



**PARENTAL INVOLVEMENT IN GRADE 4 MATHEMATICS HOMEWORK
AND A FAMILY MATHEMATICS PROGRAMME IN THE WESTERN CAPE**

By

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DECLARATION

I, Jermaine Stephen Grandly, declare that the contents of this thesis represent my own unaided work and that the thesis has not previously been submitted for academic examination towards any qualification. Furthermore, it represents my own opinion and not necessarily those of the Cape Peninsula University of Technology.

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ABSTRACT

Parents have the potential to promote learner success in school and mathematics through assistance with homework. However parental involvement with mathematics and their contribution toward success within the subject is an ongoing topic of debate, given the constraints, parents are confronted with in their daily lives. This study investigated how a family mathematics programme (FMP) can assist parent involvement with Grade 4 learners and their mathematics homework in the Western Cape and the quality of assistance being provided. This was a qualitative case study, involving convenience sampling of parents who completed pre- and post-workshop questionnaires, participated in a focus group interview, and produced workshop reflections based on the FMP. The data was analysed using pattern matching and linked to previous research outputs to determine results related to the research questions. Results indicated that the parents who took part in the study were involved with mathematics homework and could be quite resourceful in this regard. However, they were often unfamiliar with mathematical vocabulary and terminology, as well as the current teaching methods and strategies used to teach mathematics in primary school. Other challenges included parent motivation, attitude and beliefs, learner self-regulation, and communication between parent and learner, as well as parent and teacher. Furthermore, findings indicated that parents are unaware of what the curriculum expects from the learners when the curriculum is completed. A FMP was recommended as an intervention to help improve parental involvement with mathematics homework. Also recommended was a What's App chat group devoted to parental involvement where challenges and success can be discussed. The results also showed the FMP helped to increase parental involvement and parent confidence when assisting with mathematics homework. However, parents need continual guidance on teaching methods and strategies to reinforce and strengthen what was taught in class at home, and to deepen the learners' understanding of the mathematics content taught. In conclusion, parents need assistance from schools to improve and increase their involvement with mathematics homework and a FMP is a helpful way to encourage and improve their participation.

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DEDICATION

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TABLE OF CONTENT

Declaration	ii
Abstract	iii
Acknowledgements	iv
Dedication	v
Abbreviations and acronyms	xi
Glossary	xii-xiii

CHAPTER 1: INTRODUCTION AND OVERVIEW

1.1. Introduction	1-2
1.2. Background of the study.	2-5
1.3. Rationale	6-8
1.4. Problem statement of the study.	9
1.5. The research aims of the study	9
1.6. The research questions of the study.	9
1.7. Summary of the literature review and theoretical framework.	10
1.8. Overview of methodology.	10-11
1.9. Significance of the study.	11-12
1.10. Scope and limitation of the study.	12-13
1.11. Outline of the chapters.	13

CHAPTER 2: LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1. Introduction	14-15
2.2. Parental involvement and homework.	15-19
2.3. Factors that influence parental involvement with mathematics homework.	19
2.3.1. Parental involvement and parent level of education.	19-20
2.3.2. Parental involvement and parent-teacher communication.	20-21
2.3.3. Parental involvement and parent socio-economic status.	21-22
2.3.4. Parental involvement and parent availability.	22
2.3.5. Parental involvement and family dynamics.	23
2.3.6. Parental involvement and the role of language in education.	23-24

2.4. Parental involvement in countries surrounding South Africa.	24-25
2.5. Reasons to encourage parental involvement in homework.	25-26
2.6. Parental involvement and family mathematics programs.	26-28
2.7. South Africa Department of Basic Education's perception of parental involvement in education	28-29
2.8. Summary: Literature review	29
2.9. Theoretical framework	29-33
2.10. Conclusion	33

CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

3.1. Introduction	34
3.2. Research approach	34-36
3.3. Research design	36-37
3.4. Methodology	37
3.4.1. Site selection	37-28
3.4.2. Participant selection strategy	38-39
3.4.3. Demographic of participants who took part in the data collection process.	39-40
3.4.4. Data collection methods	40-43
3.4.5. Family mathematics programme design and implementation.	43-44
3.4.6. Data analysis	44-46
3.5. Trustworthiness	46-48
3.6. Researcher's position	49
3.7. Ethical consideration	49-51
3.8. Conclusion	51

CHAPTER 4: RESEARCH FINDINGS

4.1. Introduction	52-53
4.2. An overview of parental involvement with mathematics homework within the context of the study.	53-56
4.3. How do parents assist the learners with mathematics homework?	56
4.3.1. Parental involvement and the learners' mathematics homework routine.	57-58

4.3.2. Strategies and methods implemented by parents when assisting with mathematics homework.	58-59
4.3.3. Summary Q1. How do parents assist the learners with mathematics homework?	59-60
4.4. What challenges do parents identify when helping the learners with mathematics homework?	60-61
4.4.1. Parental involvement and mathematics content and methods.	61-64
4.4.2. Parental involvement and learner self-regulation.	64-65
4.4.3. Parent availability and time.	65-67
4.4.4. Parental involvement and the role of communication.	67
a. Communication with parents and learners.	67-69
b. Communication between parent and teacher.	69-72
4.4.5. Summary Q2. What challenges do parents identify when they are helping the learners with mathematics homework?	72
4.5. What issues emerge when parents reflect on their involvement in an FMP?	73
4.5.1. A Family mathematics programme and parent motivation.	73-77
4.5.2. A Family mathematics programme and mathematics language.	77
4.5.3. A Family mathematics programme and parents' beliefs and attitudes about mathematics.	77-81
4.5.4. Summary Q3. What issues emerge when parents reflect on their involvement in an FMP?	81-82
4.5. Conclusion	83

CHAPTER 5: DISCUSSION, CONCLUSION, AND RECOMMENDATIONS

5.1. Introduction	84
DISCUSSION	
5.2. How do parents assist the learners with mathematics homework?	84
5.2.1. Parental involvement and the learners' mathematics homework routine.	85-86
5.2.2. Parental involvement and strategies and methods used to deepen learner understanding.	86
5.3. What challenges do parents identify when helping the learners with mathematics homework?	87
5.3.1. Parental involvement and mathematics content and methods.	87
5.3.2. Parental involvement and learner self-regulation.	88

5.3.3. Parental involvement and communication.	88-89
5.4. What issues emerge when parents reflect on their involvement in an FMP?	90
5.4.1. A Family mathematics programme and parent motivation.	90
5.4.2. A Family mathematics programme and mathematics language.	90-91
5.4.3. A Family mathematics programme and parents' beliefs and attitude toward mathematics.	91-92
5.5. Summary	92
5.5.1. Summary Question one: How do parents assist the learners with mathematics homework?	92
5.5.2. Summary Question two: What challenges do parents identify when helping the learners with mathematics homework?	92-93
5.5.3. Summary Question three: What issues emerge when parents reflect on their involvement in an FMP?	93-94
5.6. How can a family mathematics programme (FMP) assist parental involvement with Grade 4 learners and their mathematics homework in the Western Cape?	94-96
5.7. Limitation of the study.	96-97
5.8. Recommendations and future research suggestions.	97-98
5.9. Final conclusion	98-100

REFERENCES	101-111
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LIST OF FIGURES

Figure: 2.1. Bronfenbrenner's human ecology systems theory.	29
Figure: 2.2. Epstein's theory of overlapping spheres.	29
Figure 3.1. Parental availability for the focus group interviews.	39
Figure 4.1: Parents' views on the importance of their involvement with mathematics homework.	54
Figure 4.2: Parental involvement with mathematics homework.	54
Figure 4.3: How often do parents assist learners with mathematics homework?	55
Figure 4.4: Parents' Mathematics skill level.	61
Figure 4.5: Parents' level of confidence with the basic content areas in Grade 4 mathematics.	64
Figure 4.6: Parents discuss with learners the importance of mathematics.	68
Figure 4.7: Parent communication with the teacher regarding challenges experienced when assisting with mathematics homework.	69

Figure 4.8: The importance of communicating challenges with teachers.	71
Figure 4.9: Parents' level of confidence when assisting with mathematics homework after the FMP.	75
Figure 4.10: Parent level of struggling when helping with mathematics homework after the FMP.	76
Figure 4.11: Parent–learner communication after the FMP.	76
Figure 4.12: Parent experience of a Family Mathematics Programme.	78
Figure 4.13: Parent overall involvement before the FMP.	80
Figure 4.14: Parent overall involvement after the FMP.	81

APPENDICES

Appendix A: Parental involvement letter of permission.	112
Appendix B: Parental involvement letter of participation.	113
Appendix C: Parental involvement pre-workshop questionnaire.	114-116
Appendix D: Focus group interview questions.	117
Appendix E: Outline of the family mathematics programme.	117-126
Appendix F: Parental involvement family mathematics programme reflection slips.	127
Appendix G: Parental involvement post-workshop questionnaire.	128-130

ABBREVIATIONS AND ACRONYMS

CAPS	Curriculum and Assessment Policy Statement
DBE	Department of Basic Education
FGI	Focus Group Interview
FMP	Family Mathematics Program
FRC	Faculty Research Committee
ICT	Information and Communication Technology
LOLT	Language of Learning and Teaching
NECT	National Education Collaboration Trust
NEED	National Education Evaluation and Development Unit
NICLE	Numeracy Inquiry Community of Leader Educators
PHMS	Parent Home Management Scale
Pre. WQ	Pre-Workshop Questionnaires
Pst. WQ	Post-Workshop Questionnaires
SACMEQ	Southern and Eastern Africa Consortium for Measuring Education Quality assessment
SANCP	South African Numeracy Chair Project
SGB	School Governing Body
SMTU	Science Mathematics and Technology Unit
TIMSS	Trends in International Mathematics and Science Study
WCED	Western Cape Education Department

GLOSSARY

Case study research	a process or record of research into the development of a particular person, group, or situation over a period of time
Constructivism	a theory that says individuals and learners construct knowledge rather than just passively taking in information by reflecting upon those experiences when they build their representations and incorporate new information into their pre-existing knowledge.
Direct parental involvement	the immediate parents-learner interactions with relation to subject content.
Family dynamic	the status of the learner's family e.g. single parent, married parents, etc.
Focus group	a research method that brings together a small group of people to answer questions in a moderated setting.
Homework	schoolwork that a learner is required to do at home.
Indirect parental involvement	parental involvement that is not directly associated with school content but comes in the form of parents' supervision, homework routine management, parent encouragement, and providing suitable learning spaces at home.
Interpersonal skills	the ability to communicate or interact well with other people.
Interpretivist	social theories and perspectives that embrace a view of reality as socially constructed or made meaningful through actors' understanding of events.
Learner	a person who is learning a subject or skill
Methodology	a system of practices and procedures that a teacher uses to teach. It will be based on beliefs about the nature of language, and how it is learned (also known as 'Approach').
Mixed methods approach	research intentionally combining or integrating quantitative and qualitative approaches as components of the research.
Paradigm	the framework of key provisions and the ideas which are acknowledged by the pedagogical public during the concrete time period and are the cornerstone of scientific research
Parent	the legal guardian of the child
Parental involvement	the interaction with the child and the school on how best to teach or support the child to promote educational success
Qualitative research	a process of naturalistic inquiry that seeks an in-depth understanding of social phenomena within their natural setting.
Quantitative research	research that is expressed in numbers and measurements of quantities.
Sampling	the selection of a subset of the population of interest in a research study
Self-regulation	the self-directive process through which learners transform their mental abilities into task-related skills without intervention from external influence.

Social-economic status the social standing or class of an individual or group. It is often measured as a combination of education, income, and occupation.

CHAPTER 1

INTRODUCTION AND OVERVIEW

1.1. INTRODUCTION

Over the past decade, there have been many research studies that illustrate how parents can be critical agents to promote learner success in school and mathematics (Fu, Yuan & Xue, 2017; Jay, Rose & Simmons, 2017; Otani, 2019). Yet, not all parents actively participate in the learners' education and regularly evade being involved with homework. The limited involvement of parents in the learners' education and specifically parental involvement with mathematics has become an important and heated topic of debate. Some parents fail to recognise how they can influence the learners' mathematics performance and attitude toward the subject. For parents to exert their influence, they need to attempt to be more actively involved in the learners' mathematics learning and homework (Maimela & Monyatsi, 2016).

The South African Schools Act 84 (RSA, 1996) defines a parent as the legal guardian of the child who can successfully attend to all the learner's education needs. Until now parental involvement has no specific definition but is generally defined as the relations between the parent, the learner, and the school on how to adequately support the learner to promote educational success. This is a task that many parents are unable to accomplish (Garcia & De Guzmam, 2020). Within the context of the current study, parent involvement typically includes either being a member of the School Governing Body (SGB), attending parent-teacher meetings, paying school fees, supporting school fundraisers, or volunteering at the school. Although this type of parental involvement might be beneficial for the school, it does not necessarily mean that it is beneficial for the learners' academic performance in mathematics and education overall.

In this study, the importance of parental involvement in homework is highlighted, in contrast to some educationalists who support the idea of reducing or even eliminating homework, especially in primary schools (Vatterott, 2018). Parents need to think of homework as an opportunity for them to discover what learners are being taught at school (Ndebele, 2018). It is an opportunity for monitoring school work that can enhance the learners' learning abilities and achievement. Furthermore, parental involvement highlights the value of school work and can increase learners' academic motivation, which improves school engagement and academic performance including mathematics (Chung, Jensen, Lanier & Phillips, 2019).

It is the perceived lack of involvement of many parents that is the driving force for this study to explore how involved parents are with mathematics homework. This study will look at how parents help the learners and what factors may be preventing them from being more involved with the learners' mathematics homework. It will also investigate how a family mathematics programme (FMP) can help parents to be more involved in assisting the learners.

1.2. BACKGROUND

Mathematics homework is traditionally given as part of the consolidation process to reinforce work completed during the school day, and to strengthen learner comprehension (Bempechat, 2019.) Yet, learners frequently had incomplete homework due to a limited understanding of the content. I am currently a Grade 7 teacher however, at the commencement of this study I taught Grade 6. When I asked my grade 6 learners if they requested assistance from their parents, they responded that their parents could not help them. However, a degree of sensitivity had to be practiced as most of the learners have parents but some learners live with relatives who are also at times unable to assist.

Homework, regardless of its advantages and disadvantages (which is discussed in greater detail in the next chapter), tends to be an obstacle for some learners because they do not receive adequate support at home to provide the needed reinforcement to consolidate the knowledge and skills taught in the mathematics classroom, as the homework tasks are sometimes beyond the parents' scope of knowledge (Henderson & Mapp, 2002). If parents cannot help with homework, then one of the benefits of homework is lost. Sometimes parents may wish to be involved and support the learners, but there are barriers such as subject content knowledge and teaching methods on how to help with homework that prevents this from happening (National Education Evaluation and Development Unit, 2018). The language of learning and teaching (LOLT) can also be a barrier for parents if it differs from the home language of the learner or the parents (Vukovic & Lesaux, 2013). Furthermore, some parents are also faced with the challenge of the mathematical language used within the homework tasks which could result in parents grappling to comprehend what has to be done with the homework given (Tabaeian, 2016).

Although a FMP may not resolve all the challenges hindering parental involvement with mathematics homework, it can alleviate those that directly influence the learners' mathematical learning at home such as content and curriculum knowledge; methods and strategies used to teach mathematics in the current system; mathematical language; and how to reinforce the skills taught in class at home without consuming the too much of the parents' time. The learners' mathematical development could be rewarded with the benefits that are associated with homework such as but not limited to strengthening content knowledge,

improved study habits, improved self – regulation, etc. due to active parents and quality parental involvement.

I am a mathematics teacher, teaching at a government primary school in Mitchell's Plain for more than 6 years, where learners are taught in English. Over the years, when I consulted with learners regarding their parents' involvement with mathematics homework, the reply was either they could not help or they did not know what to do. These statements were confirmed by parents during parent-teacher meetings if they were assisting the learners or not. The answer was always the same they cannot assist because they do not know the content and methods used to teach mathematics in the current system. Additionally, through informal discussions with some parents, parents are not always sure of what the learners are expected to do because of the language used within the homework task and it is at times a challenge for them to decipher what needs to be done. The feedback received from parents and learners about not completing homework sparked a curiosity by me (a Grade 6 teacher at that time) to know if teachers in the lower grades of the Intermediate Phase were experiencing similar challenges.

Upon further investigation and through informal discussions with colleagues, I discovered that there was a noticeable difference in parental involvement from Grade 3 to Grade 4 and a considerable decrease in the amount of homework completed by learners. From these informal discussions with colleagues, it is apparent that parents become less involved once learners enter the Intermediate Phase.

After I had consulted the curriculum document (National Curriculum and Assessment Policy Statement) (RSA, 2011a & b), it became evident that mathematics subject content and teaching methodology changed between phases. Learners have to deal with larger numbers, more complex problem solving which requires higher levels of thinking, more complex mathematical processes, and different teaching methodologies when entering Grade 4 in comparison to Grade 3. This transition between phases could be one of the reasons why learner performance in mathematics decreases along with parental involvement in homework. For example, during the teaching of patterns in Grade 3 most of the teaching requires concrete apparatus but in Grade 4 teachers tend to move away from the concrete approach to a more abstract approach. For example teachers would let learners use toothpicks to build simple patterns and use it to identify the pattern, the rule and to expand on the pattern. Once learners display a indepth understanding of patterns teachers will slowly move away from learners constructing patterns and introduce patterns where only the values within the pattern is given in tabular form or pre-constructed patterns printed on paper. Learners are also introduced to Algebra for the first time in Grade 4 through number sentences where the methods of

inspection, trial and improvement, and substitution are introduced and applied (RSA, 2011a & b).

The Numeracy Inquiry Community of Leader Educators (NICLE, 2013) intervention that took place in the Eastern Cape is one of the projects that focused on the above-mentioned transition. It began in 2011 as a key intervention project of the South African Numeracy Chair Project (SANCP, 2011) of Rhodes University in the Eastern Cape. It focused on the change from Grade 3 to 4 (Foundation to Intermediate Phase) aiding mathematical growth and skilfulness by allowing the participants to work more self-sufficiently, and have an investigative approach toward the content. NICLE's programme (Numeracy Inquiry Community of Leader Educators) operated in such a way that teachers from Grades 3 and 4 were able to scrutinise mathematics through active involvement and discussions of the subject, without having to focus on expectations of the curriculum, grade-specific outcomes, and the challenges associated with teaching full classes. It also focused on various remediation methods that will enable learner growth from the concrete manner of doing calculations which is often a common practice in primary schools (Graven & Stott, 2012; Graven & Stott, 2014).

Such projects have resulted in an escalation of teacher confidence and dedication to practices that promoted sense-making and understanding whilst improving learner performance in a variety of assessments from 2011 to 2014 (Graven, 2015; Graven, 2016). Although parents formed part of the projects and their involvement showed promise, the focus of the projects tended more toward teachers connecting the gap between phases and ensuring learners were ready to meet the demands of the new phase. This is one of the reasons why this study focused on the parents of those learners who progressed to Grade 4. It attempted to understand why parental involvement declines after the learners enter the Intermediate Phase and how parents try to assist the learners with mathematics homework. It is important to understand and identify the challenges parents are experiencing and how they can be assisted to contribute more positively to the learners' mathematics learning.

This study was undertaken in Mitchell's Plain, Cape Town in the Western Cape. An area comprising of families from poor to middle social-economic groups and various races, religions, and family dynamics (single-parent, divorced parents, and married parental status). Some parents from these households have a lower level of education and may have had experiences in learning mathematics that influenced them negatively. According to Page (2016), parents may be cautious when helping with mathematics homework and reframe from supporting the learners because of their limited content knowledge, confidence, and comprehension of how to assist the learners.

Researchers such as Monson (2010) and Page (2016) who conducted their research in Minnesota, America, and Cape Town, South Africa respectively, have addressed the topic of parental involvement. Both these researchers have made attempts to either improve or increase parental involvement not just in mathematics, but in other subjects also. Page (2016), used an informative approach to parental involvement by empowering and providing information on parental involvement to the principal, staff, and parents of the school on what parental involvement is, what the role of parents is within education, and how they can promote learner success at school. The research suggests that high-quality, positive parental involvement has the potential to improve learners' academic performance in mathematics and education overall.

Monson (2010) also researched how parental involvement could be improved through increased school communication and home-based activities but found no great change in the learners' mathematics and overall academic results. However, Mutodi and Ngirande (2014) looked at the connection concerning parental involvement and how learners perform academically and found that parenting, parent-teacher communication, and family support had a positive effect on learner performance. Their study concluded that in South Africa if parents remain active in the learners' education, it could result in a positive effect on the learners' academic performance. Before parents can stay involved, parents need to get involved first, and both the studies of Monson (2010) and Page (2016) illustrate that if parents are confident and knowledgeable in mathematics, their involvement with the learners' homework could increase. Nonetheless, given the findings of Mutodi and Ngirande (2014), there is concern that South African learners are being outperformed by learners in neighbouring countries. Botswana ranked above South Africa in both the Southern and Eastern Africa Consortium for Measuring Education Quality assessment (SACMEQ, 2011), and the Trends in International Mathematics and Science Study (TIMSS) (Sandefur, 2016).

A family mathematics event for parents organised by Graven and Stott (2014), held over several nights focusing on Grades 2 to 4, revealed similar results. They found as parents participated in the programme, they started to feel more certain, competent, and sure of their abilities when assisting and supporting the learners with mathematics homework. Whereas parents previously refrained from assisting the learners with mathematics homework. This experience gave them the chance to understand what was being taught in the mathematics classroom and how they could assist the learners. This suggests that schools should include parents to assist in the learning process. The parents need to be empowered and made more knowledgeable about what their children as learners are being taught, and how they can reinforce and consolidate what was taught in the classroom at home. It is important to make parents more knowledgeable about mathematics content and methods, enabling them to

assist the learners. We also have to remember that there can be other reasons for low parental involvement in homework support such as time constraints, availability, working hours, and in some cases where learners have no parents. These influential factors are discussed in more detail in the literature review.

1.3. RATIONALE

This study is important because teachers stated that learners who are in Grade 4 do not regularly complete homework. Therefore, they are not consolidating the knowledge and skills they need to perform well in mathematics. Parents say that they cannot help because they do not know the methods used to teach mathematics in the current system nor do some parents possess the content knowledge to help with mathematics homework. Some of the FMPs highlighted in this study were mostly concerned with improving teaching practice and as part of these practices were to include parents within the learners' learning of mathematics at home. The FMP within this study does not prioritise teaching practices but solely focuses on parents and how to improve their involvement with mathematics homework and the quality thereof. Discovering how parents within the context of this study are assisting learners with mathematics homework before participating in a FMP and the methods they resorted to in doing this task.

Furthermore, highlighting which aspects of parental involvement need the greatest attention and how best to improve these aspects to enhance parental involvement with mathematics homework. Additionally, if any, what non-content related attributes (e.g. parents' view of mathematics, eagerness to want to assist with mathematics homework, etc.) restricts or prevent parents' involvement with mathematics homework and what assistance can be given to participating parents to improve these attributes. This will guide the structure of the FMP to meet the needs of the parents, so what use to be hindering their involvement with mathematics homework would no longer do so.

Parents need to be aware that including them in the learners' education not only provides an opportunity to increase the learners' achievement in mathematics but also helps parents to better understand how the learners learn (Epstein, Jansorn, Salinas, Sanders, Simon, & Van Voorhis, 2002). By being involved in the learners' schoolwork (homework) parents create an opportunity to motivate the learners and provide structure at home, to help the learners to succeed in mathematics and at school (Garcia & De Guzman, 2020). According to Chung et al. (2019), parental involvement practices should include both autonomous support such as motivating the learners, and direct support (helping with activities) such as helping with mathematics homework.

Numerous benefits of parental involvement are identified by Henning, Liu, and Sulaimani (2020) parents who are actively involved have the potential to a) increase learners' school attendance and school behaviour; b) motivate learners; c) help improve learner performance academically. Furthermore, it builds a good relationship between teachers and parents, and parents will receive a better understanding of the curriculum because of the relationship built between parents and teachers. Although these may be the possible benefits of parental involvement, the learners within the current study may not be receiving these benefits, due to limited parental involvement, especially where mathematics homework is concerned.

There may be countless explanations for the reduction in involvement by parents and there are some studies related to parental involvement in homework that took place in Botswana that may have some interesting lessons for parents in South Africa. Kgosidialwa (2010), Maimela and Monyatsi (2016), and Yamasaki (2013) illustrated that circumstances in Botswana are not much different from that in South Africa. There are many similarities between the two countries such as that both have adopted English as the LOLT (from Grade 4 in South Africa), the average class size is forty or more learners per class, and there is a lack of space and infrastructure and a shortage of textbooks. Teachers are not always confident in their knowledge of the mathematics content and appropriate teaching strategies, and both countries have their share of poverty, yet Botswana is still performing better than South Africa in regional and international assessment studies. Interestingly, Maimela and Monyatsi (2016), revealed that since 1966, the Botswana national government has demonstrated a marked interest and commitment to the enhancement of education at primary schools by introducing two policies; the Education for *Kagisano* (1977) and the Revised National Policy on Education (1994) to direct the advancement of education in the country. Parent active participation was one of the endorsements made by both policies.

