionnaire is very important and will be highly appreciated.

Thank you

**This Questionnaire is to be filled out by the Parent(s) or the Guardian of the Child / Children.**

**Please Cross [ X ] in the appropriate response**

**1. Indicate your relationship with the child / children in your care**

- Mother       Father       Stepfather  
 Stepmother                       Grand parent  
 Guardian (brother, Sister, uncle, aunt )       Other (Specify)

**2. Gender**

- Male       Female

**3. Age ( in years )**

- 20 – 30                       31 – 40                       41 – 45                       46 and over

**4. Marital status**

- Single Parent       Single Married Parent       Both Married Parents  
 Divorced Parent       Guardian       Other ( Specify)

**5. Number of members in a family**

- 2 – 3       4 – 5       6 – 7       8 – 9  
 more than 10

**Parents or Guardian employment**

( Where applicable both 6 and 7 below must be filled out )

**6. Father / Stepfather employment**

- Unemployed
- Professional / Semi-professional ( Management, Executive, Administration )
- Clerical
- Salesperson
- Manufacturing
- Services ( Public, Personal, Domestic )
- Self employed
- Labourer
- Other : ( Specify )

**7. Mother / Stepmother employment**

- Unemployed
- Professional / Semi-professional ( Management, Executive, Administration )
- Clerical
- Salesperson
- Manufacturing
- Services ( Public, Personal, Domestic )
- Self employed
- Labourer
- Other : ( Specify )

## 8. Guardian employment

( This is to be filled out ONLY if the child / children are taken care of a person other than the father/stepfather or mother/ stepmother)

- Unemployed
- Professional / Semi-professional ( Management, Executive, Administration )
- Clerical
- Salesperson
- Manufacturing
- Services ( Public, Personal, Domestic )
- Self employed
- Labourer
- Other : ( Specify)

**Highest level of education** ( Where applicable both 9 and 10 below must be filled out )

### 9. Father / stepfather level of education

- No Formal Education
- Primary education: ( SSA – std 4 )
- High school: ( std5 – std 10 )
- College : ( Pre std 10 )
- College : ( Post std 10)
- Technikon
- University education
- Other: ( Specify )

### 10. Mother / stepmother level of education

- No Formal Education
- Primary education: ( SSA – std 4 )
- High school: ( std5 – std 10 )
- College : ( Pre std 10 )
- College : ( Post std 10)
- Technikon
- University education
- Other: ( Specify ) .....

**11. Guardian level of education**

( This is to be filled out ONLY if the child / children are taken care of a person other than the father/stepfather or mother/ stepmother)

- No Formal Education                       Primary education: ( SSA – std 4 )
- High school: ( std5 – std 10 )             College : ( Pre std 10 )
- College : ( Post std 10)                     Technikon                     University education
- Other: ( Specify )

**12. Indicate the number of children in your care:**

- None       One       Two       Three       Four
- Five or more

**13. Number of children in Pre-school ( Those under the age of 7 years )**

- None       One       Two       Three       Four
- Five or more

**14. Age of the eldest child in your care ( in years )**

- Under 5       5 – 12       13 – 19       Over 19       Not applicable

**15. Indicate the number of:**

Sister(s) younger than the child in question: .....

Sister(s) older than the child in question : .....

Brother(s) younger than the child in question: .....

Brother(s) older than the child in question : .....

**16. Indicate the extent of your agreement with the following statements by circling the appropriate number in one of the corresponding boxes.**

NOTE: 1 = Strongly disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly agree	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Everyone in my family has a household responsibility, at least one chore that must be done on time.	1	2	3	4	5
2. We have regular times for members of the family to eat, sleep, play, work and study.	1	2	3	4	5
3. Schoolwork and reading come before play, TV or even other work.	1	2	3	4	5
4. I praise my child for good schoolwork, sometimes in front of other people.	1	2	3	4	5
5. My child has a quiet place to study, a desk or table at which to work, and books, including a dictionary or other reference material.	1	2	3	4	5
6. Members of my family talk about hobbies, games, news, the books we're reading, and movies and TV programs we've seen.	1	2	3	4	5
7. The family visits museums, libraries, zoos, historical sites and other places of interest.	1	2	3	4	5
8. I encourage good speech habits, helping my child to use the correct words and phrases and to learn new ones.	1	2	3	4	5
9. At dinner, or some other daily occasion, our family talks about the day's events, with a chance for everyone to speak and be listened to.	1	2	3	4	5
10. I know my child's current teacher what my child is doing in school and which learning materials are being used.	1	2	3	4	5
11. I expect quality work and good grade. I know my child's strengths and weaknesses and give encouragement and special help when they're needed.	1	2	3	4	5
12. I talk to my child about the future, about planning for high school and college, and about aiming for a high level of education and vocation.	1	2	3	4	5
13. I monitor my child's / children's homework and studies.	1	2	3	4	5
14. I read my child's / children's written work.	1	2	3	4	5
15. I make it a point that I sign my child's written work.	1	2	3	4	5