Maimela and Monyatsi (2016), found that parents in their schools related well with teachers even though they were often not well educated, they helped the learners with homework, and they go to great lengths to assist with all educational matters. Schools were encouraged to build strong alliances with parents if academic improvement and success is the desired outcome they wanted to achieve. Teachers were encouraged to provide parents with information outlining the educational goals of the school which included what is expected of each learner, the high standard that was attached to expectations, and different approaches that parents can apply when it came to assisting with homework and lessons taught in class. Kgosidialwa (2010), conducted a similar study that investigated school-based activities that parents from Botswana could participate in with the learners.

The study explored how parents viewed their participation and what their expectations were of the learner academically. This resulted in parents participating more with homework at home by motivating the learners to make a greater effort toward their schoolwork. Parents and teachers communicated regularly and parents helped learners with homework despite the content being challenging. They encouraged the learners to show a greater level of seriousness toward their school work. Most parents believe that their role and participation are most fitting at home and that the school is the teachers' domain. The study found that parents' expectations for the learners were high and they want the learners to pursue tertiary education. Parents also held the belief that if the learners are educated, they can improve their quality of life because they will obtain good jobs and would be able to support and care for their parents.

Based on the studies conducted by Kgosidialwa (2010) and Maimela and Monyatsi (2016), it is evident that, despite the many challenges, some parents in Botswana are making great efforts to be part of the learners' education even if it is just encouragement given, or ensuring that the learner has the right attitude and mind-set about school. The results of these and other such studies motivated me to research the involvement of parents in the learners' mathematics homework.

The Botswana studies show that positive parental involvement is benefiting the learners' progress. Given that the learners in South Africa entering Grade 4 which is a more demanding phase and many parents withdraw from helping with homework or do not even attempt to help. Parents need to be more aware of their roles and responsibilities with guidance and support from teachers. Ndebele (2018), proposes that homework is not just given to help learners to excel academically but to also encourage a positive study routine, improve academic performance, and promote positive attitudes toward school. Parents can ensure this happens but they cannot do so alone and need guidance from schools and teachers.

This study has the potential to provide parents with an opportunity to be exposed to current teaching practices and tools, such as using apparatus to teach fractions, songs for learners to practice and remember their multiplication tables, and math games that can be played at home such as hopscotch, to develop the learners' mathematical knowledge and skills. Parents can be informed about what strategies and tools to use at home to best help the learners with homework. In this way, parents may discover how to be more competent facilitators of mathematics learning and foster a positive mathematics culture at home.

1.4. PROBLEM STATEMENT

This study examined parental involvement in mathematics homework at the Grade 4 level by investigating influential factors preventing parental involvement, not just limited to mathematical understanding, and empowering parents to be able to assist the learners with their mathematics homework using relevant content and methods.

1.5 THE AIMS OF THE STUDY

1.5.1. MAIN AIM OF THE STUDY

The study seeks to investigate how a family mathematics programme (FMP) can assist parent involvement with Grade 4 learners and their mathematics homework in the Western Cape. Providing parents with information regarding the mathematics curriculum, curriculum expectations for learners, and methods and strategies that can be used to reinforce mathematics classroom teaching at home with an emphasis on whole numbers focusing on addition, subtraction, multiplication, division, and also fractions.

1.5.2. SUB-AIMS OF THE STUDY

- 1.5.2.1. To investigate how parents assist the learners with mathematics homework to reinforce the knowledge and skills taught in class.
- 1.5.2.2. To identify the challenges that parents identify when helping the learners with mathematics homework.
- 1.5.2.3. To determine what issues emerge when parents reflect on their involvement in a FMP.

1.6. RESEARCH QUESTIONS

This study sets out to address the following research question(s):

1.6.1. MAIN QUESTION

How can a family mathematics programme (FMP) assist parent involvement with Grade 4 learners and their mathematics homework in the Western Cape?

1.6.2. SUB-QUESTIONS

- 1.6.2.1. How do parents assist the learners with mathematics homework?
- 1.6.2.2. What challenges do parents identify when helping the learners with mathematics homework?
- 1.6.2.3. What issues emerge when parents reflect on their involvement in a FMP?

1.7. SUMMARY OF THE LITERATURE REVIEW AND THEORETICAL FRAMEWORK

The literature review within this study covers several facets related to parental involvement, from how parental involvement has shifted from parents just being involved in the logistics and the governance of the school to how parents have a more active and direct role in the learners' mathematics learning, homework, and education (Fu et al., 2017; Jafarov, 2015; Jay et al., 2017; Otani, 2019). It highlights the advantages and the disadvantages of homework, mathematics homework (Ashim & Sahin, 2018; Bempechat, 2019; Clarke, 2019; Lara & Saracostti, 2019; Ramdass & Zimmerman, 2011; See & Gorard, 2015) as well as the various factors (e.g. parent education, availability, the role of language in teaching and learning, socio-economic status, etc.) that could be preventing parental involvement both in South Africa and internationally (Ashim & Sahin, 2018; Caro, 2018; Dettmers, Yotyodying & Jonkmann, 2019; Feng, Xie, Gong, Gao & Cao, 2019; Jay, Rose & Simmons, 2018; Lara & Saracostti, 2019). It simultaneously magnifies the benefits parental involvement can have on learner performance in mathematics (Bempechat, 2019; Jafarov, 2015). Furthermore, it explores the effects a FMP has on parental involvement (Otani, 2019).

The theoretical framework within the current study draws on the work of Bronfenbrenner's (1994) ecological systems theory, often also referred to as the human ecology theory, which states that how humans advance and grow is often influenced by different aspects of their lives which is known as environmental systems, and Epstein et al. (2002) theory of overlapping spheres of influence proposes that learners will learn more effectively if parents, teachers, and the community collaborate to provide guidance and assistance to aid the learners' learning and growth. These theories are explained in terms of their development and are used by various researchers who explored and investigated parental involvement in both mathematics and education with a keen interest in the improvement of academic performance (Atilola 2014; Kaptich, Kiplangat & Munyua, 2019; Kgosidialwa, Moeti, & Nenty, 2016).

1.8. OVERVIEW OF METHODOLOGY

This study involves qualitative research which aims to comprehend specific societal occurrences that may include individuals, groups and their interactions, roles, and events (Creswell, 2014). Qualitative research is generally concerned with interpretation and meaning and places less emphasis on rigorous examination, or the measurement of quantities, opposed to quantitative research. The methodology of the study involves a qualitative case study design underpinned by an interpretive-constructivist approach (Rule & John, 2011; Maree, 2012; Creswell, 2014). Convenience sampling was used to recruit participants, as parents are the unit of analysis in this case study, and I had immediate access to the group

as I invited parents from the school where I am teaching to be part of the study (Cohen, Manion & Morrison, 2018).

There were four data collection methods used in the study: firstly, the participants completed a pre-workshop questionnaire; secondly, they were part of a focus group interview; thirdly, they attended a FMP where they were given insight into the mathematics curriculum, the methods teachers use to teach the content and how parents can reinforce the skills taught in class at home concerning addition, subtraction, multiplication, division, fractions and the terminologies used with mathematics. Furthermore, also curriculum expectations of the learner for each content area. Parents were also provided with various online applications that could support them with mathematics homework assistance such as interactive activities and games. Thereafter, parents had to complete reflection slips; and lastly, they had to complete a post-workshop questionnaire. Data analysis involved pattern matching to find relationships such as similarities and differences in the experiences of the parents (Yin, 2009; Sinkovics, 2018). The trustworthiness of the data was verified by its triangulation as a variety of methods for collecting data were used to strengthen the dependability of the study (Creswell, 2014; Maree, 2012).

In terms of the researcher's position, I had to be aware of my position within the context of the study and my relationship with the participants as I am a teacher at the school where the study took place. I had to show how the data will not be compromised due to the position I held at the school and how parents were not influenced by my teacher status to answer in a particular way. Ethical clearance was obtained from the Faculty Research Committee (FRC). This is to ensure that all required ethical considerations and issues were catered for in respect of the participants (parents) as well as the reputation and integrity of the university. All the information collected from the parents remained confidential. All procedures regarding data collection met all ethical standards of a research study.

1.9. SIGNIFICANCE OF THE STUDY

The findings of this study highlight how a FMP assisted parents to become more involved with Grade 4 learners and their mathematics homework. It indicated how parents can help with mathematics homework and overcome the challenges they encounter when assisting the learners. The findings could potentially be used by schools to identify the challenges that parents encounter when assisting learners with mathematics homework; and the factors that are either hindering or preventing parents from being actively involved in the learners' learning of mathematics at home. However, the needs of parents must be determined, so that the needed interventions can be put in place to provide parents with the needed knowledge and skills regarding the best practices for assisting the learners with mathematics homework.

This helps to minimize or eliminate any obstacles that prevent parents from assisting with mathematics homework including reducing the frustrations parents experience when assisting with mathematics homework. The findings of the FMP hold the potential to increase parental involvement and improve the quality thereof, helping parents foster a more mathematics-orientated atmosphere at home that could have a positive effect on the learners' attitude and progress in mathematics and school in general.

The results of this FMP can be used to be presented to schools as evidence of the effectiveness of a FMP for parents. Moreover, parents should be made aware that they can be actively involved and contribute positively to the learners' success with mathematics and how the school can assist them in this regard to be part of the learners' learning of mathematics and mathematical development. Furthermore, it suggests how schools can approach the topic of parental involvement so that it is truly of benefit to the learners, and how schools can improve and strengthen the relationship between families and schools.

1.10. SCOPE AND LIMITATIONS OF THE STUDY

The study investigated how a family mathematics programme (FMP) can assist parental involvement with Grade 4 learners and their mathematics homework so they can become more involved in helping with mathematics homework and overcome the challenges they experience when doing this task. The study covers parental involvement at a primary school in Mitchell's Plain, Cape Town, and involved parents of learners who entered Grade 4 in 2021. The study was focused on the parents' experiences and the challenges they faced when assisting with mathematics homework and what direction the FMP should follow to best equip parents to help with mathematics homework.

The study highlights how parental involvement can be used to influence the learners' overall mathematics development through the theories of Bronfenbrenner and Epstein. How these theories are interlaced to increase and improve parental involvement to contribute greater to the learners' success in mathematics through homework assistance. Although both theories apply to parental involvement in Bronfenbrenner's theory only the microsystem, mesosystem, and chronosystem were highlighted as these systems are more directly linked to parental involvement, school, and homework. Similarly, with Epstein's theory although all six types of involvement apply to the parents only parenting, communication, and learning at home were emphasised because it is directly linked to parental involvement, school, and homework.

There were some limitations involved in this study due to time constraints and the nature of a master's thesis which I will highlight in more detail in the chapters that follow. I completed this task over three years due to Covid-19 disruptions in 2020 which were unforeseen. I did not test the parents' ability to do mathematics but tried to empower them with methods and

strategies that can be used to assist the learners with mathematics homework. The study did not include the entire school's parent population nor did it include parents from other schools who had learners in Grade 4. I did not investigate the effectiveness of parental involvement on the learner's academic performance nor was I concerned with determining if parental involvement had a direct relationship with the learner's performance in mathematics. Lastly, the sample size of the study was much smaller than expected due to parent reluctance to be involved in group gatherings during the pandemic. Therefore, the anticipated 320 Grade 4 parent sample size was not achieved. Just 24 parents completed the online pre-workshop questionnaire, 5 parents took part in the focus group interview, and 7 parents with the learners took part in the FMP and those 7 parents went on to complete FMP reflection slips and the online post-workshop questionnaire. Furthermore, the duration of the FMP was over 4 Saturday mornings for one and a half hours and could have been more beneficial if it was over a longer period.

OUTLINE OF THE CHAPTERS

1.11.1. CHAPTER TWO: LITERATURE REVIEW

This chapter discusses the relevant research that has been conducted on the research topic. This chapter will also discuss the theories used to guide the research study.

1.11.2. CHAPTER THREE: METHODOLOGY

This chapter highlights the research paradigm, design, and methodology that were applied, in which the following aspects are discussed: participants and sample, data collection methods, method of data analysis, the trustworthiness of the data, the researcher's position within the study, and the ethical consideration that had to be considered.

1.11.3. CHAPTER FOUR: DATA ANALYSIS AND RESULTS

This chapter describes the findings of the study, describes the participants, and outlines the results of the data analyses.

1.11.4. CHAPTER FIVE: DISCUSSION OF THE FINDINGS, CONCLUSION, AND RECOMMENDATIONS

This chapter discusses the findings of the study, and how successful the study was in terms of addressing the problem statement and the research questions. Furthermore, this chapter concludes the study by summarising the findings of the study, providing recommendations for schools on how to possibly improve parental involvement concerning mathematics homework, and providing suggestions for future research.

CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1. INTRODUCTION

As education has developed over the last decade and in previous years, parents became an essential support system within schools. They form part of the governing body, are included in some administrative aspects of the school, and occupy influential positions in the finances and policy development of schools. Some studies revealed that parents can also be an important part of the learners' education and academic performance (Fu et al., 2017; Jay et al., 2017; Otani, 2019). Although parental involvement encompasses many crucial tasks, according to Jafarov (2015), parental involvement includes but is not limited to homework supervision, ensuring learners complete their work. It also involves helping learners when they have difficulties and developing a relationship with teachers. In addition, Jafarov (2015), explains parental involvement is important, as it may influence learners' academic success by impacting their academic self-awareness which contributes to academic progress. However, some parents may not possess the required ability to assist learners with homework or other tasks related to the curriculum.

According to Dettmers et al. (2019), parental involvement with homework is a subject of great complexity and presents two visible forms of assistance. The first form is helping with homework and providing answers (quantitative assistance). The second is setting up a homework routine, and the rules associated with homework (qualitative assistance). These types of parental involvement are also known as direct and indirect assistance. Tabaeian (2016), states although parental involvement has its advantages for learner education and academic success, it might also impact the learners' performance negatively both inside and outside of the school setting and could influence the learners' growth and progress. This is supported by the research of See and Gorard (2015), who suggested that certain activities to enhance parental involvement may do more harm than good.

Mahuro and Hungi (2016), promote parental participation in learners' schooling because it has the potential to satisfy an extensive variety of academic objectives for the learners. Time, resources, and commitment are but some of the requirements linked to parental involvement to promote the learners' academic performance. If learners want to progress in their education then learning should not be limited to the learner-teacher relationship but parents should also be included and have an active role.

Given the South African context and the poor performance levels in mathematics both in local and international assessments, parents can be a critical element to improve these results through their involvement in the learners' mathematics homework. Results in neighbouring African countries recognise the benefits of the active role of parents in reinforcing, supporting, and encouraging learners in their learning of mathematics (Maimela & Monyatsi, 2016). However, this might be difficult to achieve considering the South African context; more so in the context of the Cape Flats as there are many socio-economic factors preventing parents from being actively involved in the learners' education, especially in assisting with mathematics homework. This is why it is important to understand how parents are currently assisting the learners with homework, how regular assistance with homework could be encouraged and promoted through an after-school FMP.

I have consulted literature from the last decade and earlier, in an attempt to get a deeper insight into the research on parental involvement in education, mathematics, and homework, and the challenges that parents are faced with when assisting with mathematics homework, and homework in general. This literature review analyses the results of various research studies on different aspects of parental involvement and homework and highlights the key findings from these studies. The literature has been organised into six categories: parent involvement and homework; factors that influence parental involvement in homework; parental involvement in countries surrounding South Africa; reasons to encourage parental involvement in mathematics homework; parental involvement and family mathematics programmes; how the South African Department of Basic Education views parental involvement; and lastly the supporting theories related to parenting and parental involvement in both education and the development of learners.

2.2. PARENTAL INVOLVEMENT AND HOMEWORK

The universal practice by teachers to connect parents to schools and include them in the learners' education is by assigning homework (Bempechat, 2019). This is also supported by Clarke (2019), who stated homework is a practice that allows parents to be directly involved with the learners' education. It can be the bridge that connects the home and school and allows parents the chance to converse with both learners and teachers. This can only happen if parents are allowed to be part of the learners' education and to be actively involved in assisting with homework.

Ramdass and Zimmerman (2011), defined the function of homework as to foster a variety of aspects within learners such as responsibility, strengthen comprehension of content knowledge and promote academic achievement, whilst reviewing classroom material and

practicing skills taught in class. More so, it also provides a crucial aspect of teaching and learning which is to provide teachers with feedback on areas of concern where learners may need additional support. These mentioned claims are supported by Bempechat (2019) and Pfeiffer (2018), who stated that providing homework must be done to enhance and assist classroom teaching and learning, strengthen routine procedures and knowledge, and eventually promote a positive self-study routine at home. The use of homework can heighten the relationship between home and school by purposefully involving parents in the learners' education.

Although parental involvement is seen as an agent that contributes positively to learning, parent involvement with homework may not always be aligned with the school's desired achievement outcomes. Assistance with mathematics homework may be of an advantage to learners but intrusive assistance may be a disadvantage for the learners' achievement (Dettmers et al., 2019). Research produced by Dettmers et al. (2019) revealed a converse relationship between parental involvement with homework and learner outcomes that highlighted the more parents were involved in homework the less effective their assistance was in achieving the required outcomes. A different study conducted by Feng et al. (2019), found that parental homework involvement was notably linked to the learners' overall mathematics achievement but the significance was rather marginal. A similar discovery was made by Ashim and Sahin (2018), that when parents helped with homework there was minimal to no effect on mathematics achievement.

Notwithstanding the findings of Feng et al. (2019) and Ashim and Sahin (2018), Warren and Locklear (2021), in their study on the role of parental involvement, including their beliefs, parenting styles, and contribution to the academic success of American Indian learners, suggested that parental involvement does impact learner achievement. A similar discovery was made by Maldonado, De Witte, and Declercq (2022), who indicated that assistance from parents helped increase learners' financial literacy and improved academic achievement. However, while the influence of parental involvement on the learners' academic success was not great, it did improve their behaviour, especially with the disadvantaged learners. According to Lara and Saracostti (2019), much of the research conducted thus far concerning parental involvement in homework and education has been qualitative with a focus on explaining the relationship between families and schools and highlighting any tension that may exist between the two. Interestingly, research in South Africa has tended to follow a similar pattern.

See and Gorard (2015) evaluated various studies conducted on parental involvement in homework and concluded regrettably that no investigation has evaluated if parental involvement was improving learner achievement. Furthermore, they claim that focusing on the

relationship between home and school just shifts liability for any success not achieved to parents and teachers, instead of questioning the education system or the government that manages it.

These findings support the argument of Kohn (2007). In 2007, Kohn, an advocate siding against the practice of giving learners homework, argued that there was insufficient evidence of how beneficial assigning homework was to primary school learners and Kohn further argued that the positive effects of homework are largely mythical as the advantages of homework still need to be proven practically. He stated that what happens after the school day was as important as what happens during the school day. Vatterott (2018) add to the argument made by Kohn, stating that the pressure that comes with homework and having to complete homework tasks is stressful for learners which results in the loss of family time. Learners cannot spend time with parents, siblings, and other relatives, and are losing out on their childhood. Learners are not allowed to be children and enjoy their childhood. More so the excessive workloads have learners staying up late at night causing learners to suffer from sleep deprivation and could even result in obesity because learners do not have time to play and be active.

Learners need fresh air and unstructured playtime to be children, including family time and downtime. The power of play does not just enhance social and emotional development but also has a positive effect on academic performance (Vatterott, 2018). This statement of Vatterott (2018) brings the focus to a primary school in the Sun Valley area, Cape Town, which changed its views on homework and introduced a no-homework policy at the school in 2015. This no-homework policy was adopted from the education system used in Finland which has produced striking results (Federick, 2020; Kaushik, 2022).

Homework at the Sun Valley school was replaced with 20 minutes of reading time a day instead. The policy was introduced after it was discovered that school can be a high-stress, anxiety-based environment, and learners have no time to be innovative and creative (Pfeiffer, 2018). Learners need time to rest properly and there is no time to play if learners are overwhelmed with homework because playing drives creativity (Pfeiffer, 2018). Bempechat (2019), who is supportive of assigning homework to learners, however, agreed with the above statement, that learners must be provided with the opportunity to rest their minds.

Since the implementation of the no-homework policy at the school, academic results have improved, learner motivation has increased and a significant increase in reading was noticed (Pfeiffer, 2018). However, accepting that South Africa is more diverse and unequal in many respects, this approach may not work for all schools. Given the high socio-economic context of the Sun Valley school, this approach could impact the learners and their academic

performance positively, as the area is relatively affluent and parents are likely to have higher levels of education. Learners may also have additional educational resources at their disposal and possibly possess high levels of self-regulation.

Self-regulation, in terms of learning and school, means being able to plan effectively, avoid interruptions, have resilience with challenging tasks, overcome unwanted emotions, and to reflect on the learning that took place during the school day. Self-regulation skills and motivational beliefs correlate positively with activities that have to be completed at home (Ramdass & Zimmerman, 2011). Pfeiffer (2018), who investigated this first no-homework policy which was introduced by the above-mentioned school, found the reason for the introduction of this policy was that homework seemed to interfere heavily with the learners' after-school life and compromised responsibilities and activities such as completing chores at home, sport, and impacted family and leisure time.

The findings of Pfeiffer (2018), form part of the foundation for the arguments made by Kohn (2007) and Vatterott (2018). Despite some of the findings of Pfeiffer (2018) and Bempechat (2019), both researchers argue against the implementation of a no-homework policy and caution that eliminating homework would do learners and their families a grave disservice, especially to the learners' development during their early years. This notion is not shared by Kohn (2007) and Vatterott (2018) who both argue strongly for the reduction of homework in primary school to high school and the possible elimination of homework, especially in the early grades. Nonetheless, if a school removes homework completely, it will be abandoning an influential educational resource (Pfeiffer, 2019).

One of the benefits of homework is that it allows learning to continue beyond the normal school day. This provides learners with the opportunity to self-evaluate their comprehension of the content, reinforce practice and develop any shortcomings in their content knowledge. Homework is a critical part of the learning process, especially in the Foundation Phase, as it allows parents to instill a positive mindset with accompanying behaviours that help establish effective study skills and academic perseverance, but the quality of the parental help and input are important (Bempechat, 2019; Pfeiffer, 2019). Parents tend to participate more willingly in Foundation Phase mathematics as they may feel more competent and confident when dealing with mathematics at that level compared to an Intermediate Phase level of mathematics (Pfeiffer, 2019). Homework also provides a good opportunity for parents to support the development of the learners' knowledge and skills (Bempechat, 2019; Pfeiffer, 2019).

While the purpose and value of homework remain debatable and whether or not homework holds purpose at a primary school, studies conducted on primary school homework found that parents and learners do recognise the benefits of homework (Hoeke, 2017). Principals

interviewed in the study conducted by Ndebele (2018) shared similar beliefs about homework and while the value of homework may still be questionable, the principals who were part of this study perceive homework as an advantage for teaching and learning, a view that is shared by Pfeiffer (2018).

Although most parents deem homework as an important part of schooling and see it as a compulsory feature of academic success, not all parents are actively assisting or taking part in homework activities with the learners (Bempechat, 2019). According to Clarke (2019), research conducted on the topic of parental involvement with mathematics homework is limited while studies on homework, in general, are varied and generate mixed views on the topic.

2.3. THE FACTORS THAT INFLUENCE PARENT INVOLVEMENT IN MATHEMATICS HOMEWORK.

Parental involvement in education, homework, and parents' contribution to academic performance, especially on the subject of mathematics, has been a heated topic of debate within the field of education. The benefit of parental involvement in the learners' education over the last decade has generated mixed views amongst the education community. In various instances, it has been shown how parental involvement was successful and in other instances how it was unsuccessful. Jafarov's (2015), research highlighted several factors that influence parental involvement in homework such as economic status and parents' negative school experiences. Research conducted by Muir (2012), Ariës and Cabus, (2017), Fu et al. (2017), and Chophel and Choeda (2021) concurs with Jafarov (2015) and also indicated that various factors prevent parents from being involved in the learners' mathematics homework and education overall. These factors include but are not limited to socio-economic status, finance, family dynamic, level of education, parental availability, and methods on how to assist learners with mathematics homework.

2.3.1. PARENTAL INVOLVEMENT AND PARENT LEVEL OF EDUCATION

Parents generally want to be involved with and support learners with mathematics homework and the learning of mathematics at home regardless of the challenges they might face when assisting the learners. However, many parents' knowledge concerning the mathematics content that learners are exposed to at school is rather limited, and this influences the effectiveness of parents' involvement with mathematics homework (Henderson & Mapp, 2002; Dettmers et al., 2019). Unfamiliarity with the current mathematics curriculum and limited content knowledge means that parents may not have the necessary skills to assist and support the learners with mathematics homework and at times, do not get the necessary guidance

from teachers on how they can best assist the learners (Muir, 2012; Jafarov, 2015; Tamboto, Lengkong, Rotty & Tambingon, 2021). Jay et al. (2018), found similar results in their study and argued that when schools practice a school-centered approach to parental involvement two influential factors yielding success were present. Parents experienced authoritative inequality concerning the communication between them and the school and had a lack of confidence in their ability to assist with mathematics homework. If parents experience these challenges, Feng et al. (2019) caution that parents could end up practicing a form of controlling or intrusive support which could impact learners' motivation and academic achievement and cause more harm than good.

It is often perceived that parents with low levels of education tend to evade assisting the learners and are less involved with mathematics homework because of the above-mentioned factors than the more educated parents who tend to be more involved (Muir, 2012; Jafarov, 2015). Parents with low levels of education depend on schools to provide quality education so that the learners can have greater success at school (Harvey & Reddy, 2021). While parents with higher levels of education do assist with mathematics homework more regularly, interestingly Jafarov (2015), found these parents identified availability and time to be the main hindrance to their involvement. Notwithstanding these findings, Harvey and Reddy (2021), found that parents with tertiary education appear to have a greater impact on the learners' academic achievements which would include mathematics.

2.3.2. PARENTAL INVOLVEMENT AND PARENT-TEACHER COMMUNICATION

Parents' involvement in the learners' education might not be able to reach its full potential and bring about aimed academic success in both mathematics and education as a whole without effective communication. According to Jay et al. (2018), parental involvement in mathematics and education is influenced by two factors, one of which is communication. In another study, Dettmers et al. (2019) found that effective family-school communication is a key performance factor that helps parental involvement in homework which in return could improve the quality of parental involvement. However, this may only be achievable if two-way communication is implemented and practiced. This ensures that parents are well informed about what the learners are taught at school and have open channels of communication to provide important information to teachers concerning the learners' mathematical progress (Page, 2016). According to Pelemo (2022) communication between parents, schools, and teachers are of critical importance.

Furthermore, Al-Mahdi (2010) suggested that when developing mathematics homework activities, there should be adequate information made available to parents about the topic and

the strategies needed to assist the learners. Mutodi and Ngirande (2014) highlighted this statement made by Al-Mahdi (2010) and elaborate that parent-teacher communication, regularly informing parents of learner progress and family support could be an advantage, with the potential to have a positive effect on learners' mathematical performance.

Involvement of this nature is commonly implemented by teachers to include parents in the learners' learning of mathematics. Nonetheless, this form of communication should not only allow teachers to inform parents regarding the learners' and their learning of mathematics but should allow parents the opportunity to reply to any communication from teachers. Parents must be given the chance to ask questions if the need arises (Jay et al. 2018). Notwithstanding the findings of Jay et al. (2018), this might be easier for some parents than for others. According to Otani (2019), parents with lower levels of education may hesitate to approach teachers to ask about those topics they have no knowledge of or even how to assist the learners with mathematics homework in general because they feel that they possess limited knowledge and comprehension of what the learners learn at school.

Despite the advantages and potential that parent-teacher communication holds, a study conducted by Ashim and Sahin (2018) found few connections between parent-teacher communication when it came to mathematics and the learners' education as a whole. In a different study by Tabaeian (2016), results showed when information is communicated to parents, the language in which the information is given has a pivotal role in the process of parent-teacher interaction. Many schools share information with parents in the LOLT of the school and this may differ from the parents' home language. This could become a challenge for parents regarding the comprehension of the information being provided on what learners are taught, their progress, and how best to assist them concerning mathematics homework.

2.3.3. PARENTAL INVOLVEMENT AND PARENT SOCIO-ECONOMIC STATUS

A study conducted by Spaul (2011), found that socio-economic backgrounds influence parental involvement and learners' mathematics and reading performance. This finding is supported by Caro (2018), who found that parental financial status and education had a great influence on the standard and magnitude of the learners' learning experience at home. Ndebele (2015) agreed with Spaul (2011) and Caro (2019) that the social class of parents may have a key influence on their participation in the learners' homework. Ndebele (2015) claims that a higher income and social class of parents could increase their chances to be involved with mathematics homework or homework in general, in comparison with those parents from an underprivileged background who are more likely to participate less in homework activities related to mathematics.

Parents from underprivileged backgrounds could be less involved because they earn less and have to work more to earn money to satisfy the basic needs of their families. They may also have fewer financial resources available to provide educational support such as computers, tutoring, and other academic enrichment activities (Bempechat, 2019). Furthermore, O'Sullivan, Chen, and Fish (2014), proposed that limited financial resources may impact economically underprivileged learners negatively. According to Spinelli, Fasolo, Lionetti, and Setti (2021), parents burdened by their responsibilities which include providing an income for the household find it difficult to provide effective and adequate assistance to learners and this can affect the learners' mathematical and overall educational development. While low-income parents may not always be able to assist with homework, for different reasons, these parents perceive homework as a crucial connection between home and school (Bempechat, 2019).

Despite the evidence with regard to whether or not low-income parents are involved in the learners' mathematics homework or education as a whole. Caro (2018), found that several underprivileged learners displayed a high level of determination and dedication toward their reading and mathematics in her study.

2.3.4. PARENTAL INVOLVEMENT AND PARENT AVAILABILITY

According to Mahuro and Hungi (2016), time, availability, resources, and effort impact parental involvement, especially if parents want improvement in the learners' mathematical performance and education. O'Sullivan et al. (2014), indicated that parents from low-income homes frequently had to work long hours and in certain circumstances have multiple jobs to earn money for their families. Due to parents having multiple jobs and working long hours, reduces parent availability to spend time assisting and supporting the learners with homework. This can adversely impact the learners' mathematics performance and educational success. Tamboto et al. (2021) agreed with the statement made by O'Sullivan et al. (2014) that time and availability are crucial parts of parental involvement. Nonetheless, one would presume that parents from a greater social status would be more participative regarding the learners' education and are more likely to assist the learners with homework and more specifically mathematics homework, but this might not always be the case. Jafarov (2015) found that when it comes to parents with tertiary education, time is the main reason for that lack of involvement with the learners' homework and education. This could be because parents with tertiary education have more time-intensive and time-consuming careers and lives which prevent them from being involved in the learners' education and assisting with mathematics homework. Caro (2018) found that irrespective of the socio-economic status of parents, the possibility of parents providing support with mathematics homework or just homework, in general, is constrained by their socio-economic status.

2.3.5. PARENTAL INVOLVEMENT AND FAMILY DYNAMICS

Additionally, family structure has also been highlighted as an issue for parental involvement and learner academic achievement in both mathematics and education overall. O'Sullivan et al. (2014) proposed that family dynamics (single-parent status, etc.) may impact economically underprivileged learners and families negatively as they may face more difficulties that place additional stress on the family, especially single-parent families. These parents frequently have to work long hours and have multiple jobs to receive an income so that they can provide for their family's daily requirements which results in parents being away from home most of the time. Learners from single-parent households may require more parental supervision than learners from married families but this may not always be possible, which can result in underperformance academically (Davids & Roman, 2013). Furthermore, Tamboto et al. (2021) found that more mothers show a greater interest in the learners' education and tend to be involved in the learners' homework and the learning of mathematics at home. This could be an added problem if the mother is the sole breadwinner.

Bray, Makusha, and Ward (2015), claimed that family structure could be effective if families can provide the learner with adequate care and support. For instance, learners from single-parent homes may display poorer attitudes and behaviour toward school and education because their parents are probably overwhelmed by poor living conditions and poverty. Furthermore, they could also be overwhelmed with the demand on them to fulfill their duties as parents concerning educational support which can have marked influences on whether families can care adequately for the learners or not. The seriousness of this factor is emphasised by Lara and Saracostti (2019), who conducted a study in Chile on the importance of collaboration between parents and schools. This resulted in the adoption of a national policy that focused on parental involvement in the learners' education. The policy recognises that parents have a role in the learners' education and can influence their academic success, but they need support from schools through activities that promote parental involvement and interventions where parents are upskilled to support learners confidently and adequately.

2.3.6. PARENTAL INVOLVEMENT AND THE ROLE OF LANGUAGE IN EDUCATION

As mentioned previously, communication is of important significance in terms of parental involvement and involvement with mathematics and education. If communication is considered an important factor of parental involvement, then surely language has to be also. Moschkovich (2012) highlighted that language may have different uses and definitions when used at school, at home, in workbooks, and during examinations. She focused her research on learners who were learning mathematics in English (not their mother tongue) and provided several suggestions to combat the obstacles associated with mathematics when teaching

learners in English. Some of these include recognising and supporting learners to engage with the intricacy attached to language in the mathematics classroom and using basic ordinary language and experiences as tools that could advance mathematics teaching (Moschkovich, 2012). These suggestions were provided to enhance mathematics learning through language with a keen focus on those learners being taught mathematics in English.

Vukovic and Lesaux (2013), examined how language ability relates to mathematical development and found that learners from minority backgrounds, especially those in high-poverty urban settings, tend to struggle with mathematics suggesting that language proficiency contributes to mathematical development. They found that language proficiency serves as a barrier to mathematical performance for these learners because the task requirements were not understood. This lack of understanding could be worsened if parents do not help the learners to make sense of the homework task requirements due to the differences between the LOLT and the home language.

As mentioned, the LOLT of the school might not be the home language of the learner or the parents, or in certain cases, it might be the home language of the learner but not the parents. When assistance needs to be provided the lack of parental knowledge of the terminologies used within the current mathematics curriculum and mathematics homework activities can pose a challenge to parents when they want to assist with mathematics homework. This idea is shared by the South African Department of Basic Education (2010), which states that the LOLT in schools became particularly important, especially where learners do not speak the language of instruction then authentic teaching and learning cannot take place. This may be a factor in the current study where some parents may not have had English as their LOLT when they were at school which could be a challenge when having to comprehend the requirements of the homework task.

2.4. PARENTAL INVOLVEMENT IN COUNTRIES SURROUNDING SOUTH AFRICA.

An analysis of the SACMEQ and TIMSS tests for South Africa and Botswana by Sandefur (2016), found that Botswana learners outperformed South African learners in both of the tests. Botswana was not the only country involved in the testing and results from Kenya, Mozambique, Swaziland, and Tanzania showed that all these countries scored higher than South Africa in the SACMEQ assessment of 2000. This is worrying, given that all these countries are similar to South Africa in context.

Various studies on parental involvement and learners' achievement have been conducted in Mozambique, Tanzania, Swaziland, and Kenya. Lauchande (2017), found in Mozambique that factors such as poverty, economic status, the language of instruction, home environment,

quality of assistance at home by parents, parents' level of education, and even changes in the curriculum can affect learner performance in mathematics and impact parental involvement. The same pattern of factors emerges in Tanzania where parents' income, level of education, and parents' socio-economic status all influenced parents' involvement and learner performance in mathematics (Kapinga, 2014; Mauka, 2015).

Another study conducted in Swaziland by Mabuza, Okeke, and Thwala (2014) highlighted an issue that is not uncommon in South Africa. They examined how learners who are raised by single parents develop cognitively, socially, and emotionally. Findings revealed that single parenting can have negative effects on the psychosocial development of learners. Parents and learners from single-parenting households may communicate less about their needs than learners in traditional two-parent families which can impact their involvement in homework. The same parents are often concerned with the stress and tension of their own lives, especially parents who are struggling to deal with their own financial and social problems. This study found that most of the learners lived with their grandparents or other relatives and learners from such households were likely to have academic problems. The lack of parental involvement due to these circumstances will also contribute to poor learner performance academically which includes mathematics.

2.5. REASONS TO ENCOURAGE PARENTAL INVOLVEMENT IN HOMEWORK

Many parents do not realise that they are the safety nets for the learners and an under-utilised resource with the potential to influence the learners' education greatly (Modisaotsile, 2012). Jafarov (2015), concurs and suggests that parental involvement plays an important role in learners' education, and the advantages for learners are numerous. When parents are involved in the learner's education it helps provide a sense of ownership over the learners' educational progress. Parents experience a sense of satisfaction when they can assist and support with mathematics homework and view it as a positive aspect of parenting rather than an obligation to the learner (Bempechat, 2019). Maltese, Tai, and Fan (2012), found that there was a positive relationship between homework, time spent on homework, and examination results. Homework creates an opportunity for parents to provide a supportive environment at home, encourage learning, and discuss problems in the subject. Parents can monitor the learners' activities, help improve their study habits and build a positive disposition while advising them (Abah, Age & Okoronkwo, 2018).

While parental involvement in homework can be beneficial for learners, Dettmers et al. (2019), explain that parental involvement is a multidimensional construct including two distinct types of involvement, indirect and direct involvement. Indirect parental involvement includes the

family expectations concerning the learner's mathematical attainment, the parents' attitudes towards mathematics, the broader family encouragement and support for the learner through a variety of materials (for example, books or educational software) or immaterial means (for example, guidance about mathematically related or affected professional prospects). Direct parental involvement refers to the immediate parent-learner interactions that include their interaction with mathematics homework, as well as a variety of mathematically related activities.

Irrespective of the type of involvement being provided to the learner it must be remembered that the quality rather than the quantity of parental involvement in homework is crucial to learner progress. Parent support can assist the learners' academic performance (including mathematics performance) but having a parent who is controlling or intrusive can impair motivation and academic achievement (Feng et al., 2019). Learners who see their parents as supportive of them were found to have a more positive attitude toward mathematics. These findings suggest that the higher the level of parental involvement the more favourable the learners' attitudes toward mathematics and the greater the achievement but then the assistance being provided must be supportive and not controlling (Kgosidialwa et al., 2016).

Interestingly, the study of Cunha, Nunez, Rosario, and Xu (2018), found no relationship between PHMS (Parent Home Management Scale), the parent's ability to provide quality direct or indirect support at home, and the amount of homework completed. The reason for this could be that learners have a gap in their content knowledge and parents have insufficient knowledge and methods to provide direct assistance. Some parents do help the learners with mathematics homework but can place unnecessary pressure on the learners and can cause confusion by presenting them with different methods of learning (Hoeke, 2017).

2.6. PARENTAL INVOLVEMENT AND FAMILY MATHEMATICS PROGRAMMES

FMPs are not unfamiliar nor is it a new practice within the mathematics education community in South Africa. There have been different family programmes designed across the country, to help parents in disadvantaged areas to assist learners in learning mathematics. A FMP is a programme designed to reach out to families to inform them about subject content, current teaching methods, and issues in mathematics education. It helps to show parents how important their role is in supporting the learners' learning of mathematics. According to Brown, Bradbury, Burke, Graves, and Triest (2022), schools need to design homework activities and intervention programmes that allow parents to be more fully engaged in the learning of mathematics at home and in education. Strande (2022), concurs and suggests that schools need to implement parent initiatives to support parents to improve parental involvement and the quality thereof. School outreach is a practice in which schools engage with parents for the

benefit of learners' education, for example, by informing parents about the learners' progress, behaviour, school activities, meetings, and parent conferences, as well as providing workshops for parents (Otani, 2019). A FMP can be part of a school outreach plan.

The following section provides an overview of some of the FMPs and materials made available to parents in South Africa over the past number of years. Firstly, there was the Family Maths and the Family Science programme at Nelson Mandela University (Science Mathematics and Technology Unit, 2008) and adapted from the Equals programme in America. Piloted in 2008, the programme provided support for the *transformative education practices* targeted by the South African National Department of Education. This support extended to the community by offering creative education practices reaching teachers, parents, learners, and community members.

The Family Maths and Family Science programmes aimed to bring interested parents and those not involved to be part of the school community and the educational lives of the learners. The programme provided a series of structured materials and parent workshops to promote mathematics learning in learners from the early grades until Grade 9. The programme offered various activities and games for young learners using hands-on material that can often be found at home. It focused on different mathematics concepts such as counting, sorting, logic, classifying, arithmetic, and problem-solving skills. It aimed to get parents more involved by providing them with the needed skills to assist the learners better at home and to help families develop a positive attitude towards mathematics. Positive feedback was received from parents, that they felt more equipped to assist the learners at home but no research was conducted on the effectiveness of the programme regarding learner performance in the subject.

The second FMP was organized by the South African Numeracy Chair Project (SANCP, 2011) in association with Rhodes University which is described as a 'hub of mathematical activity, passion, and innovation that blends teacher and learner numeracy development with research in mathematics education in rural schools in the Eastern Cape'. One of the aims of the SANCP is to promote mathematics development and provide resources for families to use at home. Some of the findings of the SANCP projects revealed that as parents participated in the FMP, they started to feel more certain, competent, and confident in their abilities to assist and support the learners with mathematics homework. The third project is the Moms Maths website, founded by Louis Wells and author of the Moms Maths Manual (Wells, 2011). This site provides online resources for parents to assist learners with mathematics at home for various grades. Wells designed the manual to provide appropriate tools to both learners and their parents to enhance their understanding of mathematics (Mohala, 2011).

These different kinds of support programmes help build a positive relationship between parents and learners around mathematics and homework. They help to increase parental participation and involvement and provide the much-needed tools for parents to overcome their insecurities about mathematics homework. They have the potential to build and restore parents' confidence and make it possible for parents to reinforce the needed skills learners are taught in class. These support programmes can also help to improve both the attitudes of parents and learners towards the subject of mathematics.

2.7. SOUTH AFRICAN DEPARTMENT OF BASIC EDUCATION'S PERCEPTION OF PARENTAL INVOLVEMENT IN EDUCATION

In 2016, the South African Department of Basic Education (DBE) and the National Education Collaboration Trust (NECT) developed a booklet that covers various aspects of parental involvement and how parents can contribute meaningfully to the learners' success at school. According to the DBE and NECT (2016), both parents and teachers need to be involved in the learners' education. If parents are actively involved in the learner's education, learning at school can be optimised regardless of the level of education, socio-economic status, or ethnicity. By showing interest in the learners' education, parents can help learners to see education as a priority but they need the support and supervision of parents.

If parents are unable to provide support to the learners, it is the responsibility of the parents to find the support the learners need from relatives, neighbours, or other community members (NECT, 2016). Parents must have a structure and routine that allow learners to internalise constructive habits. This includes having a set time and space to do homework. Parents have to make sure that the learners do the homework and also check if the work is completed and done correctly. Learners must know that homework time is a serious matter. Homework is emphasised by DBE and the NECT (2016) as one way of encouraging learners to study and work independently; however, parents should avoid negative comments and recognise good performance as learners need encouragement from those whose opinions they value most, their parents.

The NECT (2016), advises that parents should meet regularly with teachers during terms as well as outside of the planned dates. These meetings are important because it is at these meetings where parents find out about how the learners are performing academically and whether they are doing their homework. Parents have to communicate directly with the school to get first-hand information about what is expected from the parents as well as what parents can expect from the school. However, parents must be aware that teachers are at school to

teach learners and not to replace parents. Learners are still the parents' responsibility even when they go to school (NECT, 2016).

2.8. SUMMARY OF LITERATURE REVIEW

The effectiveness and relevance of homework will always be questioned however, homework does have its benefits and it is one of the most common ways to get parents involved with education and the learners' academics. Parental involvement is hindered by several factors such as parents' level of education, socio-economic status, time and availability, language, etc. These factors prevent parents from being more actively involved with mathematics homework therefore, the learners do not receive the benefits of homework and the positive effects of quality parental involvement. To improve parental involvement and the quality thereof, interventions or projects like the NICLE or the SANCP, FMPs where parents are shown what they need to do and how to do it so that not all the parents' time is exhausted. Parents are the safety nets for the learners at home and their involvement can have a great influence on the learners' motivation, beliefs, and attitudes concerning mathematics and school.

2.9. THEORETICAL FRAMEWORK

The theoretical framework is the structure that can hold or support a theory of a research study. Within the current study, two theories, Bronfenbrenner's ecological systems theory and Epstein's theory of overlapping spheres of influence were used to guide the research in terms of parental involvement and mathematics homework.

Bronfenbrenner's Ecological Systems Theory

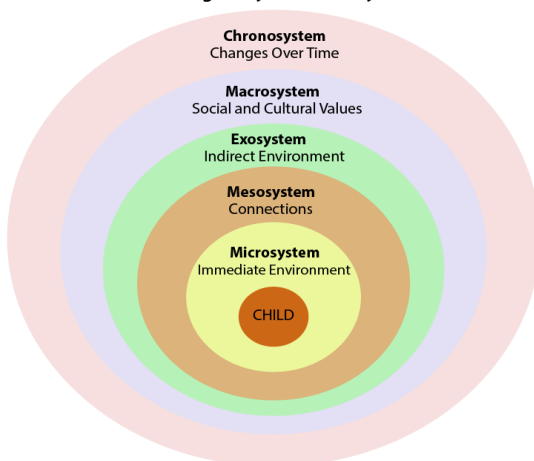


Figure 2.1. Bronfenbrenner's human ecology systems theory

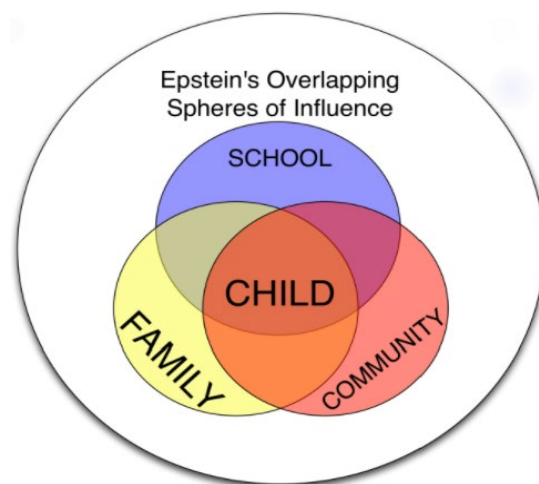


Figure 2.2. Epstein's theory of overlapping spheres

Many different theories can explain and contribute to how learners grow and develop but their growth and development are influenced by their environment. According to Bronfenbrenner's

(1994) ecological systems theory, usually referred to as the Human Ecology theory, diverse environmental systems have an impact on human development. These systems include the microsystem (learner's immediate environment such as family, neighbourhood, and peer group), the mesosystem (the connection between immediate environments such as home and school), the exosystem (wider social systems that impact indirectly such as the parental workplace), the macrosystem (wider cultural contexts such as government and economy) and the chronosystem (time and environments: patterns of events and changes in the learner's life) (MacBlain, 2018).

As the learners encounter these different environmental systems, it can influence the learners' development and behaviour in different ways. This theory helps us to understand how the different environmental systems can impact the learner's development and highlights the important connection between the learner, the family, and the school. Epstein (1987, 1996; Epstein et al. 1992) expanded the work of Bronfenbrenner further in her theory of overlapping spheres of influence which suggests that learners learn more effectively when parents, teachers, and others in the community collaborate to promote and support learning and development. This theory places focus on the parents, their contribution to the learners' development, and the influential power they have over the learners to develop healthily (Allen, Davis, Kennedy, McGinty, Ray & Terry, 2015). The stronger the relationship between home and school, the more the spheres will overlap and in return affect the learners involved. This theory emphasises the shared responsibility between home and school where they share common educational goals for the learner (Epstein, 1996; Lemmer & Van Wyk, 2009).

When parents are interested and involved in the learners' education and schooling, they create a greater overlapping in the family and school spheres. Epstein (1996) states that for this overlapping to occur there must be interaction. She identifies two levels of interaction in the form of communication. Firstly, *standard organization communication*, which takes place between families and schools, and secondly, *individual communication*, which takes place between parents and teachers. *Individual communication* tends stronger toward the two-way communication that must exist between the teachers and parents and the parents and teachers. This involves sharing information related to mathematics homework and the challenges that may occur during the homework activities.

Epstein and Salinas (2004) developed a framework that identifies six types of family involvement: parenting, communicating, volunteering, learning at home, making decisions, and collaborating with the community. The types of parental involvement are described as follows:

- Parenting: Support parents by training them in parenting techniques, supporting them with guidance, comprehending learners' development, and helping them create a setting at home that facilitates learning for learners of various ages and grade levels. Supporting schools make great efforts in trying to understand the backgrounds, beliefs, and expectations of families for the learner.
- Communicating: Notifying families about educational interventions and learning outcomes provide pathways for two-way communication between the home and the school.
- Volunteering: Enhance volunteer recruiting, training, scheduling, and events to include families as audiences and volunteers at the school or other venues. Give teachers the chance to collaborate with volunteers who help the school and the learners.
- Learning at home: Engages families with the learners in academic learning at home, such as homework, goal-setting, and other activities about the curriculum. Encourage teachers to create homework assignments that let learners collaborate on and discuss engaging projects with their parents.
- Making decisions: Utilizing school governing bodies, quality management, committees, and parent organisations, involve families in decision-making, school governance, and advocacy efforts.
- Collaboration with the community: Work with community organisations, such as businesses, agencies, cultural and civic organisations, and colleges or universities, to coordinate resources and services for families, learners, and schools. Allow everyone to serve the community.

While all six types of involvement in the framework are relevant, the focus was placed only on three out of the six types, namely parenting, communication, and learning at home, as these aspects relate more directly to parental involvement in mathematics homework.

Both theories informed the design of the study as they help to explain how parents are an important part of the environmental systems of developing learners and need to be provided with the opportunity to be more involved in the learners' education (Epstein et al, 2002). The theory of Epstein is embedded within the theory of Bronfenbrenner. If the six types of parental involvement (Epstein & Salinas, 2004) as stated above, are practiced and promoted as part of the school ethos then parents can shift from being spectators of the learners' mathematical learning to active participants and facilitators of their learning of mathematics within the home setting. This active involvement can, therefore, contribute to their mathematics development as they progress through the grades. Strengthening the relationships presented within Epstein's theory of overlapping spheres, resulting in a greater overlap of the spheres. The

increasing overlaps of the spheres can cause a dispersion that can carry over into Bronfenbrenner's (1994) different systems of human development as mentioned above. With stronger and improved developmental systems it is hoped that the learners' mathematical development will have a positive impact on the learners' mathematical performance and success within the subject.

It is for these reasons these theories were most suitable for the study as parents within the current study were unable to assist adequately and by not interacting with the teachers, resulted in the spheres drifting further apart. This causes the relationships that are supposed to be supporting and enhancing the learners' different systems of development to be weakened. This limits the learners' mathematical development which then affects the learners' mathematical performance and success in the subject. The theories have been used and applied by various researchers over the last decade. Researchers such as Atilola (2014); Kaptich et al., (2019); Kgosidialwa et al. (2016); Krishnan (2010); Muir (2012); Mutodi & Ngirande (2014); Ndebele (2015); Otani (2019); Page (2016); and Wright (2009) all applied the theories to their studies. The theories were either used individually or combined, depending on the nature of the research.

Ndebele (2015) refers to both Bronfenbrenner's and Epstein's theories in his study that looked at socio-economic factors influencing parental involvement in homework at the Foundation Phase level in eight Johannesburg public primary schools. He uses the theories to classify parents, with the view of analysing the relationship between the different types of parental involvement in homework and how it affects the learners' development and achievement at school. He found that the socio-economic status of parents has a major influence on their participation in the learners' homework and suggests that socio-economic status does affect parental involvement. Previously, Pleck (2007) used Bronfenbrenner's ecological systems theory to investigate how father involvement in homework benefits learners and the dynamics of fathers' specific influence as parents because fathers' personalities are different from mothers. The results indicate that learners' proximal process interactions with fathers are different from mothers in ways that are potentially important for development.

According to Pleck (2007), Bronfenbrenner's concept of the proximal process provides a potential underpinning to conceptualisations about "unique" kinds of parental influence more often provided by fathers. Kaptich et al. (2019) used Epstein's spheres of influence theory and the six types of parental involvement as the basis for their study to illustrate how communication between parents and teachers influences learners' academic performance in public primary schools in Kenya. The findings showed that parent-teacher communication is

a positive predictor of learners' academic performance in primary schools and such communication should be enhanced if it improves the academic performance of learners.

Both theories have transformed over time to accommodate different aspects of childrens' development. In the case of Bronfenbrenner there were initially four layers and the chronosystem was added later. The theory was also renamed the bio-ecology theory to indicate that the developing person's biology also influences the person's development (Page, 2016). Similarly to Epstein's theory, in the early versions of the theory only the school and the family were considered but over time she introduced the third sphere: community (Epstein et al., 1992; Epstein et al., 2002). These theories have significant relevance to the current study, as Epstein's theory will be used to investigate how parents' involvement in the learners' education can be improved and overcome the factors that hinder or prevent their involvement. Bronfenbrenner's theory will be used to highlight the relationships and interactions needed between the families and schools that benefit the learners' mathematics development and growth to optimise the learners' mathematical ability and achieve success within the subject.

2.10. CONCLUSION

The role of parents in education has taken a drastic shift over the last decade and research conducted by Pfeiffer (2019); Harvey & Reddy (2021); and Maldonado et al. (2022) highlighted that parents hold an important position within the learners' learning of mathematics and education. The effects of limited or a lack of parent involvement in the learners' education are well documented, and the benefits of parents' involvement in the learners' learning of mathematics and performance in the subject are evident within the literature. Various factors that influence parental involvement and prevent parents from being actively involved in homework are highlighted. Parents, especially those from the middle to lower class, appear to have more challenges to attend to, than their more affluent counterparts. There were further discussions regarding the challenges experienced with parental involvement in other African countries which are similar to those experienced by parents in South Africa. Furthermore, the role of a FMP in assisting parents and the success of past FMPs on parental involvement included but was not limited to restoring parent confidence with assisting with mathematics homework and how to provide better quality assistance.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1. INTRODUCTION

The study's design, methodology, and research approach functioned as its guide. These elements function as the study's compass, influencing the problem statement and research questions. They informed the procedures I needed to follow to determine how parents assist the learners with mathematics homework, the challenges they face when helping with mathematics homework, and the issues that emerge when parents reflect on their involvement in a FMP. An overview of the methodology and design relevant to this investigation will be introduced in this chapter. This is followed by the methodology section which provides details of how the sample was selected, the type of sampling that was used, and how data was collected, analysed, and coded. The chapter's concluding three sections evaluate the credibility of the study's methodology, my contribution to the study as a researcher, and the ethical concerns that were considered during the research process.

3.2. THE RESEARCH APPROACH (PARADIGM)

Three types of research methodologies can be used to investigate a problem: qualitative, quantitative, and mixed methods (Kruger, Huysamen, Mitchell & Welman, 2005; Maree, 2012). Qualitative research is fundamentally a descriptive form of research (Kruger et al., 2005). In contrast to quantitative research, which objectively examines and measures variables in terms of number, amount, intensity, or frequency. Mixed methods research, on the other hand, is a research type that encompasses collecting, analysing, and interpreting quantitative and qualitative data in a single study that investigates the same underlying problem (Kruger et al., 2005). I did not measure parents' involvement in homework nor was I testing their mathematical ability and content knowledge to be able to assist with mathematical problems. For this reason, the study was best orientated towards a qualitative approach rather than a quantitative approach or mixed methods approach as this approach is influenced by quantitative means to a certain degree. (Kruger et al., 2005; Maree, 2012).

Multiple paradigms can be used in a research study such as positivism, critical theory, realism, and interpretivism. Positivism is associated with quantitative research. Critical theory emphasis social, political, cultural, economic, ethnic, and gender values. This paradigm type is often a long-term study process relating to the scientific description of people and cultures with their customs, habits, and mutual differences. As opposed to realism where there is a belief that objective reality is independent of an individual's perception of reality. Interpretivism

(also known as constructivism or naturalism) holds a belief system that highlights only one specific context (Yong, Husin & Kamarudin, 2021).

The qualitative approach to research focuses on interpretation and meaning, therefore, places its focus on the subjectivity of the study. According to interpretivism, the social world can be interpreted in a subjective manner (Creswell, 2014). The greatest attention here is given to understanding the ways through which people experience the social world. Due to this statement, interpretivism is often combined with constructivism. Constructivism states that people build on their experiences of the world through social interaction and reflect upon those experiences to construct new knowledge. They create their reality therefore there are multiple realities and incorporate new information into their pre-existing knowledge. (Yong, Husin & Kamarudin, 2021). Interpretivism also recognises that reality consists of “multiple realities” that people have in their minds because of their interaction with the world around them and their experiences. Thus, reality is socially constructed and, therefore, there are multiple realities (Creswell, 2014). An experience that was constructed by the person’s interaction with the world. It is due to this conjunction in paradigms that interpretivism and constructivism are often combined.

I chose the qualitative interpretivist–constructivism approach because I could not use a positivistic approach as my research is not quantitative nor was I interested in the social, political, cultural, economic, ethnic, and gender values of the parents that are often highlighted by critical theory. Realism too was not going to suffice as I wanted a deeper understanding concerning the parents’ perception of their assistance and their experiences when they do assist the learners with mathematics homework. To do this I cannot treat the parents’ reality independently from their perceptions of reality which is associated with realism. I wanted to understand parental involvement through the understanding and experiences of the parents and how various aspects of school (how mathematics is taught in the current systems referencing the methods learners are taught in class and the mathematics problems learners should be able to solve) influences their involvement and interpreting the experiences of the parents within the context of the study.

While interpretivist – constructivism holds the potential for bias and can often be too idealistic, it allowed me to have a greater understanding of the parents’ experiences when dealing with mathematics homework, and how they constructed their realities because of those experiences. This allowed me to interpret and construct my perceptions of parental involvement through the experiences of the parents regarding mathematics homework. All of this was accomplished by socially engaging with the parents to better comprehend their

experiences both successes and difficulties they confronted due to their involvement with mathematics homework.

3.3. RESEARCH DESIGN (METHOD)

There are different research methods that I could have used within this qualitative study such as narrative, phenomenology, ground theory, ethnography, or case study research method. Given the study's nature, I used qualitative case study methods within an interpretive-constructivist paradigm. A case study was chosen although the narrative approach is similar to a case study, however, the study was not focused on the entire life experiences of the parents but just their involvement with mathematics homework at the Grade 4 level (Creswell, 2014; Yin, 2009).

Neither was I interested in an idea or concept that holds a common meaning among the parents concerning their lived experiences of a particular phenomenon, such as grief or sadness which is often associated with phenomenology. Similarly, was I also not interested in seeking to generate or discover a theory to explain social processes experienced by the parents which are emphasised by the ground theory form of research. Furthermore, the focus of the study was not on an entire culture-sharing group. Where shared and learned patterns of values, behaviours, beliefs, and language of the group are favoured and where I am immersed in the day-to-day lives of the parents (Creswell, 2014; Yin, 2009).

I wanted to delve extensively into a particular programme, event, activity, process, or one or more specific individuals (Rule & John, 2011; Maree, 2012; Creswell, 2014). This implies that the investigation was focused on a specific instance with a distinct selection rather than the general experiences. This was relevant for me because I was not focusing on parental involvement of the entire school but rather a group of parents of learners in Grade 4 (unit of analysis) to understand why parental involvement in homework appears to decline when learners enter the Intermediate Phase. Additionally, it allowed me to magnify the views and experiences of a particular group of parents, and to develop a tangible understanding of what they perceive about parental participation and the circumstances they are in. Thus, the case study research was most suitable for the study because I was focused on a particular group of parents and only their experiences and views about their involvement with mathematics homework in a certain grade. In the case of this study parents who have learners in Grade 4.

Creswell (2014) states that qualitative research takes place in real-world environments where human behaviour and events occur and describe a real-world context as the setting where participants encounter the problem or subject being studied. However, this study was not carried out in the participants' natural settings (home) but in a setting selected by me. I did not go to the parents' homes; they came to the school to participate in the focus group interview and the FMP. This was to encourage dialogue among parents about their experiences and to respond and speak freely without feeling they were being judged for the responses or the perceptions they held. It allowed me to understand the parents' experiences and their perspectives on the topic of the investigation through continual dialogue. It also allowed me to generate meaning and construct my interpretation of their situations. Furthermore, it also allowed me the flexibility to shift attention to whichever behaviour seemed most relevant to the topic being discussed (Graziano & Raulin, 2004).

As this qualitative case study was underpinned by interpretive ideals, the data collection methods needed to provide an opportunity for rich descriptions and detailed explanations of parental involvement in mathematics homework, including their actions and interpretations during this process (Cohen et al., 2018). The case study aimed to obtain a greater understanding of parents' experiences when being involved with mathematics homework, the views they held about parental involvement, and the factors that could have shaped or contributed to their view of parental involvement (Lune & Berg, 2017).

I wanted to understand how involved the parents are in helping the learners with mathematics homework and what parents needed to increase their involvement. Parents within the current study were not tested on their knowledge of mathematics but rather on how they helped the learners with mathematics homework to reinforce concepts taught in class and deepen the learners' understanding of the content taught at school.

3.4. METHODOLOGY

3.4.1. SITE SELECTION

The study took place at the school where I currently teach, as there was a perceived need for parents to be more involved in helping the learners with mathematics homework. This need was identified following an informal discussion with the Grade 4 teachers about the poor learner mathematics results in the provincial systemic mathematics tests. It was noticed that learners' performance in mathematics decreases when they enter the Intermediate Phase from Grade 3 which might be due to the lack of involvement by parents at this phase level. The school is a public quintile 4 government school which means that parents pay school fees and the school can sustain itself, although some parents do request an exemption from paying school fees. It is a co-ed school situated in Mitchell's Plain (Cape Town) and has been part of

the community since 1977. There are approximately 1200 learners who attend the school and come from lower to middle socio-economic households.

The school is well-resourced with smart boards and projectors in some classrooms and a functional computer laboratory with internet and Wi-Fi in most parts of the school. Classrooms, however, are too small for the number of learners and the building itself has a traditional design of a double-story structure. The physical appearance of the school is favourable and well maintained by the staff of the school. The school has a good academic reputation and is known for its competent teachers, good discipline, and consistent performance in academics and sports.

However, there is a challenge at the school with learners' mathematical proficiency deteriorating as they transition from Grade 3 to Grade 4, and with parents' involvement in homework decreasing during this transition as noted by teachers during informal discussions. This provoked curiosity and concern about why this occurs and what could be done to increase parental involvement in mathematics homework.

3.4.2. PARTICIPANT SELECTION STRATEGY

The total parent population of the school is quite large and given the nature of my study, my focus had to be narrowed down. I selected a sample of parents since I was unable to include all of the parents for each grade to be participants in the study. The sample consisted of parents of learners who were in Grade 4. The parents would represent the original population group.

According to Kruger et al. (2005) and Maree (2012), in research, there are primarily two categories of selection strategies, non-probability sampling and sampling with probability. In quantitative research, probability sampling is frequently utilised, but non-probability sampling is employed in qualitative research. There are different types of non-probability sampling such as convenience sampling, quota sampling, opportunistic sampling, and purposeful sampling. Purposive sampling is frequently and extensively utilised in qualitative research.

Due to the study focusing on Grade 4 parental involvement in mathematics homework at my school, I decided to use convenience sampling to recruit parents, the unit of analysis for this case study, as I had easy access to the group (Cohen et al., 2018). Convenience sampling is often referred to as haphazard sampling. As it entails selecting the cases that are the simplest to acquire and include in the sample. Although this technique of sampling is widely used it may be perceived as biased due to the fact the cases obtained from the sample were easy to gain (Kruger et al, 2005). I invited all Grade 4 parents of the school where I am currently teaching to be part of the study instead of opting for Grade 4 parents from a different school

as I had full access to these parents and it made acquiring the sample of parents much easier. There is no specific manner in how the participants were acquired, meaning there was no specific criteria or pattern to how parents were selected to be part of the study but all Grade 4 classes' parents could complete the pre-work questionnaires that were made available to them and be part of the focus group interview and the FMP.

3.4.3. THE DEMOGRAPHIC OF THE PARTICIPANTS WHO TOOK PART IN THE DATA COLLECTION PROCESS.

Of the approximately 320 parents of the learners in Grade 4 who were invited to be part of the research study, 24 parents completed the online pre-workshop questionnaire. Although parents were given the option to fill in a hard copy of the questionnaire there were no requests made for a hard copy. Of the 24 parents who voluntarily completed the questionnaire, 86% were female and 14% were male. While the majority of the participants indicated they would make themselves available to be part of the interview process, only 5 parents (3 mothers and 2 fathers) volunteered to be part of the focus group interview.

17. Would you avail yourself to be part of a focus group interview, to discuss parental involvement with mathematics homework in greater detail, based on the questionnaire responses?

23 responses

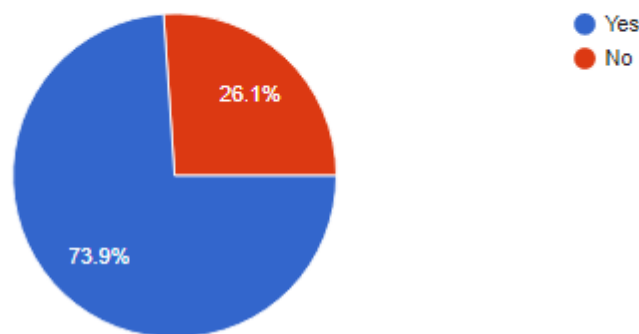


Figure 3.1. Parental availability for the focus group interviews

The parents who formed part of the interview process were between the ages of 30 and 45, three were married and two were single. I was hoping for more parent participation in responding to the questionnaire and for being part of the focus group interview, but the Covid-19 pandemic happened while I was collecting my data. Parents may have felt anxious about being in a group with other parents knowing that there were many health risks they could expose themselves to despite all the COVID-19 protocols being adhered to as per government regulations and as requested by the management of the school.

In summary, during the data collection process, a total of 24 parents completed pre-workshop online questionnaires, 5 of the 24 parents volunteered to be part of the focus group interview process, 7 of the 24 parents along with the learners (their children) took part in the FMP but only the parents completed reflection slips, and 7 parents completed the post-workshop online questionnaire. I could not confirm if the 24 parents who completed the online pre-workshop questionnaires were from the same households as this information was not asked for during the data collection process in the pre-workshop questionnaires. However, it was confirmed during the interview process that the 5 parents who volunteered to be part of the focus group interview were from different households. There were supposed to be 7 parents taking part in the focus group interview but two parents were unable to attend for reasons that were not disclosed. They contacted me after the interview process and asked if they along with the learners (their children) could be part of the FMP. By granting the two additional parents and the learners access to the FMP, there were a total of seven parents and seven learners from different households who participated in the FMP.

The study's findings could be impacted by the small sample size, which is not a sufficient representation of the parent population. However, according to Hackshaw (2008), studies with a small sample size can be quickly conducted concerning the research question(s) which can be answered in a rather short amount of time. In contrast, Van de Schoot and Miočević (2020) argue that with a smaller sample, the main research question might remain unanswered, but they acknowledge if a more in-depth investigation is done with the smaller sample, it can lead to a greater understanding of the topic and a large sample may not be needed. The current investigation enabled me to gain a deeper grasp of the research issue and was consistent with Van de Schoot and Miočević's (2020) explanation.

Vasileiou, Barnett, Thorpe, and Young (2018) also agree that smaller samples can provide richly-textured information, relevant to the phenomenon under investigation because participants can go more in-depth with their experiences which can intensify the case under investigation. Delice (2010) and Jamalludin (2013) suggest that what matters is having a sample size that is appropriate to meet the study's objective, not whether it is larger or smaller. They also claim that better preparation and smaller sample size can lead to more reliable results.

3.4.4. DATA COLLECTION METHODS

Open-ended observations, interviews, and documents which can include a diverse range of sources like audio, e-mails, scrapbooks, etc., are typically the foundation of qualitative research methods of data gathering (Kruger et al., 2005; Maree, 2012). Four data collection methods were used in my study: a focus group interview, a pre and post-workshop

questionnaire, and written reflection responses submitted by parents during the FMP. These methods were most appropriate as I wanted as much insight into the experiences of parents as possible and from as many parents as possible who consented voluntarily to participate in the research. According to Creswell (2014), qualitative research is an approach that is primarily concerned with obtaining narratives regarding individuals' perspectives. The focus of the study was on parental involvement and how a Family Mathematics Programme (FMP) can assist parent involvement with Grade 4 learners and their mathematics homework in the Western Cape. This means that I was focusing on the experiences of parents when they assisted the learners with homework by narrating their individual experiences which included but were not limited to the challenges parents faced.

Firstly, all Grade 4 parents were invited via letter (Appendix B) to complete a pre-workshop questionnaire about their current mathematics homework practices and experiences. Before concluding the questionnaire, parents were asked if they would be interested in being part of a focus group interview. The parent participation in the focus group interview was voluntary to encourage as many parents as possible to be involved in the study and to not let any parent feel excluded. The data collection process was as follows: firstly, a semi-structured questionnaire (Appendix C) including multiple choice and open questions was given to parents. This was to establish an overall understanding of how parents are assisting the learners with Mathematics homework and the challenges they encounter. A rapid and efficient method for obtaining data from a large number of people instantaneously is by using questionnaires. It is also one of the most widely used techniques for obtaining information from participants in qualitative research (Rule & John, 2011; Maree, 2012). The questionnaire was electronically created using a Google form and parents were provided with the link via text message. There was also a hard copy of the questionnaire available for parents who do not have access to an electronic device or the internet.

A volunteer group of parents was invited to participate in a focus group discussion after the questionnaires were analysed and interpreted (Appendix D). A focus group is comprised of a small group of individuals who are primarily gathered to discuss attitudes, opinions, and beliefs on a particular subject (Dilshad & Latif, 2013). Focus groups generally have no more than six participants considering larger groups are difficult to manage and limit each participant's capacity to communicate their viewpoints and observations. When the participants have a great deal to discuss regarding the topic or have extensive or prolonged experiences with it, smaller groups are preferable. In contrast to utilising questionnaires, it enables the interviewer (facilitator) to relate to participants, and because the interviewer manages the questions, it ensures that all of the topics will be covered (Rule & John, 2011). The purpose of conducting

such group interviews is to acquire information that may not be easily collected by employing individual interviews (Kruger et al., 2005).

The focus group interview provided a deeper way of probing some of the questions within the questionnaire and allowed parents to discuss in greater detail what they are doing when they help the learners with mathematics homework and the challenges they experience. In the focus group, it was my responsibility as the researcher to direct the discussion. The following abilities and traits should be demonstrated by the focus group facilitator: being a good listener, none bias, flexible, and possess good interpersonal skills (Gibbs, 1997). The facilitator's purpose is to ascertain participants' knowledge of and experiences with the subject under discussion, as well as the causes of any distinctive mind-sets (Dilshad & Latif, 2013). The purpose is also to extract information, maintain the meeting's focus, encourage conversation among participants rather than merely between them and the facilitator, and make sure each participant is allowed to speak (Gibbs, 1997). The focus group discussion was recorded and transcribed for later analysis.

Thirdly, the data from the questionnaires and the focus group interview were used to inform the development of the FMP. I collaborated with the Grade 4 teachers regarding their desires for the FMP and the information received from the data collection to design and implement the FMP (Appendix E). The design and development of the FMP were guided by the principles of the research discussed in Chapter Two and the activities and books, including internet sources, developed from those projects. The materials used met the requirements of the CAPS document and provided a practical and fun approach to mathematics that could be used both at home and at school by parents and teachers (RSA, 2011b). All participating Grade 4 parents and learners were invited to be part of the FMP which consisted of four workshops. Short reflection slips to elicit responses were given to parents after each of the workshop sessions (Appendix F).

The purpose of the reflection slip, which is also known as an exit slip, was to provide an informed response on how well participants understood a topic that was presented. These reflection slips were anonymous and parents were asked to reflect on what their thoughts, feelings, and experiences were about the workshop, what they liked and disliked about the session, and if anything useful was learned during the session. Furthermore, if there was any change in their thinking about being more involved with the learners' mathematics homework. The reflection slip helped participants to critically and constructively reflect on the FMP and their involvement. Participants were able to share their thoughts, review important concepts, and reflect on their experience with the FMP using reflection slips. The reflection slip questions may also centre on the learning processes or the efficiency of a particular teaching strategy.

As the facilitator, I was able to plan for additional workshop sessions according to the participants' responses to these questions (Leigh, 2012).

Lastly, a final post-workshop questionnaire (Appendix G) was issued to the participating parents at the end of the last workshop to obtain parents' overall impressions of the FMP and their thinking about their involvement with the learners' mathematics homework. The questionnaire was made available electronically and in hard copy form, depending on the parent's preference. All data were captured electronically to assist with data analysis thereof.

3.4.5. FAMILY MATHEMATICS PROGRAMME DESIGN AND IMPLEMENTATION

The FMP was informed by two of Epstein's types of parental involvement: parenting and learning at home, as well as Bronfenbrenner's human ecology theory which seeks to improve the quality of the learners' microsystems (parents and their influences on the learners' development) and mesosystem (parents and the schools as well as the home-school relationship and how it influences the learners' development). The parents' participation in the FMP provided an opportunity for them to engage more with the content that the learners deal with daily and to obtain a greater understanding of what was expected from the learners during a mathematics lesson. If parents have a positive response towards the subject of mathematics, they can create an opportunity that will allow the learners to foster a positive view of the subject of mathematics and the learners' overall mathematics skills and development.

One of the objectives of the FMP was to encourage family involvement through homework, and Epstein et al. (2002) types of parental involvement indicate strategies that could be employed by schools in this regard. Epstein et al. (2002) suggest that workshops and materials should be provided to parents to assist with the different aspects of parenting but, in this case, the focus must not be placed on how to raise the learners, but rather on how to encourage the learners' mathematical development and have a beneficial impact on the learners' mathematical development. The school must assist parents in creating a setting at home where learners can study. Furthermore, the parents must be provided with information and ideas to familiarise themselves with ways to help the learners with homework and other curriculum activities. Further suggestions are made by Epstein et al. (2002) in addressing type 4 parental involvement, which stipulates that parents must either be supplied with the knowledge or the abilities to provide the highest quality support at home. This should include the monitoring of homework and must create an opportunity for parents and learners to discuss homework. It can be achieved by engaging in repeated family mathematics, science, and reading activities at school.

Parents who participated in the focus group interview took part in the FMP which consisted of 4 ninety-minute-long workshops, held over 4 Saturday mornings to ensure parents could attend. The programme covered some of the content topics from the Grade 4 national curriculum that included mental maths, addition and subtraction, multiplication and division, and fraction activities. The programme was designed based on data obtained from the questionnaire responses and the focus group interview, related to the challenges that parents identified when assisting with mathematics homework. As the facilitator, I emphasised methods and strategies that were not time-consuming but would benefit the parents and advantage the learners. This was highlighted as one of the challenges by parents during the focus group interview. Parents do not always have the time to sit and assist the learners with mathematics homework. They have other family responsibilities that require their attention impacting their availability to assist with mathematics homework.

The workshops consisted of two parts: firstly, what learners needed to know according to the curriculum and how parents can reinforce these needed skills at home using everyday objects. The reason for the curriculum focus was to provide parents with information to make them aware of what learners are being taught in class and what skills need to be practiced and reinforced at home. Parents often do not just lack content knowledge but knowledge about the curriculum also and what it expects from the learners (Muir, 2012; Jafarov, 2015). The second part of the workshop focused on information and communication technology (ICT), where parents were shown what online applications, resources, and packages were available to help reinforce the mathematics skills needed, without consuming too much of a parents' time. This allowed the learners to work independently and helped to improve learner self-regulation with parents monitoring their progress (Epstein et al., 2002). Parents had to understand the purpose of the programs and were shown how to use them so they can assist the learners at home and contribute to their mathematical development.

3.4.6. DATA ANALYSIS

Fundamentally, qualitative research is interpretive. Constructing a description of a person or environment, analysing data for themes or categories, and drawing inferences about its meaning both personally and philosophically. It also includes summarising the lessons learnt and recommending additional questions to be explored (Creswell, 2014). The research, the data analysis, and the interpretation of the results were all influenced by the theories of Bronfenbrenner and Epstein. The intention was to obtain an understanding of how the different systems of development were illustrated by the data after its analysis. Extracting the data that highlights the microsystem regarding the learner's immediate environment such as the learners' home setting, family structure e.g. single parent household, married parent

household, or living with relatives. Including the relationship between the parents and learners concerning mathematics. The type of parenting that takes place concerning mathematics homework and their control over the learners' homework routine, their study habits, how parents assist learners with mathematics homework, and how the home environment is set up to support and promote mathematics learning at home. Furthermore, how does this microsystem relate to the mesosystem of the learners by focusing on the relationship and interaction between the parents and teachers, and the home-school relationship. Also do parents communicate with the teachers regarding the learners' mathematical development at home, regarding the challenges they face, or the progress made by the learners concerning mathematics and their mathematical development. The objective thereafter was to develop themes that related to the learners' holistic mathematical development through the different types of parental involvement derived from Epstein's theory. These themes were parenting, communication, and learning at home.

After I compiled and processed all the information from the questionnaires, the interview transcripts, and reflection slips, the aim was then to reduce the huge amount of data to manageable and understandable texts by grouping it into themes guided by the literature and theoretical framework. Tags and labels were used to identify keywords and place them under different headings. For example, when parents described the relationship they had with teachers concerning parent-teacher communications this was placed under the theme of communication which is also included in Epstein's theory, or when parents used the words homework routine which will then be placed under the heading parenting which was also one of the themes. Keywords such as assist, help, speak, involvement, advice, and methods along with phrases that describe where the homework was done, how the assistance was given, and what type of assistance was given were all tagged using a colour code system where data related to parenting was yellow, data related to communication was blue and data related to learning at home was red. This was done to organise chunks of text according to the themes of parenting, communication, and learning at home which was all present in Epstein's theory.

Pattern matching, explanation building, time-series analysis, logic models, and cross-case synthesis are the five categories of data analysis techniques outlined by Yin (2009). Pattern matching was used to help identify similarities and differences in the experiences of the parents that were matched with patterns in earlier studies. This is why it complemented my study. For example, parents who had challenges with learners working independently and not being available to assist with mathematics homework:

“He never gets started with his maths, I want to get to that point, where he gets started with his maths. My biggest challenge is basically that for all the years it's never been at a point where he starts a new

maths problem. It's always the challenge of waiting for mommy or daddy to be available to start with the maths (F2-FGI, father 2, focus group interview)."

This statement was coded under the theme of learner self-regulation as the father displayed frustration because his son does not start with his homework but waits for him to return from work. This suggests that the learner lacks the personal skills outlined by Ramdass and Zimmerman (2011) which are referred to as planning, inhibiting distractions, persisting at challenging assignments, managing the environment, overcoming unwanted emotions, and reflecting on what they have learned. It also suggests that the learner cannot work independently and has poor self-regulation. Another example of pattern matching is this statement made by a different parent:

"My challenge is, we are parents and we have responsibilities, and we are not always available at the best moment, we have to find a moment (F1FGI, father 1, focus group interview)".

This statement was one of many that contributed to the theme of time and availability of parents which forms part of Epstein's (2002), first type of parental involvement where parents had to be aware of their own and other challenges in parenting. The development of the themes was based on my analysis of the data which was then linked to previous studies and the theoretical framework for this study. If patterns concur with the patterns of past studies, it can help strengthen the results and the credibility of the case study. This was an inductive analysis process as the patterns that emerge are communicating with the theory and vice versa (Rule & John, 2011; Sinkovics, 2018).

3.5. TRUSTWORTHINESS (credibility, confirmability, transferability, dependability)

Both qualitative and quantitative research can be descriptive, however, quantitative research opposed to qualitative research, uses a rigorous examination of measurements in terms of quantity, amount, intensity, or frequency. The trustworthiness of qualitative research might be questionable and triangulation can assist in this process by collecting data from various sources to improve its validation (Creswell, 2014). This section will highlight the different aspects of trustworthiness, how triangulation was used to improve or strengthen the trustworthiness of the study, and what type of triangulation was used by differentiating between the different types of triangulation.

This is done in this order because in qualitative research triangulation is what is used to improve or strengthen the trustworthiness of a study. However, the term validity refers to the strength of the research and concentrates on determining whether the findings are accurate from the perspectives of the researcher, the participant, or the readers. The term

"trustworthiness" is used in qualitative research. A study's credibility, confirmability, transferability, dependability, and authenticity are referred to as its trustworthiness (Maree, 2012). The degree to which a research narrative is convincing and appropriate is referred to as its credibility, the degree to which the completeness and essence of the case's actuality are captured by the study. Confirmability focuses on how additional researchers might be able to confirm the research study's conclusions (Rule & John, 2011; Maree, 2012). It aims to demonstrate that the data and interpretations of the results are real and that they were drawn from the data. The transferability of the study refers to whether or not the findings found within the case can apply to another case (Rule & John, 2011; Maree, 2012).

Dependability focuses on methodological rigour and concerns regarding the researcher's influences and biases on the study which can be addressed by working coherently toward producing conclusions that the scientific community can accept with confidence and confirmability (Rule & John, 2011; Maree, 2012). Furthermore, it helps determine whether any errors or negligence occurred during the study's data collection, analysis, and reporting. Authenticity involves whether or not an impact was made on members of the community being researched which is the Grade 4 parents in this case (Rule & John, 2011; Maree, 2012).

The credibility of the study was achieved by the appropriateness of the data that was collected concerning the patterns that emerged and could be related to previous studies conducted on the topic. Transferability was ascertained because the FMP can be replicated by teachers at other schools to improve parental involvement within their context. How adaptable the findings of the study are in another context would emphasise how transferrable the results of the study are. If there is a strong link between the findings and the theory, this means that findings could have greater adaptability to another case or other cases with similar contexts.

The dependability of the study was addressed by disclosing all ethical considerations that were taken for the study and showing that I did not influence how parents responded to the question in the study. The study held authenticity as the parents were effect by participating in the study. They became more confident, more willing to assist, and it changed their views about mathematics and their involvement with the subject through homework.

The reliability and confirmability of a case study can be increased by full disclosure of the research procedure, the researcher's positionality, and ethical constraints (Rule & John, 2011; Maree, 2012). In other words, the trustworthiness of my study was greatly influenced by how believable the findings are, including that the findings presented are not falsified. This was done by adding quotes from participants to show that findings were generated from the data so that other researchers could verify the study's findings.

This can also be accomplished if a pattern that closely connects the study's findings to the theories that informed them, in this case, the six types of parental involvement described by Epstein's theory of overlapping spheres and the human development theory of Bronfenbrenner, can be found. For example, when parents discussed the relationship they had with the teacher, this covered aspects of each theory. Due to the necessity of communication between parent and teacher, the interaction between parent and teacher is first and foremost focused on the learner mesosystem. This then links to Epstein's types of parental involvement in which communication between home and the school looks at the relationship that is supposed to be present between parents and teachers and how it can be promoted by schools.

The data collected and analysed was used to highlight the different aspects of trustworthiness and was fully exemplified in the reporting of the findings and discussion. There are four types of triangulation namely data triangulation, investigator triangulation, theory triangulation, and methodological or method triangulation. Data triangulation is the use of a variety of data sources, including time, space, and persons, in a study. Methods triangulation is the use of multiple methods to study a situation or phenomenon. Investigator triangulation is the use of more than one investigator, interviewer, observer, researcher, or data analyst in a study. The ability to confirm findings across investigators without prior discussion or collaboration between them. Theory triangulation is the use of multiple theories or hypotheses when examining a situation or phenomenon (Peersman & Rugg, 2010).

Regardless that data triangulation tends to be related to the quantity and quality of the data. For example, having too few data means that triangulation is unlikely to provide any meaningful insights. In addition, poor quality data can completely undermine the usefulness of triangulation (Peersman & Rugg, 2010). I had to ensure that the data that I collected was not limited nor too much and not of poor quality meaning that the data had to be concise, clear, unambiguous, or not vague. By using questionnaires, interview transcripts, and reflection slips, the parents' experiences helped me to develop a more thorough understanding of parental participation. Thus, I gained a deeper comprehension of how these parents engage with the learners and how they perceive their engagement.

3.6. THE RESEARCHER'S POSITION

Being continually conscious of my place within the setting of the study and with the participants was crucial for me as a researcher. I am a Senior Phase, Grade 7 teacher at the school (at the commencement of the study was still teaching in the Intermediate Phase, Grade 6) and working with both Grade 4 teachers and parents as part of the research. My role in this study was twofold in that I co-designed and presented the FMP and I was also the researcher. I had to be clear with the participants (parents) that during the data collection period, I was a researcher and they must see me as such and not as a teacher because I wanted them to speak freely.

The information may be convenient and simple to gather when researchers gather data at their place of employment (or when they are in a position of authority over participants), but it may not be credible information, jeopardising the roles of the researcher and the participants. The researcher must demonstrate how the data would be compromised and how using it would not put the participants (or the researchers) at risk. This means that I had to acknowledge that my researcher status and authority might influence the data being generated. For this reason, I had to emphasise to the participants that I did not want them to respond in a way they think I want them to respond, but to simply just speak of their experience when assisting with mathematics homework.

I had to show a great degree of sensitivity to my status, power, and relationships with the parents because I am a teacher at the school. This could impact the results of the study. Fully disclosing the purpose of the study and my role in this research helped minimise such influences and in return helped to improve the quality of the study (Rule & John, 2011). I had to be aware of the fact that the study was about the parents and that they had to report on their experiences as much as they could because the aim was to get a direct understanding of the parents' reality when assisting with mathematics homework (Kruger et al., 2005).

3.7. ETHICAL CONSIDERATION

It is essential to plan for potential ethical problems that can arise when conducting a study. Making an argument for a research study involves writing about these topics (Creswell, 2014). I had to address several ethical concerns that would have affected the study's objectivity in this particular circumstance. Getting ethical approval from the university's ethics committee was the first stage in the ethical procedure. I inquired with the Western Cape Education Department (WCED) to see if I needed authorisation since I conducted my research at a government school but I was advised by the management of the school that if no learner had to complete questionnaires, fill in any forms or provide any information that links them to the study, then permission from the WCED was not needed.

The unit of analysis was not the learners but the parents, so I only had to get permission from the school to conduct my research on the premises and ensure that parents' safety, while they are on the premises, would not be compromised. This was needed because I had to find an alternative to the parents' natural setting (home) and it had to be a setting they were familiar with, such as the school. I drew up a letter asking permission from the principal of the school (Appendix A) and enquiring if the security of the school could ensure that no unwanted people entered the school. I provided a list of all the participants' names who indicated they would like to be part of the study. This meant that if the person's name was not on the list, he or she could not enter. After a few days, the principal returned the letter I submitted to his office completed and signed granting permission for me to conduct my study on the school premises.

Furthermore, I had to obtain parents' informed consent to strengthen the ethics of my study. This meant that participants needed to be aware of the research they were taking part in and what was expected of them. These details include the study's objectives, the methodology, and potential results, as well as any demands, discomforts, risks, or hazards that volunteers might experience as a result of the study. A letter of full disclosure was then sent to parents to explain the purpose and procedures of the study, that they could choose to participate, and lastly, what was expected from them as participants. The letter also stated that no parent was obligated to participate in the study and if they choose to participate, it must be of their own accord and voluntarily.

Additionally, I had to also ensure that participant responses would remain anonymous. To adhere to this ethical principle, I had to avoid producing data collection instruments that required personal information such as names, surnames, addresses, etc. Even before and during the commencement of the focus group interview, I emphasised to parents to refrain from using their names and use alternative wording when they want to make a statement or wanted to add to the statement of another parent. For example, instead of using the parent's name to agree or elaborate, I suggested that they used words like you, her, and him to keep their identities unknown.

Another aspect of ethical consideration was that I had to avoid unethical practices throughout the study and during the data collection process because participants would not be confident and speak freely if they feel that they were being deceived. It was for this reason that I explained in detail what the participants' role was within the study and I highlighted that should they feel that they no longer wanted to participate in the study they could do so freely. To remain ethically compliant all the above-mentioned information was presented again to the focus group participants and they were asked if they would still like to continue and were informed that they could leave if they chose to do so (Lune & Berg, 2017). Lastly, I provided

participants of the focus group with examples of how I used the data I gathered and what it would look like in the thesis. This assisted in reducing the anxieties the participants might have. The same method was used when analysing and interpreting data because participants were able to identify themselves in the data but others would not be able to, since any other characteristic by which they could be identified was removed (Birch, Jessop, Mauthner & Miller, 2012).

3.8. CONCLUSION

Being able to investigate a case study through the use of a qualitative approach provided a deeper perspective for me of the sample participants (parents) about their involvement when assisting with mathematics homework and the challenges they face. The data collecting techniques were well suited for this particular case study and permitted the collection of a wide range of data and its presentation for analysis. The usage of pattern matching as a data analysis process was relevant because patterns were present within the data and had to be extracted, organised into themes, and linked to the theoretical framework and previous research studies. I considered all issues of trustworthiness in reporting the data with the use of data triangulation and acknowledged my role as a researcher in the research. Lastly, I adhered to the ethical standards and practises that the university and the school had outlined and requested.

CHAPTER FOUR

RESEARCH FINDINGS

4.1 INTRODUCTION

The results of a qualitative case study that examined how parents could help learners learn mathematics at home by helping them with their homework are presented in this chapter.

The conclusions respond to the following inquiries:

1. How do parents assist the learners with mathematics homework?
2. What challenges do parents identify when helping the learners with mathematics homework?
3. What issues emerge when parents reflect on their involvement in a FMP?

The chapter's structure was determined by the research sub-questions; the major research topic will be discussed in the following chapter. Each research sub-question forms the main heading with additional subheadings to address different elements of the questions using data from the questionnaires, the interview, and reflections. The first question has findings related to parental involvement and assistance with mathematics homework, homework routine, and strategies and methods used by parents. Question 2 relates the challenges identified by parents, namely: mathematics content and methods; learner self-regulation; parent availability; and communication between learner, teacher, and parent. The final question deals with issues arising from the parents' experience of the FMP: motivation, mathematical language, beliefs and attitudes, and overall impressions of the programme.

As indicated and discussed previously, with a focus on parental involvement, this study was informed by the theories of Epstein's (2002) theory of overlapping spheres and Bronfenbrenner's (1994) ecological systems theory. According to Bronfenbrenner (1994), parents form part of the learners' microsystem which has a direct influence on the learners' development. This is expanded upon by Epstein's theory of overlapping spheres, which outlines six different types of parental involvement, including parenting, communication, learning at home, volunteering, decision-making, and community collaboration. The analysis and interpretation of the empirical data employed the research questions and responses that are correlated to the first three forms of parental participation. These are examples of parenting (Type 1), which takes place within the home settings, concerning the type of home setting regarding the home environment itself, family dynamics, and values instilled within learners, and schools should be conscious of the families and the learners they serve. When educators, learners, and families establish efficient channels of school-to-home and home-to-school communication, this refers to communication (Type 2). Thirdly, learning at home (Type

4) occurs when knowledge, suggestions, or instruction is given to educate families on how to assist learners at home with homework, decision-making, preparation, and other curriculum-related activities.

I will start the presentation of the findings by giving an overview of parental involvement with mathematics homework after which I will attend to each of the research sub-questions. The overview data was collected using an online questionnaire and helped to contextualise the findings in the research sub-question sections

4.2. AN OVERVIEW OF PARENTAL INVOLVEMENT WITH MATHEMATICS HOMEWORK WITHIN THE CONTEXT OF THE STUDY.

The questionnaire findings indicated that 97% of the parents, who took part in the data collection process, were involved in the learners' learning of mathematics and mathematics homework. The parents who participated in the study agreed that it is important to help the learners with their mathematics homework (*See figure 4.1*) and 91% of the parents indicated that they do assist with mathematics homework (*See figure 4.2*).

The parents who agreed that it is important to be actively involvement in the learners' learning of mathematics at home recognises that they have a role in the learners' mathematical development. This realisation and frame of mind align with Bronfenbrenner (1994) the parents who agreed have some awareness that they have a degree of influence over the learners' overall mathematical development concerning the learners' micro and mesosystems. Meaning that they have an influence on the immediate environment regarding how the home setting is set up to promote the learners' learning at home along with their homework routines. This will then influence the relationship between the spheres of influence bringing the spheres closer together through their involvement and assistance with mathematics homework as highlighted in Epstein's (2019), theory of the overlapping spheres of influence means of the first, second, and fourth type of parental involvement, parenting, communication and learning at home.

8. Do you think it is important to help your child with his/her Mathematics homework?

23 responses

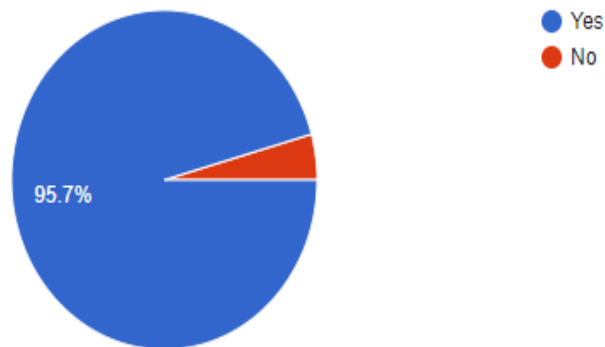


Figure 4.1: Parents' views on the importance of their involvement with Mathematics homework

9. Do you help your child/children with mathematics homework?

23 responses

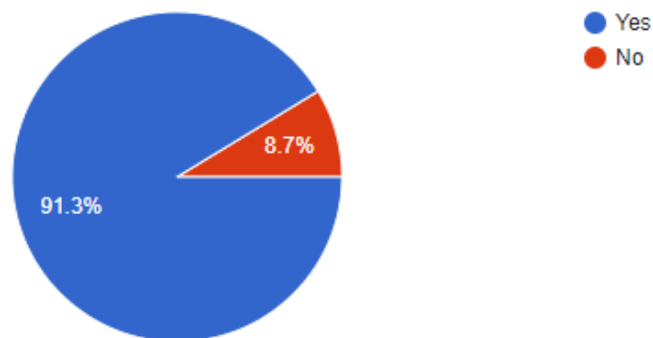


Figure 4.2: Parental involvement with Mathematics homework

In figure 4.1, 4% of the parents did not agree that assistance with mathematics was important. However, after evaluating these particular results, it was found that one parent made an incorrect selection on the questionnaire because when an explanation was needed to justify the parent's selection the explanation did not correspond with the selection the parent had made. The other parent did not provide a reason for his/her selection. Similar to figure 4.2, two parents claimed that they did not help the learners with their mathematics homework but did not provide any explanations. The next question looked at how often parents assisted the learners with mathematics homework which differed from parent to parent. Figure 4.3 shows that 52% of the parents do assist the learners with mathematics homework daily while other parents only managed to assist between 2 to 4 times a week, and some parents once per week.

10. If you do help your child/children with mathematics homework, how often do you help him/her/them?

21 responses

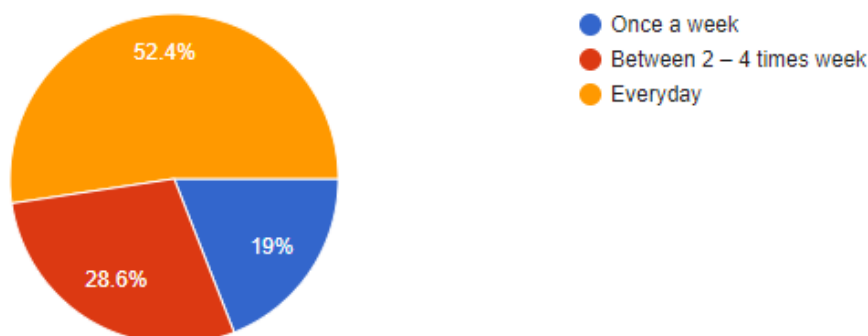


Figure 4.3: How often do parents assist learners with Mathematics homework?

Parents who assist the learners daily with mathematics homework do so for a variety of reasons. In certain cases, parents helped the learners to understand the subject matter more thoroughly. Other parents did it so that the learner has something to do every day, that there may be no gaps in the learners' learning that they can deal with the complexity and intensity of the workload demand of the new grade and phase.

“So she has something to do every day.” (P4 – PreWQ, parent 4, pre-workshop questionnaire).

“Because we want to see if he pays attention in class and understands the methods and processes before we assist and try to explain the work” (P7– PreWQ, parent 7, pre-workshop questionnaire).

“So that I can see if my child understands and if she can cope with school.” (P2– PreWQ, parent 2, pre-workshop questionnaire).

Some parents preferred to re-explain the content to the learner because they found it more beneficial for the learner's learning when the learner is outside of the classroom setting. The information is retained better as there are fewer distractions. This strategy of re-explaining was highlighted by one of the parents who completed the pre-workshop questionnaire and had this to report:

“I prefer to re-explain it to him and because he sometimes gets lost in class then when I explain it again, he gets it Especially one on one works for him” (P10-Pre. WQ, parent 10, pre-workshop questionnaire).

Some parents would also assist daily with mathematics to evaluate the learners' understanding of the methods that are used within the mathematics classroom.

The parents who assisted the learners with mathematics homework twice to four times per week did so because the learner was assigned homework twice to four times a week. Since the COVID-19 epidemic required learners to attend school on alternate days; they were not always assigned mathematics homework daily.

“Because that is how many times he gets maths homework, (P14 – PreWQ, parent 14, pre-workshop questionnaire).

“My child does not attend school every day due to COVID-19 (P15– PreWQ, parent 15, pre-workshop questionnaire)

“When he has homework, I assist him” (P8-Pre. WQ, parent 8, pre-workshop questionnaire).

The parents who assisted the learners once a week did not give a reason as to why they were only able to do so once a week. In another response, one of the mothers who were part of the focus group interview said that she rarely assisted her daughter with mathematics homework. This was because her daughter appears to have the needed mathematics skills to be able to excel in the subject at the Grade 4 level and often needs minimal to no assistance. The parent highlighted her daughter’s mathematical ability clearly when she reported the following:

“My daughter understands most of her maths and is capable of doing it on her own, so I just check her work” (M2-FGI, mother 2, focus group interview).

The findings indicate that parents make attempts to assist with mathematics homework in different ways, where possible, and some parents assist more than others. The results for each of the research sub-questions for this study are presented in the remaining sections of this chapter.

4.3 HOW DO PARENTS ASSIST THE LEARNERS WITH MATHEMATICS HOMEWORK?

Epstein's theory of overlapping spheres and the first type of parental involvement, *parenting*, were the main influences on this section of the findings. It states that parents should support the learners’ learning at all ages and grades which includes the homework routine the learner follows. Parents must also create a home setting that will complement the homework support and routine (Epstein et al., 2002). Dettmers et al. (2019) support and elaborate on Epstein’s theory by referring to this type of parental involvement as indirect assistance (rules surrounding homework and homework routine) and emphasise that indirect assistance is just as important as direct assistance (explaining content and concepts in mathematics).

4.3.1. Parental involvement and the learners' mathematics homework routine

I found the homework routine approach implemented by parents was generally similar, and when they explained the routine they followed with the learners, only marginal differences were found. The homework routine usually commenced once parents arrived home after work. Some parents start immediately with homework, others start later in the evening. Regardless of the starting time with homework, some parents felt the learners should be able to work more independently. Parents had this to report regarding the commencement of homework and learners working independently:

“She normally waits for me to come home, so at like seven o'clock or six or something then she'd be waiting for me” (F1-FGI, father 1, focus group interview).

“I feel at this stage she should already be able to do her homework on her own” (M3-FGI, mother 3, focus group interview).

It was also found in another case, that if there was any homework given, the learners were expected to finish the easier parts first or the easier subjects, and then had to wait for the parent(s) to return home to attend to the more challenging homework activities such as mathematics. This finding is evident in the comments from two of the participating parents:

“At least, she's starting to answer the easier ones; she will wait for me for the difficult sums, but I still like to just guide her” (F2-FGI, father 2, focus group interview)

“I prefer her to do her English and those things. So, she can get those easier things out of the way then I sit with maths in the evening, which is also after six” (M1-FGI, mother 1, focus group interview).

All five parents in the focus group interview agreed that they first checked the books of the learners to see if homework was completed and if it was done correctly. If any errors were found, re-explanations were given to make sure that the learners had a better understanding of the task that needed to be completed. If the learners needed further assistance, parents would then continue to render assistance.

“If there are wrong things then I will sit with her and I will explain to her everything. So, we will sit around the table and we'll discuss it if she doesn't understand” (M3-FGI, mother 3, focus group interview).

This parent re-explains the work done in class to the learner and follows the examples provided by the teacher that was taught in class. Furthermore, these parents also mentioned that they work with the learners to check the learners' understanding of the homework content. The learners have to communicate their understanding of the content to the parents. While there were some differences in the daily homework routine, most parents assisted the learners

when they get home, and parents who worked from home let the learner start with his/her homework after resting for an hour or so. The overall parent expectations were that the learners should start their homework by completing the easier subjects and problems when they get home from school and then the parents would check and provide assistance where needed after they have arrived home from work.

4.3.2. The strategies and methods implemented by parents when assisting with mathematics homework

The findings from the interview indicated that parents did assist with mathematics homework when the learners were struggling with the content. Some parents used the examples provided in the homework and other parents made use of mathematical aids, such as counting charts and cards or everyday objects found at home, to help the learners understand the content better. Some parents have the perception that mathematics within the current education system is taught differently from when they were at school which made it difficult for them to assist the learners. They assumed that because they did not know the methods taught, therefore they did not know the strategies needed to be able to assist learners in a way to reinforce what was taught in the mathematics class adequately. These findings reflect Epstein's second and fourth types of parental involvement, communication, and learning at home. According to Epstein et al. (2002), homework must be designed to promote the interactions between the learners and parents, however then readable, clear, and concise information regarding homework must be attached to the homework especially the instructions and expectations for the learners. Furthermore, consideration must be given to those parents who do not have the LOLT of the school as a home language. The information must also be made available on how parents can assist best to meet the required outcomes of the homework tasks.

“The new curriculum is different to what I can remember” (P3-Pre. WQ, parent 3, pre-workshop questionnaire).

“Some times I don't understand and have to see and go over the example etc. to understand” (P15-Pre. WQ, parent 15, pre-workshop questionnaire).

When parents were asked to elaborate on concerns related to methods and strategies used when assisting the learners with mathematics homework, a similar pattern emerged to that of the pre-workshop questionnaires (Pre. WQ). Parents tend to start by working through the examples provided in the homework activity, an approach they called the pen and paper approach. When they were unsuccessful with this approach, they used alternative methods and strategies at their disposal, such as using various apparatus, like an abacus, or a number chart, flard cards (flard cards are used to test mathematical bonds and to show how numbers

are formed/made up.), and counting grids, to assist the learners' understanding of the activities, and to reinforce the skill the activity aims to promote.

“So, at first what I do is I do the pen and paper. And if see she still struggles I do the visual” (M2-FGI, mother 2, focus group interview).

Parents were quite resourceful in their approaches and the methods they use when helping the learners with mathematics homework. In certain cases, the parents made use of YouTube videos and Pinterest resources to help them understand the activity. This meant that when parents were unsure of what needed to be done concerning the homework provided or how it needed to be done, they made use of different sources for guidance on how best to approach the mathematics homework that was assigned.

“I will go to the bluebook. If I'm still not happy with that I go on to YouTube or whatever, Pinterest, just to see what other things are available” (M1-FGI, mother 1, focus group interview).

Other parents used various objects found in the learners' bags, whether it be pencils, pens, crayons, or counting charts, anything that would help to deepen the learners' understanding. One of the mothers in the focus group made use of real-life examples, as she tried to identify the content that was being dealt with in the real world, for example, how to identify fractions on a clock. Moreover, as a collective, most parents tended to work from the abstract to the concrete, from what they call the pen and paper approach to everyday objects that learners can physically touch, see, and interact with.

“Firstly, the pen and paper approach, to see if he understands it that way. If he struggles with it. I will then tell him to take out his pencil crayons and whatever he has in his pencil bag” (F2-FGI, father 2, focus group interview).

All parents made attempts to help learners to grasp concepts taught in the mathematics classroom and appeared to be resourceful in doing so. The data responses showed different ways parents approach mathematics homework and how parents attempt to teach or reinforce concepts and skills needed to complete the homework. The strategies and methods indicated by parents show that these parents assist and are part of the learners' learning of mathematics and homework. Some parents experience some challenges when they attempt to help the learners with mathematics at home.

4.3.3. Summary Q1. How do parents assist the learners with mathematics homework?

Parents assist learners in two ways; firstly, by providing a grounded homework routine by which parents can monitor learner homework and homework progression by checking the learners' books, and confirming if the homework was done correctly. Secondly, they assist

with homework through direct assistance, by implementing strategies and methods to strengthen the learners' understanding of the concepts and content taught in the mathematics classroom.

Parents who took part in the study refer to this method as the pen-and-paper approach which means that they explain the homework activity to the learner by writing the mathematics sums in a notebook and explaining how the sum was done and would refer to the examples provided in class. If this does not strengthen the learners' understanding, parents resort to using concrete objects such as pencil crayons, counting charts, abacus, etc. Some parents would turn to internet resources such as YouTube to help deepen the learners' understanding of the content in the homework activity and to reinforce what was demonstrated in class. Epstein et al. (2002) in their first type of parental involvement that focuses on parenting suggest that teachers and schools must provide parents with information and guidance as to how the home environment should be set up to support the learners' learning of mathematics at home for the required grade level.

The next section deals in more detail with the challenges experienced by parents when they try to assist the learners with mathematics homework. The second question will be addressed utilising information from both the questionnaires and the focus group interview, respectively.

4.4. WHAT CHALLENGES DO PARENTS IDENTIFY WHEN HELPING THE LEARNERS WITH MATHEMATICS HOMEWORK?

Learning at home is another form of parental involvement according to Epstein et al. (2002). This focuses on the importance of involving families in the learners learning at home. If families are to participate in the mathematics learning process, then there is a potential chance for challenges to arise. Past studies by researchers such as Muir (2012), Jafarov (2015), Moschkovich (2012), and Page (2016) highlighted some of the challenges that parents faced when assisting with mathematics homework. These included parents' education level, the subject matter, and techniques of mathematics, as well as the LOLT. This section of the chapter will highlight with examples some of the challenges experienced by parents when helping with mathematics, such as mathematics content and methods; learner self-regulation; parent time and availability; and communication between parents, teachers, and learners.

Several different researchers such as Henderson and Mapp (2002), Muir (2012), Jafarov (2015), and Dettmers et al. (2019) have found that parents' level of education can greatly influence parent involvement concerning mathematics homework, as it can hinder parents' willingness to help with homework activities. Parents' education level, concerning

mathematical proficiency, may influence the number of challenges that parents experience when assisting learners with mathematics homework. The graph (figure 4.4) indicates the mathematical school level of parents who completed the questionnaire. The graph shows all the parents did mathematics up to high school. The majority of parents did mathematics until grade 12. The remainder is spread across the remaining grades, with grade 10 having the second-highest number of parents with that grade level of mathematics. Then there were three parents each at a different skill level of mathematics with one parent at the Grade 8 level and the other two parents at the Grade 9 and 11 levels respectively.

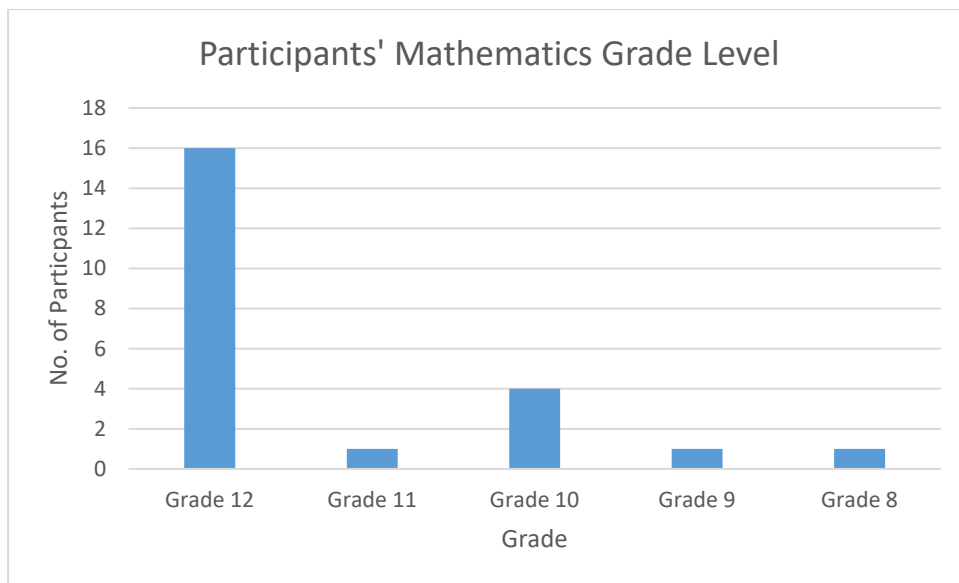


Figure 4.4: Parents' Mathematics skill level.

81% of the parents who completed the questionnaire identified challenges with understanding the content (the facts that must be taught) and methods (how the content is taught) of school mathematics. Parents often have to revisit the examples provided to ensure that they know what mathematics the homework requires the learner to do to complete the task. Through further discussions with the parents in the focus group interview, more challenges emerged:

"I sometimes not sure of what it is that must be done and don't understand the terms that get used" (P10-Pre. WQ, parent 10, pre-workshop questionnaire).

"Sometimes I don't understand and have to see and go over examples etc. to understand" (P15-Pre. WQ, parent 15, pre-workshop questionnaire).

4.4.1. Parental involvement and mathematics content and methods

Involving families in the academic learning of the learners at home, including homework, goal-setting, and other curriculum-related activities, is Epstein's fourth type of involvement. According to Dettmers et al. (2019) and Cunha et al. (2018), parents are either involved in the

learners' learning of mathematics directly or indirectly. To provide direct assistance (showing how to do the sums and how to get to the answer and explaining the methods used in the homework activity) parents should at least have some mathematical knowledge to be able to assist adequately. Ideally, if parents can provide both types of involvement, it may have a greater impact on the learners' mathematical development, knowledge, and success with the subject. Having analysed the data from the questionnaires, it was found that the challenge parents faced, within the content and methods, tends more toward the solution methods needed to solve problems. These are some of the parent responses who completed the Pre-WQs:

“Not the same maths we did at his age. (P6-Pre. WQ, parent 6 pre-workshop questionnaire).”

“Some of the work is different from what I was taught when I was younger” (P13-Pre. WQ, parent 13, pre-workshop questionnaire).

“It's sometimes quite difficult. Because the methods used now and that were used in my time are very different” (P5-Pre. WQ, parent 5 pre-workshop questionnaire).

“Do not always understand” (P16-Pre. WQ, parent 16 pre-workshop questionnaire).

“I sometimes not sure of what it is that must be done ... and don't understand the terms that get used” (P10-Pre. WQ, parent 10, pre-workshop questionnaire).

These are examples of comments made by parents when sharing their experiences regarding helping with mathematics homework. 13 out of the 24 parents who completed the pre-WQ (which included the parents from the focus group interview) indicated they often (3 out of 5 times when homework is given) do not understand the requirements of the activity due to a lack of information and understanding. They have to resort to revisiting the examples that are provided in the homework activity. 8 parents explained that during their assistance with mathematics homework, the learners are not always able to comprehend their explanations, and multiple explanations are required.

“Sometimes it's easy for me to explain something and something that I'm saying doesn't seem to sink in and have to repeat it a few times” (P1-Pre. WQ, parent 1 pre-workshop questionnaire).

“Because the methods used now to those that were used in my time are very different”. (P7-Pre. WQ, parent 7 pre-workshop questionnaire).

The parents who participated in the study had limited knowledge of the methods used in the mathematics classroom, and do not have an understanding of the mathematics principles concerning the content taught. This tended to generate frustration and confusion among the

parents when helping the learners with mathematics homework as one mother from the focus group reported:

“I don't want to confuse her, even further because, I mean, to be honest with you I was getting confused” (M1-FG, mother 1, focus group interview).

Five parents indicated that they practice caution when they assist with mathematics homework as they do not want to confuse the learners about the methods used in class because they do not understand the method completely. This could inhibit the learners' understanding of the content and mathematical progress. However, the degree of the struggle on what needs to be done and how it needs to be done is determined by what information the activity and the learners provided to the parents. What this means is that parents at times struggle when attempting to assist learners with mathematics homework but the difficulty of the struggle is determined by the information given within the activity itself and the information provided by the learners regarding the activity. The parents regardless that they did the subject at school tended to struggle with the solution methods used in school mathematics.

“I sometimes not sure of what it is that must be done ... and don't understand the terms that get used” (P10-Pre. WQ, parent 10, pre-workshop questionnaire).

“Depending on what needs to be done and the information my child gives me” (P11 – PreWQ, parent 11, pre-workshop questionnaire).

“Then my husband comes and says we maths people, how are we not able to understand this. This doesn't make sense, why are they teaching my child this nonsense that they would probably never use” (M2-FGI, mother 2, focus group interview).

Parents may not appreciate some of the content contained in the mathematics curriculum as they may not see the relevance of the content and may not assist the learner, or it could be a mechanism to cope with their limited knowledge regarding the content. Regardless of the reason, the learners' mathematics development will be affected as the learner will not have acquired the needed mathematics skills related to the topic of concern, whatever it may be.

The graph below (figure 4.5) shows how confident parents are with the different content areas of mathematics in Grade 4. Parents are confident to moderately confident with the basic aspects of mathematics addition, subtraction, multiplication, and division. This provided me with some insight into how familiar parents are with the basic mathematics content within the current curriculum. Content and methods are one of the challenges that parents face when they assist learners with mathematics homework. Despite that, the majority of the parents showed confidence in the content but their confidence decreased as the content becomes more challenging, especially with fractions.

15. Rate how confident you think you are in the following areas when having to assist your child with Mathematics homework. (1 = not confident at all, 2 = moderately confident, 3 = confident)

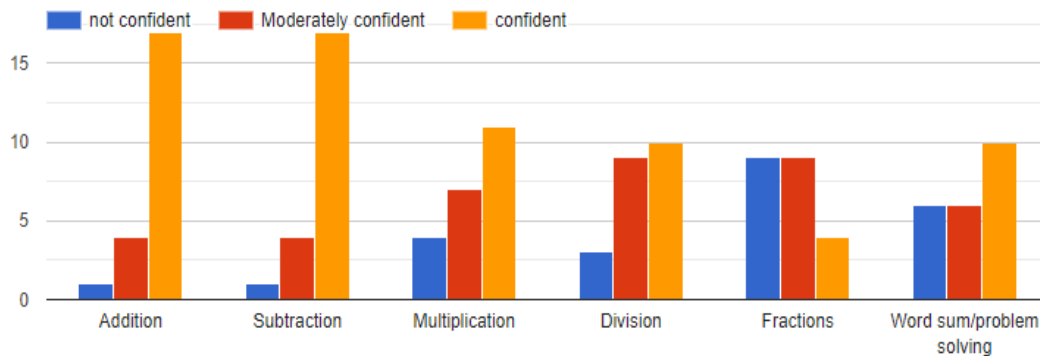


Figure 4.5: Parents' level confidence with the basic content areas in Grade 4 mathematics.

4.4.2. Parental involvement and learner self-regulation

This subsection could not be directly linked to any of Epstein's different types of parental involvement but has some relevance within the study. During the FGI discussion, it was found that learner self-regulation was also identified by parents as a challenge and parents feel that the learners are lacking when it comes to working independently. Self-regulation abilities and motivational beliefs are positively correlated with tasks that must be accomplished at home, claim Ramdass and Zimmerman (2011).

Planning, preventing distractions, persevering with challenging tasks, arranging the environment, controlling undesired emotions, and reflecting on what they have learnt are all examples of self-regulation behaviours. These were behavioural traits parents from the focus group felt were lacking in the learners. There was an expectation from parents that required learners to start with the mathematics homework on their own and not wait until their parents arrived home from work to start with the mathematics homework. Parents felt that learners at the Grade 4 level should be able to commence with the homework activity and at least deal with the easier mathematical problems instead of just waiting until their parents come home to assist them.

"It's never been at a point where he starts a new maths problem. It's always the challenge of waiting for mommy or daddy to be available to start with the maths" (F2-FGI, father 2, focus group interview).

"I'm praying for the day, when I get home and the homework is done, like, she's grade four so I'm like waiting when is that going to start" (M1-FGI, mother 1, focus group interview).

The fact that the learners do not start with the homework on their own may be interpreted by the parents as the learners did not understand the content that was taught. Parents want to assist but also expect learners to work independently as having to come home after a stressful day at work and still having to deal with mathematics homework frustrates parents to a certain extent, especially if they have to start from the beginning and have to comprehend the requirements of the homework activity.

“Yeah, an hour out of our time, and we have to go in and sit, because we know we're going to struggle now. We know we're going to have to sweat now and we both frustrated and with everyday stress also” (F2-FGI, father 2, focus group interview).

“You get frustrated and you build up that frustration trying to understand what you need to do, after a long day of working” (F1-FGI, father 1, focus group interview).

“If I know how to do it, I'm not going to be frustrated, then I'm going to be able to help my child better.” (M1-FGI, mother 1, focus group interview).

Regrettably, not all of the parents who participated in the interview process agreed with this viewpoint, as two mothers out of the five parents stated they do not mind assisting with mathematics homework even after a full working day. But they also desired that the learners would take more ownership of their learning and at least start with the homework, so when the parents come home, they can just check what was done and if it was done correctly. This then leads to the next challenge faced by parents when helping with mathematics homework.

4.4.3. Parent availability and time

The next aspect of parental involvement found to be a challenge for some parents was time and availability. This relates to what Bronfenbrenner (1994) refers to as the chronosystem. The time needed for the learners to develop positively, however, how much time the parents invest to assist the learner will impact the duration needed for the learners' development to mature. The findings indicated that it was not just the single parents that found this to be a challenge but some of the married parents also. When I asked if time and availability were a challenge for the parents, one mother did not hesitate to respond:

Mother one (single parent)

“Yes” (M1-FGI, mother 1, focus group interview).

It further emerged during the discussion with the parents, one of the parents (married) alluded to the fact that they are parents and have many other responsibilities that need their attention and they are not always available to assist.

“We are parents and we have responsibilities, and we are not always available at the best moment, we have to find a moment” (F2-FGI, father 2, focus group interview).

After a stressful day of work and having to come home and having to explain mathematics homework just adds to the stress they are already enduring.

“Yeah, it's, for me it's to take the frustration out for myself when I come home and stressed from work and I still have to help with homework” (M1-FGI, mother 1, focus group interview).

“So that's what I also feel like especially when the days are stressful at work, you don't feel like coming home to do a maths explanation” (F2-FGI, father 2, focus group interview).

This could be to justify this parent's unavailability or to mask his limited knowledge of how to best help the learner and the content taught in class. Notwithstanding the comments of these parents, some of the other parents did not share the same view. One of the mothers (married) had this to report regarding the statement made by the other parents:

“No, I make an effort to spend that time with them. I think is important that the parents should be involved in their children's education either maths or English, it doesn't matter” (M2 – FGI, mother 2, focus group interview).

It was found that one of the mothers who is a single parent, does not allow her parental duties to keep her from assisting the learners with mathematics homework and creates the opportunity to be involved, irrespective of her duties as a parent.

Mother three (single parent)

“Most of the time I do make time to sit with them. When I get home the food is done, the food and everything get done. It's just for me to see to them and their homework. So I do make the time, and I am on top of it. I want to know what are they struggling with and what they need help with” M3 – FGI, mother 3, focus group interview).

This translates that the choice of whether or not parents want to be involved lies with the parent and if so, they will make a greater effort to be involved in the learners' learning of mathematics at home through homework and they will not allow the other aspects of being a parent to prevent them from wanting to help the learners with mathematics homework and wanting them to succeed in the subject. However, this particular parent had this to report:

Mother three (single parent)

“At times there are challenges when I come home too late and then I can't sit with them or I try to get at least a half an hour in to see what are they are struggling with, things like that with the homework” (M3-FGI, mother 3, focus group interview).

The parents from the focus group agreed that parents should make time to be involved in the learners' learning and viewed their involvement as important in the learners' learning of mathematics through homework activities. Irrespective of the many challenges they encounter, parents must be aware of what the learner is doing and what he/she is struggling with and parents should make themselves available to the learners when the need arises.

"I feel that you should be aware of what the child is doing, because, as I said, sometimes they struggle but will not always go to the teacher. So, I make that time, I don't have a problem with that" (M3-FGI, mother 2, focus group interview).

This parent did not disclose why the learner did not go to the teacher when the learner struggled with the content and there could be several reasons why, such as the teacher-learner trust relationship. The learner may not be comfortable speaking to the teacher, learners may feel that his/her peers may be judgemental towards him/her. This is why parents must be involved to uncover what the learner is struggling with and communicate this to the teacher if the learner is hesitant to speak or approach the teacher.

4.4.4. Parental involvement and the role of communication

According to Epstein's six types of parental involvement, communication is the second form of involvement. This kind of involvement happens when teachers, learners, and families create efficient channels for home and school communication. This means that there should be two-way communication between the home and school, and if there isn't, teachers and parents must strive to establish it. Both the questionnaire and the FGI presented findings to indicate that parents had a lot to say about communication as a challenge. The parents emphasised the important role of communication, especially communication between parents, learners, and teachers.

a) Communication between parent and learner

According to Bronfenbrenner's ecology theory (Bronfenbrenner, 1994), parents have a direct effect on the learners' microsystem and mesosystem because parents are present within both systems and ultimately become the bridge between the two systems. Parents need to have a relationship with learners where both can communicate freely. This means parents must be aware of what is going on in their schooling and what challenges the learners are facing, whether it is academics or not. This can impact how the learner views school, and more so, especially with mathematics, which could affect their performance and success in the subject. If the learners are receiving mathematics teaching in a language other than their native language, it could also affect their performance. The questionnaire results show that 22

parents agree they should not only assist the learners with mathematics homework but should also speak to the learners about the importance of the subject and 2 parents disagreed with this statement (see figure 4.6).

8. Do you think speaking to your child about mathematics can emphasize the importance of the subject?

22 responses

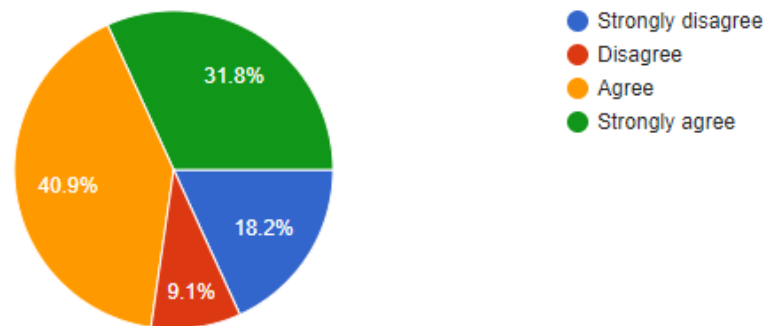


Figure 4.6: Parents discuss with learners the importance of Mathematics

From what was discussed with the focus group parents, it was found that parents were encouraging the learners regarding mathematics and the importance of the subject. They also highlighted that sometimes there were frustrations when they had to assist the learners. Nonetheless, regardless of the frustrations, they still tend to encourage the learners concerning mathematics and try to emphasise the importance of the subject and why mathematics should be practiced daily. One of the fathers described an incident where he encouraged his son, who did not do well in a mathematics test and tried to restore his son's confidence by using encouragement as a tool for him to improve upon his mathematical abilities by applying himself more and with regular practice.

"I will pick my son up from school, and on our way home, he would say, we had a test today and I didn't do so well but I got six out of 10. I said you need to work on that six. I said, it's a pass, but it needs improvement. You can do this" (F2-FGI, father 2, focus group interview).

One of the mothers from the focus group reported the following:

"So, for the most part, I mean we all encourage our children to do the best that they can do. But we also need to push them when they need to be pushed" (M1-FGI, mother 1, focus group interview).

91% of the parents are communicating with the learner regarding mathematics and the importance of the subject. This communication is also used to understand how the learner learns and to check their comprehension. Furthermore, when parent and learner conversed

this was the opportunity that was particularly used to motivate the learner to work even harder and perform even better with greater commitment and effort, as this mother above has stated

b) Communication between parent and teacher

Maintaining communication with both families and schools about school programmes and learner progress is important for academic success (Epstein et al., 2002). Dettmers et al. (2019) suggest that effective family-school communication is a key performance factor that helps parental involvement in homework which in return can improve the quality of parental involvement with homework. Parent-teacher communication involves regularly informing parents of learner progress and has the potential to have a positive effect on learners' mathematical performance (Al-Mahdi, 2010). Homes and schools should establish a transparent and open line of communication.

The analysis of the questionnaire data shows this is not the reality parents are experiencing within the context of this study. From the questionnaires and interview data, it was found that communication between teachers and parents and vice versa was identified as a great challenge. Some parents do not communicate with the class teacher when they struggle, knowing that they are not entirely confident and familiar with the content and methods used in the current mathematics curriculum, as shown by the chart below (Figure 4.7)

13. Do you speak to the teacher about how you struggle when trying to help your child with mathematics homework?

21 responses

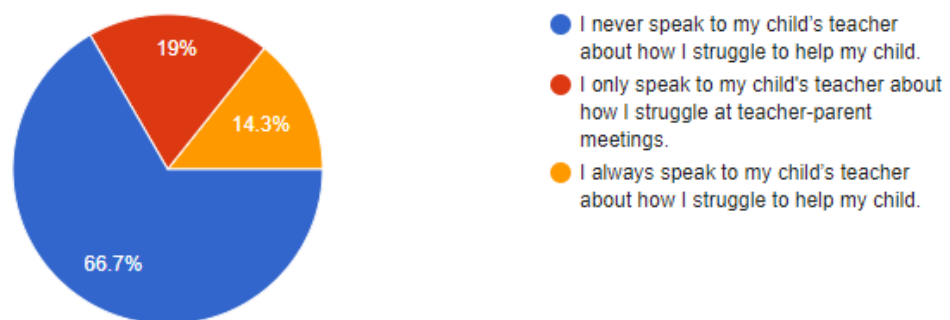


Figure 4.7: Parent communication with the teacher regarding challenges experienced when assisting with mathematics homework.

Those parents who indicated that they never speak to the learners' teacher did so for various reasons such as the learner performs well in mathematics, they did not have to because it might not change the learners' performance in the subject, because of their limited content knowledge, or they are just confident and comfortable with the content taught and when they had to assist the learners with mathematics homework.

“There's no need” (P12-Pre. WQ, parent 12, pre-workshop questionnaire).

“His performance is always good” (P7-Pre. WQ, parent 7, pre-workshop questionnaire).

“I do not struggle” (P10-Pre. WQ, parent 10, pre-workshop questionnaire).

5 of the parents indicated that assisting with mathematics homework does not pose any challenges for them and, if any challenges should arise, they will resort to either finding an alternative way to gain the needed understanding or would ask their spouses or a relative for additional assistance.

“Because I don't struggle. I make a way to understand (P2-Pre. WQ, parent 2, pre-workshop questionnaire).”

“If I can't assist with his homework, his father assists” (P6-Pre-WQ, parent 6, pre-workshop questionnaire).

The parents who indicated they always communicated with the teacher when they struggled did so for their benefit so that the learner may be advantaged.

“I would message the teacher on how to do the homework for me to assist my child” (P3-Pre. WQ, parent 3, pre-workshop questionnaire).

“I need to understand to assist my daughter if she's struggling with mathematics” (P13-Pre.WQ, parent 13, pre-workshop questionnaire).

When the same question was posed to the focus group, parents shared some of their personal experiences. Parents show a strong frustration towards this question as parents are not allowed to text the teacher, but must resort to using the learner's message book to communicate with the teacher and jot down any messages that were rarely read and seldom responded to.

“We were added to a group chat but we weren't allowed to reply to messages. There was a message book we could jot a message down where you could send a message but that wasn't always read, as there would be no response when we check the book” (F1-FGI, father 1, focus group interview).

Some of the parents said that they did not want to burden teachers, hence, they would rather not communicate, until the need arises. The other two mothers within the group said they rarely communicate with the teacher when they encounter challenges when assisting with mathematics homework. They follow other routes to ensure the learners received the needed assistance. This meant that parents asked their spouse, an older sibling, or a relative for additional assistance. One of the mothers had this report:

“We also instituted the tutor, so she does go to tutors as well” (M2-FGI, mother 2, focus group interview).

Despite the efforts made by parents to regularly communicate with teachers, another parent made it clear that when the roles are reversed the same effort was not made concerning communication on the teacher’s part. Mostly, parents are only communicated with when the learners perform poorly in mathematics.

“What I found was that I only get communication from the teacher when the child does poorly. The teacher calls me in every term and would tell me she was not doing well. I'm not sure what to do I'm not a teacher” (M2-FGI, mother 2, focus group interview).

Parents want to be communicated with and parents want to fulfil their duties as parents and be involved in the learners’ learning, whether it is mathematics or not.

“I feel because we have all these communication tools available to us why not use it? You can WhatsApp me, you can phone me, and you can email me, for goodness’ sake. You can communicate on any level” (M2-FGI, mother 2, focus group interview).

However, from the experiences of the FGI parents, teachers do not regularly communicate unless the learner performs below the expected grade level. The parents in this group agreed that speaking to the teacher about their challenges could allow them the chance to be of greater assistance to help the learners.

14. Do you think speaking to your child's or children's teacher about how you struggle could help you to help your child better.

22 responses

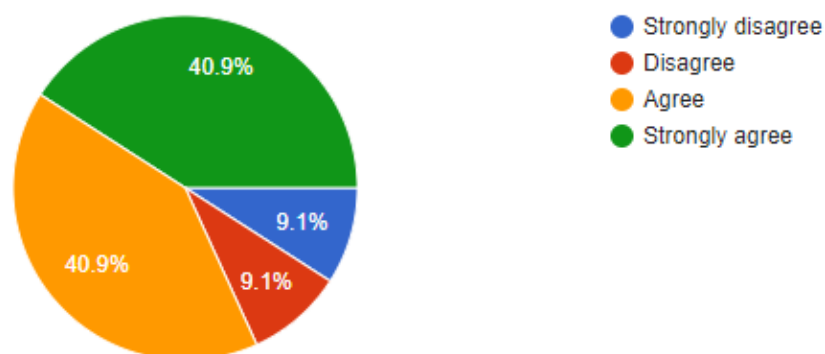


Figure 4.8: The importance of communicating challenges with teachers

More than 80% of the participants agreed that if they communicated their struggles to the teacher, there is a possibility the teacher could provide guidance that could help them to assist the learners better with mathematics homework. Yet more than 60% of the participants do not regularly communicate with the teacher. These are some of the responses that parents gave:

“It would make it easier for me to explain and help my child” (P3-Pre. WQ, parent 3, pre-workshop questionnaire).

“In knowing how to resolve the maths question, I could assist more efficiently” (P9-Pre. WQ, parent 9, pre-workshop questionnaire).

“The teacher can offer me better advice” (P13-Pre. WQ, parent 13, pre-workshop questionnaire).

One of the participants who completed the questionnaire disagreed strongly and provided the following reason:

“Because it doesn't change anything” (P1-Pre. WQ, parent 1, pre-workshop questionnaire).

Unfortunately, this specific parent did not elaborate further as to why communicating with the teacher would not improve his or her ability to assist the learner better with mathematics homework.

4.4.5. Summary Q2. What challenges do parents identify when helping the learners with mathematics homework?

There are several challenges for parents when assisting with mathematics homework. First of all, one of the greatest challenges parents experience is due to the solution methods applied in mathematics classes. When they want to assist, they feel that the teaching and solution methods have changed since their time at primary school. Secondly, parents expect more self-regulation from the learners as they feel assisting and monitoring homework adds additional stress. They would prefer that the learners commence with the homework on their own and they can just check whether it was done correctly or not.

Thirdly, parents have problems with time and availability, they do not always have the time to sit with the learners and assist them with the mathematics homework, and have to create opportunities to do so. Finally, there are challenges in communication between the parent and the teacher. Parents believed that there was no two-way communication between them and the teachers when assisting learners with mathematics homework. They received minimal or no assistance from teachers which means Epstein's (2002), second type of parental involvement (communication) is often absent. This is surprising, given the many different communication tools available to us today.

This final section looks at parental involvement in the FMP and includes an analysis of their views and reflections as the parents engaged in the programme.

4.5. WHAT ISSUES EMERGED WHEN PARENTS REFLECT ON THEIR INVOLVEMENT IN AN FMP?

Many issues arose when parents reflected on their participation in the FMP. However, I only highlight those issues that relate to parental involvement in mathematics homework to support learners' mathematical development. These relate to parental motivation, mathematics language, and beliefs and attitudes about mathematics. In this section, I include both some of the challenges and the benefits that were experienced by parents who took part in the FMP. Furthermore, it includes the above issues and quotes from parents' reflections and post-workshop questionnaires regarding their experiences during the FMP.

4.5.1. A family mathematics programme and parent motivation

Once the focus group interview was completed, parents were informed about the FMP which was developed to increase and potentially improve their involvement in the learners' mathematics learning at home. The 5 parents who took part in the focus group expressed their interest in wanting to participate in the FMP. An additional, 2 parents approach me requesting to be part of the FMP. These 7 parents accompanied by the learners (their children) took part in the FMP. Parents showed a great degree of eagerness and motivation to start and participate in the FMP. It seemed that parents want to assist the learners and be involved in the learners' learning of mathematics. One parent had this to report:

“When I found out about this I was like, let's do this” (M2-FGI, mother 2, focus group interview).

She continued by stating the following:

“I think it is a really good thing because it is a long time coming, I have been asking for something like this for years. You speak to certain teachers about it then it's, oh it's a good idea, but it never happens” (M2-FGI, mother 2, focus group interview).

Another parent elaborated on this statement:

“I think this is a good thing; this way teachers can understand from a parent's point of view, where we are coming from, especially when our kids are struggling” (M3-FGI, mother 3, focus group interview).

The parents' eagerness to participate in the programme was motivated by their perceived inability to assist the learners with mathematics homework adequately which has allowed for frustration to grow within the parents. This is an aspect that regularly appears in the literature (Muir, 2012; Ariès & Cabus, 2017; Fu et al., 2017) indicating that among the many obstacles preventing parents from being involved in the learners' mathematics learning at home is the parents' inability to provide the learners with direct assistance. The content that learners learn in mathematics classrooms is unfamiliar to parents. This limits how parents can be involved

with mathematics. Due to these limitations, parents might be experiencing a degree of hopelessness when challenges arise from assisting learners with mathematics homework as they cannot address the issues adequately (Feng et al., 2019). As parents from the focus group explained:

“Yeah, for me it's to take the frustration out for myself. If I know how to do it, I'm not going to be frustrated, and then I'm going to be able to help my child better” (M1-FGI, mother 1, focus group interview).

“Yeah, I'm just trying to get to the point where we don't have this fighting and stuff anymore so that we can just be sort of on the same page. I think it will get much, much easier with the workshop and training assistance” (F1-FGI, father 1, focus group interview).

As stated by Epstein et al. (2002), it is important to provide parents with the information and ideas they need to assist the learners and an FMP of this nature is a novel way to present the relevant ideas and information to parents (Otani, 2019). These are reflections of the parents on their experience of the information presented to them during the FMP:

“Activities were very informative and allowed me to see my child's strengths and weaknesses. It made it fun and easy to show my child how to do maths” (P2-FMP, parent 2, family maths program reflection slip).

“Activities was fun and exciting Provided information on alternative ways to learning” (P1-FMP, parent 1, family maths program reflection slip).

“Activities were informative and easy to understand and implement and quite useful” (P3-FMP, parent 3, family maths program reflection slip).

“Fun ways to do math and easy to explain also. Methods were different to the conventional way of doing things.” (P5-FMP, parent 5, family maths program reflection slip).

The above eagerness increased with parents as they participated in the FMP. This was evident in their reflections on the different sessions within the FMP as well as the post-workshop questionnaires that were completed by the parents after the completion of the FMP. This is what some of the parents had to report. It was also the reason for the theme of motivation to emerge from the data:

“I understand better how the tools can be used to reinforce different aspects of whole numbers” (P5-FMP, parent 5, family maths program reflection slip).

“More involved with help in maths” (P1-Pst. WQ, parent 1, post-workshop questionnaire).

“The activities are so simple that they can be done at home” (P4-FMP, parent 4, family maths program reflection slip).

“I could even assist relatives” (P4-Pst. WQ, parent 4, post-workshop questionnaire).

Nonetheless, although all the parents were eager and motivated to participate in the FMP and assist learners with mathematics homework during the programme, one of the parents had this to report:

“My child wasn’t in a good mood and did not show much interest but I as a parent, still found the activities very exciting” (P5-FMP, parent 5, family maths program reflection slip).

It was not known if the other parents had a similar challenge as this parent, where there was a lack of interest and motivation from the learner, as other parents have not disclosed any such information during their reflections.

Parents also found that during the FMP, they were able to see how the learners viewed mathematics, how they approach the subject, and how they think mathematically. The findings from the post-workshop questionnaire showed that parents’ confidence grew when it came to assisting with mathematics homework (See figure 4.9). This increased confidence resulted in a decrease in the number of challenges parents faced when assisting with mathematics homework (see figure 4.10).

4. How do you feel now when you help your child with mathematics homework?

7 responses



Figure 4.9: Parents’ level of confidence with assisting with mathematics homework after the FMP.

5. Do you still struggle when you help your child with mathematics homework?

7 responses

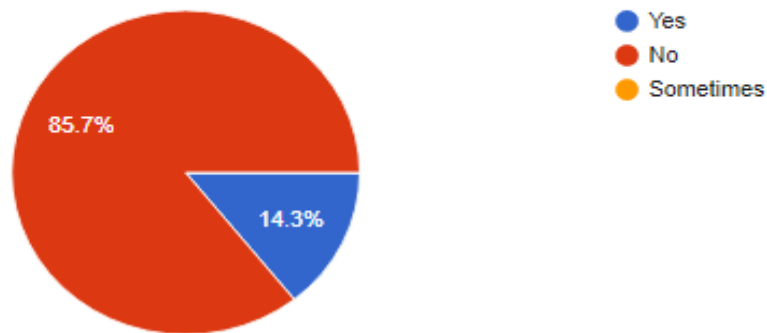


Figure 4.10: Parent level of struggling when helping with mathematics homework after FMP.

One of the reasons for parents' increased confidence was that they felt they have a more in-depth understanding of the Grade 4 mathematics content and have the accompanying methods, strategies, and resources to be able to assist the learners more effectively with mathematics homework. This was what some of the parents reported:

"I have an understanding of how they do maths" (P2-Pst. WQ, parent 2, post-workshop questionnaire).

"I know more ways to explain the work" (P5-Pst. WQ, parent 5, post-workshop questionnaire).

"I can assist my daughter without struggling" (P4-Pst. WQ, parent 4, post-workshop questionnaire).

Another aspect that was found to have improved, according to the responses of the parents, was the quality of the assistance they provided (see figure 4.11).

12. Has the workshops improved the quality of the assistance you provide your child in any way?

7 responses

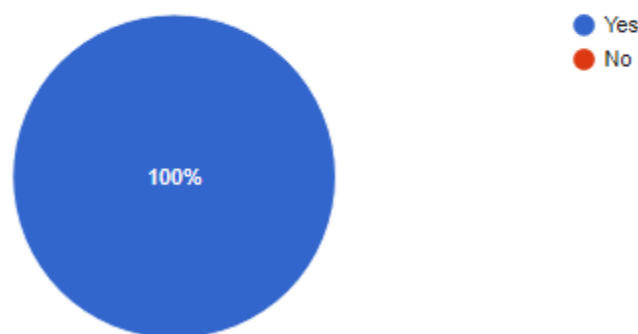


Figure 4.11: Parent-learner communication after the FMP.

Having been part of the FMP over the 4 Saturday sessions, parents felt the quality of the mathematics homework assistance they are now providing the learners was better. These were some of the reasons parents shared to justify this claim:

“I learned new methods of teaching” (P4-Pst. WQ, parent 4, post-workshop questionnaire).

“More involved with help in maths” (P1-Pst. WQ, parent 1, post-workshop questionnaire).

“I’m excited to help her because I understand it when I see it in her books” (P3-Pst. WQ, parent 3, post-workshop questionnaire).

4.5.2. A family mathematics programme and mathematics language

During the commencement of the FMP, it was found that parents were unfamiliar with the terminology that is used within the current mathematics curriculum. South Africa is a multilingual country and not all parents have the ability to comprehend the meanings of the terminology used in mathematics. This is due to the LOLT of the school, which is English as the primary language. This concern is related to Vukovic and Lesaux's (2013) investigation of the relationship between language proficiency and early childhood development of mathematics. The FMP addressed this by defining the terms used in the classroom to the parents with brief explanations. Parents who participated in the FMP had this to report:

“Getting to know all the terminology used in mathematics makes it easier to understand when my child comes with homework.” (P2-FMP, parent 2, family maths program reflection slip).

“I can understand better and can explain better to my child” (P3-FMP, parent 3, family maths program reflection slip).

“Knowing what fractions are now, I understand better what the child needs to know with regards to fractions” (P7-FMP, parent 7, family maths program reflection slip).”

4.5.3. A family mathematics programme and parents' beliefs and attitudes about mathematics

The parents who participated in the FMP held a belief that how mathematics is done within the current curriculum is a different form of mathematics from the mathematics that they were exposed to at primary school. This belief can influence parents' attitudes towards the subject in a negative way as they may feel they are not competent enough to assist learners confidently with mathematics homework because they are unfamiliar with how mathematics is taught within the current curriculum.

“ Interesting to see how they are taught multiplication and division. It is done differently to how I was taught when I was at school.” (P6-FMP, parent 6, family maths program reflection slip).

“I learned something new because I saw things I never saw when I was at school” (P2-FMP, parent 2, family maths program reflection slip).

“Not the same maths we did at his age. Some of the work is different from what I was taught when I was younger” (P6-Pre. WQ, parent 6, pre-workshop questionnaire).

“Sometimes it's not easy as the maths he does now is not the same as what we did. I usually just go with the example he jotted down” (P16-Pre. WQ, parent 16 pre-workshop questionnaire).

“This workshop opened up a new look on things. More teachers should get involved.” (P3-Pst. WQ, parent 3, post-workshop questionnaire).

Makur et al. (2019) found that parents' attitudes toward mathematics can also impact the learners' ideas and attitudes about mathematics. Parents' attitudes towards mathematics can either show learners that mathematics is a valuable and understandable subject or something to be feared and misunderstood. The parents' beliefs and attitudes towards the subject could eventually filter down to the learners and could determine how much the learners will like or dislike mathematics. This will affect how motivated they are to apply mathematics in their current or future lives.

The post-workshop questionnaire findings indicated that all the parents found the programme enjoyable as indicated by the chart below (see figure 4.12). Nevertheless, some of the participants indicated they found certain sessions more enjoyable and fruitful than others.

1. Which session did you like the most?

7 responses

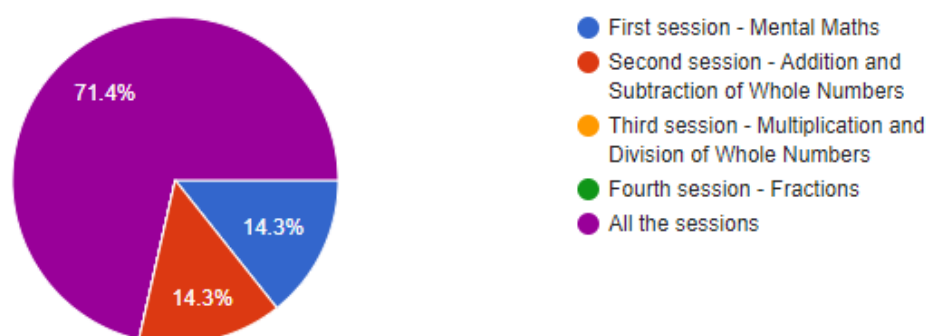


Figure 4.12: Parent experience of an FMP.

Overall, parents had a positive experience during the programme. They described the programme as informative and well-structured and reported the information was well presented, sufficient, and easy to understand. Some of the parents expressed how enjoyable it was interacting with the learners whilst doing the activities provided, during the FMP. Parents indicated that they could use and implement what was shown in each of the sessions. They

felt they had the understanding and strategies to assist both the learners and others with mathematics.

“Having tools to explain the work better” (P1-Pst. WQ, parent 1, post-workshop questionnaire).

“Because I have a better understanding of Mathematics” (P3-Pst. WQ, parent 3, post-workshop questionnaire).

“I could even assist relatives” (P4-Pst. WQ, parent 4, post-workshop questionnaire).

According to Kgosidialwa et al. (2016), the learners’ attitude toward mathematics will be more positive the more actively involved parents are and are most likely to perform well in the subject because they will be more confident in dealing with the content. Therefore, if learners have a negative attitude towards mathematics it could further result in learners having a low confidence level when it comes to engaging with the mathematics content. One of the mothers from the focus group interview pointed out the following:

“I think it is also their confidence like they're not confident enough to do it. So, I think they're just not confident enough to do it on their own” (M1-FGI, mother 1 focus group interview).

Epstein et al. (2002) suggest that parents must be guided by teachers and be provided with information and the skills on how to monitor the learners, to discuss the homework, and the skills learners need, to be able to have success within the subject and the grade.

“The new methods on how to do and deal with fractions are fun now for my child. We received emailed notes that can help if we get stuck” (P2-FMP, parent 2, family maths program reflection slip).

“I have an understanding of how they do maths” (P2-Pst. WQ, parent 2, post-workshop questionnaire).

“The methods were very useful. I can understand better and can explain better to my child” (P3-FMP, parent 3, family maths program reflection slip).

“The activities are so simple that they can be done at home” (P4-FMP, parent 4, family maths program reflection slip).

The parents who took part in the FMP overcame the challenges they previously faced when assisting with mathematics homework. One parent, however, indicated that some challenges were still being experienced. This particular parent indicated that the challenges came from methods used within the DBE workbook (the bluebook). This book is a workbook provided by the DBE for teachers to use in class and for homework as an additional resource to the prescribed textbook. Learners can work in the book and practice their mathematics. It is filled with activities to complete with explanations and examples of the content. This book is based on work covered in the Grade 4 mathematics curriculum. The challenges the parents were

experiencing, who took part in the FMP, was with the workbooks in question and not with the implementation of the strategies and methods that were shown during the FMP. No further elaboration was given as to what exactly was the challenge with the workbook.

“I don't really refer to the blue book unless the homework is in the blue book, I wouldn't go back to the blue book to try to figure it out. I just try to give myself the way I understand it” (F1-FGI, father 1 focus group interview).

“I do consult the blue book. And I also had an instance where mathematics was given, and I think it was placed values, but I could see that it was the same question in a different format, but I got confused” (M1-FGI, mother 1 focus group interview).

However, those parents who indicated that they no longer struggle when assisting with mathematics homework had this to report:

“Because I understand now what my daughter is asking” (P7-Pst. WQ, parent 7, post-workshop questionnaire).

“The methods we learned helped” (P3-Pst. WQ, parent 3, post-workshop questionnaire).

“Because I now make use of the explanations we were taught and I make use of the websites provided” (P4-Pst. WQ, parent 4, post-workshop questionnaire).

The parents' responses indicated that the programme has increased their involvement in mathematics homework with the learners (see figures 4.13 & 4.14)

9. Rate your overall involvement in your child's learning of mathematics before the workshop?

7 responses

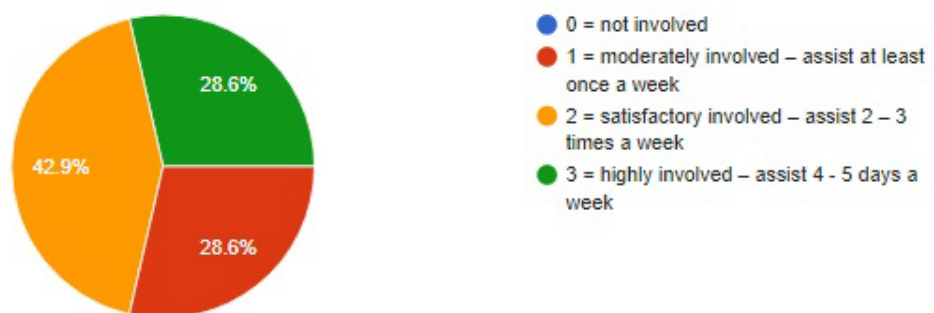


Figure 4.13: Parent overall involvement before the FMP.

10. Rate your overall involvement in your child's learning of mathematics after the workshop?

7 responses



Figure 4.14: Parent overall involvement after the FMP.

During and after the FMP, parents who took part in the FMP beliefs and attitudes toward the subject of mathematics transitioned to a more positive view of the subject.

“How everyday things can be used to explain fractions” (P5-FMP, parent 5, family maths program reflection slip).

“The ease of how we as parents can teach/help the kids.” (P6-FMP, parent 6, family maths program reflection slip)

“Very enjoyable session and my child enjoyed it too” (P5-FMP, parent 5, family maths program reflection slip).

“I never knew how multiplication was explained in class but now I do and makes it easier for me when I have to explain what to do” (P2-FMP, parent 2, family maths program reflection slip).

“I’m excited to help her because I understand it when I see it in her books” (P3-Pst. WQ, parent 3, post-workshop questionnaire).

Parents are the safety nets for learners at home when learners have mathematics homework activities to complete. When parents have a more positive attitude and belief toward the subject, assisting learners with activities, study habits, and building a positive disposition can be more beneficial for the learners (Abah et al., 2018).

4.5.4. Summary Q3. What issues emerge when parents reflect on their involvement in an FMP?

The data collected from parents during the FMP through reflection slips indicated that parent motivation, mathematical language, and beliefs and attitudes were the dominant issues that emerged from the data. Feng et al. (2019) argue that when parents lack content knowledge and confidence due to being unfamiliar with methods on how to assist learners, this could affect parent eagerness and motivation. These low levels of motivation could cause learner

motivation to also be impaired and academic achievement could be compromised, resulting in parent involvement being more of a disadvantage than an advantage to the learner.

The results of the FMP showed even though availability and time were challenges, parents were still eager to help the learners with mathematics homework and wanted to see the learners succeed within the subject but often lacked motivation based on their knowledge of mathematics content, teaching methods, and beliefs and attitudes towards the subject. Improving these aspects could increase the eagerness of parents to want to help and not sigh at the sight of mathematics homework but be motivated to want to help the learners.

Supporting learners with homework provides parents the opportunity to instill beliefs, attitudes, and behaviours that promote effective study skills and mathematical achievement when they have a favourable attitude and belief about the subject of mathematics (Bempechat, 2019; Pfeiffer, 2019). Nevertheless, all this will only be possible if parents are not just familiar with the content and methods used in the current mathematics curriculum but also with the language used in the current curriculum. This means that the belief and attitudes that parents hold about the subject must be changed. Parents had to be shown that mathematics content is still the same and not a different form of mathematics, but just that the solution methods have evolved over the years.

Vukovic and Lesaux (2013), suggest that language proficiency contributes to mathematical development. They discovered that learners' language skills pose a challenge to their ability to perform mathematically since they are unable to comprehend the task's requirements. Due to the differences between the LOLT and their home language. This lack of understanding could increase if parents do not help the learners in comprehending the requirements of the homework activity and the terminologies used within mathematics. When the parents in the FMP were made aware of the language used within mathematics, they showed a better understanding of what had to be done regarding the homework activities and the methods used within the mathematics classroom.

Accompanied by the skills to reinforce at home what was taught at school, parents appear to be more confident when they are assisting with mathematics homework, and their willingness to assist increased. This was only possible after the belief and attitude that parents held about the subject changed and they realised that mathematics is still mathematics but just with different methods.

4.6. CONCLUSION

Parents are assisting the learners with mathematics homework and go to great lengths to provide quality assistance to the learners regarding mathematics homework. Notwithstanding parents' efforts, they do experience multiple challenges when attempting to assist and these obstacles can be a hindrance to their involvement with mathematics homework and the quality thereof. The barriers that impede parents from being as involved as they should include content and methods, time and availability, and communication. Additionally, motivation, the language used in mathematics, and beliefs and attitudes further hinder parental involvement with mathematics homework.

Nonetheless, all these challenges can be reduced through the implementation of a FMP as the data has shown. The fact that parents lack the mathematical knowledge and skills necessary to support the learners is one of the factors contributing to their lack of involvement. A FMP is a platform that could provide parents with the needed strategies, methods, and knowledge for them not only to be more involved in the learners' learning of mathematics at home but also to overcome some of the challenges they face and to develop a positive belief and attitude about mathematics. This can lead to parents being more motivated in wanting to help and being more confident when helping. It can increase and improve parental involvement with mathematics homework and also the quality of the assistance being provided to the learners.

CHAPTER FIVE

DISCUSSION, CONCLUSION, AND RECOMMENDATIONS

5.1. INTRODUCTION

The purpose of this study was to examine the factors that either help or impede parents from actively participating in the learners' mathematics homework at the Grade 4 level. Furthermore, it shows how a FMP can assist parents in this regard and is not limited to mathematical understanding, but also how parents can reinforce what was learned in the mathematics classroom at home. In this chapter, I will first be discussing the research sub-questions and use these discussions to address the overall research question, followed by the conclusion, limitations, and recommendations.

The sub-questions are: How do parents assist the learners with mathematics homework? What challenges do parents identify when helping the learners with mathematics homework? What issues emerge when parents reflect on their involvement in a FMP? And the overall question is how can a Family Mathematics Programme (FMP) assist parent involvement with Grade 4 learners and their mathematics homework in the Western Cape? All findings will be linked to previously conducted research to identify similarities and differences where possible. Links to the theoretical framework supported by Epstein's theory of overlapping spheres, the six types of parental involvement, and Bronfenbrenner's theory of human development will also be highlighted.

5.2. HOW DO PARENTS ASSIST THE LEARNERS WITH MATHEMATICS HOMEWORK?

The study recognises that parental involvement has the potential to possibly affect their learners' academic success if parents are involved in their education and learning process. This correlates with Jafarov (2015) who explained that parental involvement is important, as it can make a positive contribution to learners' academic achievement. This includes the learner's performance in mathematics and the success the learner could have with the subject. In this study, it was discovered that of the 24 parents who participated in the study, 22 parents participated in the learners' mathematics homework and felt that it was crucial to be involved in their mathematics education at home. This claim is supported by a study on Tanzanian mathematics learners' performance by Ngorosh (2010). She discovered that parental influences, such as assisting the learners with their homework and monitoring their academic progress, have an impact on the learners' mathematical skills. Parents concur that being actively involved in the learners' mathematics homework should be included in parents' daily responsibilities and be regarded as a positive feature of parenting instead of an obligation, given that time management can be a barrier (Bempechat, 2019).

5.2.1. Parental involvement and the learners' mathematics homework routine

The above statement aligns with Epstein et al. (2019), first type of parental involvement: *parenting*. It is the parents' responsibility to create a home situation that will promote the learners' learning at all ages and grades that should include the homework routine. However, emphasis was placed on how parents assist the learners with mathematics homework when they do assist the learners. According to Moutsios-Rentzos, Chaviaris, and Kafoussi (2015), parents can help with homework by either assisting in solving mathematical problems or simply just creating an environment at home where the learners can complete the homework and learn as part of the learner's homework routine. The findings show that these parents seem to follow a set routine when assisting with mathematics homework. It is a process of discovering what the homework is, analysing examples, and trying to generate some understanding of what needs to be done. Thereafter, they relate this understanding to the learners so that they may have a firm comprehension of what needs to be done, and how it needs to be done.

Interestingly, Cunha et al. (2018) found no relationship between the parents' ability to provide quality direct or indirect support at home and the amount of learner homework completed, because of gaps in the learners' knowledge of the content and parents' insufficient knowledge of methods to provide direct assistance. This means that due to their lack of understanding of the content taught in class and parents not knowing how best to assist learners with mathematics homework, it could result in their assistance being ineffective. Therefore, having to reinforce what was taught in class could be challenging. From the results of this study, it appears that when there is a structured homework routine and parents provide quality assistance, manage the homework, and the homework routine, that there can be benefits for the learners. Bempechat (2019) and Pfeiffer (2018), outline some of the potential benefits learners could be receiving due to quality parental involvement with mathematics homework such as it can increase classroom learning, consolidate fundamental skills and knowledge that allows learners to establish a routine of working independently.

According to Abah et al. (2018), parental support can assist learners in developing improved study habits and acquire a more optimistic attitude which also forms part of the advantages learners could be getting because of their parents' involvement. It gives parents the chance to foster a supportive environment at home, promote learning, and have discussions about the subject. Regularly interacting with the learners and doing mathematics homework activities could improve the educational relationship between parent and learner which in return could improve the overall relationship between the parents, learner, and family. These interactions

and improvements can in the long term contribute positively to the learners' microsystem and overall development (Bronfenbrenner, 1994).

5.2.2. Parental involvement and the strategies and methods used to deepen learner understanding

Parents' approaches, techniques, and strategies for helping with homework vary. To help the learners thoroughly comprehend the content that is being reviewed with homework. 95% of the parents which includes parents from the FGI and those who completed the pre-workshop questionnaires began by adopting a pen and paper approach. The aim of this was to reinforce what was taught in class and to strengthen any skills that might be lacking with the learners in terms of the topic being dealt with. However, according to the parents from the FGI, if there was no success with the pen and paper approach, they tended to shift towards a concrete approach where tangible objects were used to highlight or emphasise the topic of concern. In some instances, parents used real-life examples and tried to link the content to actual events in the real world that the learner can relate to.

Some parents were not familiar with the content and methods the learners encounter in the mathematics classes, and this limited how they could be involved with mathematics homework. While parents need to assist with homework, they also need to be aware that it can place unnecessary pressure on the learners and confuse them by showing different methods from those used in school (Hoeke, 2017). Parents being unfamiliar with the content and methods the learners are taught in the mathematics classes can restrict parental involvement with mathematics homework, and this finding collaborates with the discoveries of Henderson and Mapp (2002).

In light of this, the fourth type of parental involvement: *learning at home* (Epstein et al., 2019) is consistent with the study's aforementioned findings. Schools and teachers can provide parents with the knowledge, skills, and methods on how best to assist the learners so that there is no confusion between what the parents are demonstrating to the learners and what is taught in class. According to Muir (2012), parents do not receive adequate instruction from teachers on how to help the learners with mathematics at home. The findings show that when guidance is provided to parents, this can allow the assistance that parents are providing to the learners to be strengthened with the hope that if quality assistance is given the learners' understanding of the content improves also.

5.3. WHAT CHALLENGES DO PARENTS IDENTIFY WHEN HELPING THE LEARNERS WITH MATHEMATICS HOMEWORK?

Previous studies by Muir (2012), Davids and Roman (2013), Vukovic and Lesaux (2013), Jafarov (2015), Page (2016), Caro (2019), and Dettmers et al. (2019) highlighted the fact that parents face multiple challenges when assisting learners with homework, specifically the learning of mathematics at home. Parents' socio-economic circumstances, communication skills, level of education, availability, and family dynamics are some of the difficulties. The findings of this study showed the teaching methods used in mathematics, the language involved in mathematics homework, communication with teachers, and learner self-regulation were identified as challenges for parents. It was found that most of the parents had mathematics skills levels up to high school and should be able to assist the learners with mathematics homework. However, evidence showed that content areas such as fractions were challenging for parents.

Some parents indicated that their availability was a challenge and this included both single and married parents, and some of the basic terminology used in mathematics within the current education system was pinpointed as another obstacle to their involvement. The section will describe various issues that the study's parents identified in greater detail.

5.3.1. Parental involvement and mathematics content and methods

As previously mentioned, parents were sometimes confused when dealing with the mathematics content and the teaching methods used in class. They spent a lot of time trying to figure out what needs to be done in the activity and how it needs to be done. They were unfamiliar with methods used in the teaching of mathematics in the current curriculum which caused a lot of time wastage. This led to another challenge for parents which was time and availability as they have other responsibilities and do not always have the time to sit and figure out what needs to be done in the activity. These results concur with the research of O'Sullivan et al. (2014) that parents' responsibilities and having to provide for their family hinder their availability. In the study, it was found that time and availability were challenges, but all the parents made some effort to make themselves available to assist learners with mathematics homework. The findings indicated that, if parents are familiar with the methods and the content taught in class and have the necessary skills to reinforce what was taught in class it becomes easier for them to comprehend the homework task requirements. This means that when parents have a better understanding of what needs to be done and how it needs to be done, it reduces the amount of time parents spend on figuring out the homework task requirements and the homework task overall.

5.3.2. Parental involvement and learner self-regulation.

Parents identified learner self-regulation as a challenge when it comes to involvement with homework as they are not always available to assist the learners. They expect the learners to begin with the homework on their own, possibly even complete the homework, so that it can be checked by the parents upon their arrival at home from work. However, this is not the reality for most parents in this study. This might be because learners lack the self-regulation abilities Ramdass and Zimmerman (2011) identify, which include preparation, preventing distractions, persevering with challenging assignments, organising the environment, handling undesirable emotions, and reflecting on what they have learned. If parents are given the support and appropriate resources, learner self-regulation can be developed and improved, and parents may not have to sit that long with learners when they are busy with mathematics homework.

Furthermore, parents communicated that it was frustrating to come home after a stressful day at the workplace, and still have to sit with the learners to complete homework. Moreover, having to explain everything from the start, they would prefer to come home and assess the homework that was done, and check whether it was done correctly. Nonetheless, it was found that despite the duties of being a parent and having to split their attention between daily parental duties, parents still made great efforts to assist the learners with mathematics homework. This result is consistent with Mahuro and Hungi's (2016) findings, according to which parental participation means investing time, money, and commitment to help the learners' academic success in mathematics and other subject areas. To ensure that learners learning mathematics at home is a fruitful learning experience, then schools and parents must collaborate. In terms of parenting, communication, and learning at home, Epstein's different types of parental involvement support this way of thinking (Epstein et al., 2019). Schools need to help parents to be of support to learners at home concerning homework and parents must take up their role as parents and must be proactive and collaborate with teachers to be more involved with mathematics homework.

5.3.3. Parental involvement and communication

The final challenge identified was the critical role of communication with both the parent and the learner and with the parent and teacher. The results showed that parental involvement should not only be limited to assisting with mathematics homework but there should also be regular communication with the learner about the importance of the subject, and the benefits that it poses for the learners' education and future. If the learners' attitude towards the subject is poor, this could affect the learners' achievement in the subject. It is part of the parents' responsibility to encourage and motivate the learners through some means of communication (Abah et al., 2018). This is consistent with claims stated by the NECT (2016) that talking,

listening, and engaging in active time with learners are among the many important factors influencing their academic achievement.

Al-Mahdi (2010) and Mutodi and Ngirande (2014) argue that regular parent-teacher communication is essential and that when homework is assigned, parents should be given adequate information about the assignment. Page (2016) added to this by stating that consistent communication between parents and teachers will ensure that parents are aware of what the learners are going through in mathematics classes, have a variety of channels to voice their concerns, and can provide useful information to the learners' teachers about their mathematical development. The study's findings revealed that parents seldom discussed their difficulties with the teachers when helping the learners with mathematics homework activities. Parents concurred that they should talk to the teachers about the difficulties they encounter when helping the learners with their mathematics homework since the teacher may be able to provide advice on how to best help the learner. According to Ashim and Sahin (2018), they discovered that there is little to no correlation between parents' communications with schools or teachers. However, results from the study showed that when parents speak about the challenges they face with assisting with mathematics homework, guidance could be provided to improve the assistance they were giving the learners.

If parents have concerns, they should schedule a formal meeting with the teacher to address such concerns, according to the NECT (2016). All of these findings align with Epstein's second type of parental involvement: *communication* (Epstein et al., 2002) in which she emphasises that communication is the key to opening the door to establishing relationships between families and schools. Better communication between parents and teachers regarding the learners' educational needs, especially concerning the learners' success in mathematics, can result in the connection between home and school is strengthened and can yield benefits for parents, teachers, and learners. Parents can benefit if they receive regular assistance and guidance from teachers on how to best assist the learners to achieve both mathematics success and educational goals. The teacher can benefit as they will receive information from parents on how the learners are performing at home concerning mathematics, and what the learners are struggling with.

5.4. WHAT ISSUES EMERGE WHEN PARENTS REFLECT ON THEIR INVOLVEMENT IN A FAMILY MATHEMATICS PROGRAMME?

The following issues emerged when parents reflected on their involvement in the FMP: parent motivation, parent beliefs and attitudes about mathematics, and the language used in the subject of mathematics. The following sections will provide greater detail on each of these issues mentioned above.

5.4.1 A Family Mathematics Programme and parent motivation.

Although parents have acknowledged that a barrier preventing them from being more actively involved in the learners' learning mathematics at home is a lack of time and availability, this did not diminish their desire to participate in the learners' mathematics learning at home. Although parents claim they wish to be active in the learners' education and mathematical learning, they frequently lack the motivation to do so. This could be because parents lack the knowledge of the methods and strategies used in class, they are not sure how to assist learners adequately and how to identify resources they can use to strengthen the learners' understanding of the content and topic (O'Sullivan et al, 2014; Jay et al., 2018). According to Epstein et al. (2019), schools must hold workshops for parents and give them appropriate information about the subject and the teaching strategies employed, as well as how to reinforce the mathematical concepts learned and set up the ideal learning environment at home.

This information could be communicated in the form of documented instructions, or, as in the case of this study, by providing an after-school FMP. This could result in parents not feeling that they are on their own to struggle but that they have the support and assistance of the teachers. In this study, it led to parents being more motivated to want to assist with mathematics homework and they displayed a higher degree of confidence as they felt more equipped to provide a better quality of parental involvement. These findings correlate with Al-Mahdi (2010) who suggests that homework tasks must not just have clear and sufficient information on the task but must also include information on how parents can assist the learners.

5.4.2. A Family Mathematics Programme and mathematics language

Parent reflections indicated that assisting learners was often a challenge due to being unfamiliar with the terminology used in the current mathematics curriculum which made understanding mathematics activities difficult. Due to their lack of understanding of the terms used in the homework tasks, parents could not understand what needed to be done. This lack of understanding affected the effectiveness of their involvement with mathematics homework.

This finding is consistent with that of Moschkovich (2012), who discovered that learners need parental assistance when they interact with the challenging language used in mathematics classes and at home; however, if parents lack the understanding of the meaning of the terminologies used in mathematics homework tasks, providing adequate support may not be possible. This correlates to Epstein's second type of parental involvement: *communication* (Epstein et al., 2019) where she highlights that consideration must be given to parents who do not speak English because these parents may not be able to comprehend the requirements of the homework task; this includes the terminologies used in mathematics.

According to Tabaeian (2016), when information is transferred to parents, the language in which the information is given to parents is pivotal. Epstein's second (communication) and fourth (learning at home) type of parental involvement states that the information provided to parents must be understandable, allow for discussion between parent and learner, and must allow for families to work together (Epstein et al., 2019). This could be an obstacle if parents do not know and understand the terminology that is used in the subject of mathematics. Language proficiency was proven to be a hindrance to mathematics ability by Vukovic and Lesaux (2013). This indicates that, if parents are unable to adequately instruct the learners about what they need to do for homework because they are unfamiliar with the mathematical terminology, it could have an impact on the learners' overall mathematics performance.

5.4.3. A Family Mathematics Programme and parents' beliefs and attitude toward mathematics

Parents' belief and attitude toward the subject of mathematics was another issue that emerged from parents' reflection on their participation in a FMP. Findings indicated that the parents who participated in the FMP held a belief that the way mathematics is done within the current curriculum is different from the mathematics they did when they were at primary school. It is this type of belief that could influence parents' attitudes towards the subject at present. It is this type of belief that could result in parents having a negative attitude toward the subject of mathematics. Makur et al. (2019) found that parents' attitudes toward mathematics can also impact the learners' ideas and attitudes about the subject. According to Bempechat (2019) and Pfeiffer (2019), homework is a critical part of the learning process as it allows parents to cultivate beliefs and behaviours within the learners. Abah et al. (2018) concur with this statement and add that parental involvement is more than just monitoring the learners' activities, and helping improve their study habits. Parents' involvement can also help the learners to build a positive temperament toward schoolwork and especially mathematics.

These findings are consistent with Epstein's fourth type of parental involvement: *learning at home* that emphasises learners will result in a positive belief and attitude toward schoolwork, in the case of the current study, mathematics homework (Epstein et al., 2019). However, this positive belief and attitude must be transmitted by the parents through their involvement with mathematics homework. This is reaffirmed by Kgosidialwa et al. (2016) who assert that a learner's attitude toward mathematics will be more positive the more parental participation there is. They continued by stating that if learners see their parents supportive of them, they will have a positive attitude towards mathematics, but then parents should know how to encourage and assist learners at home.

5.5. SUMMARY

This summary concludes this section of the study and simultaneously addresses the sub-research questions. The sub-research of the study was: How do parents assist the learners with mathematics homework? What challenges do parents identify when helping the learners with mathematics homework? What issues emerge when parents reflect on their involvement in a FMP? After the data was collected, processed, and analysed it was found that parents have a similar approach to the learners' homework when assisting with mathematics homework. Despite that, Cunha et al. (2018) found no relationship between the parent's ability to provide quality direct or indirect support at home and the amount of homework the learners completed. Bempechat (2019), Pfeiffer (2018), and Abah et al. (2018) do highlight the benefits of parental support as mentioned above.

SQ1. How do parents assist the learners with mathematics homework?

It was found that parents have a similar structure when it came to the learners' homework routine. Firstly, discovering what the homework is, then analysing examples, and lastly, trying to generate some understanding of what needs to be done. Thereafter, they ensure the learner understands what to do. When it comes to the methods and strategies implemented by parents to assist the learners with mathematics homework, most of the parents started by using a pen and paper approach. If this approach is unsuccessful, they tend to shift towards using concrete objects or real-life examples. Whilst this approach might yield some benefit for the learners, parents must be cautious to not confuse learners by showing different methods from those used in class (Hoeke, 2017).

SQ2. What challenges do parents identify when helping the learners with mathematics homework?

Furthermore, it was found that the teaching methods used in mathematics, the language involved in mathematics homework, communication with teachers, time and availability, and learner self-regulation were identified as challenges for parents within the study. They were

unfamiliar with methods used in the teaching of mathematics due to a lack of knowledge concerning the methods and strategies used to teach the content in class and spent a lot of time trying to figure out what needs to be done in the activities and how it needs to be done, causing a lot of time wastage. Time and availability were also identified as an obstacle as parents have other responsibilities to attend to and cannot also sit and try and figure out what has to be done regarding the homework activities. Parents identified learner self-regulation as a challenge. Parents expected the learners to begin with the homework on their own, and possibly even complete the homework so that it can be checked by the parents upon their arrival at home from work.

According to Ashim and Sahin (2018), there is little to no correlation between parents' communications with teachers or schools about the learners' education and mathematics. However, according to Page (2016), regular communication between parents and teachers assure that parents are aware of what the learners are going through in the mathematics classroom, should be able to express their concerns, and can provide teachers with pertinent information about the learners' mathematical development. The study's findings revealed that parents hardly ever discussed their difficulties with the teachers when helping with mathematics homework. Parents are in favour of speaking to the teacher concerning the challenges they face when assisting with mathematics homework because guidance on how best to assist the learners can be given. Furthermore, the language used within the homework task must be considered as some parents may not have the LOLT of the school as a home language. This will result in parents being unable to support the learners' comprehension of the homework task requirements which could result in confusion and the homework task's objectives not being met.

SQ3. What issues emerge when parents reflect on their involvement in a FMP?

Regarding the issues discovered during the FMP, it was found that parent motivation, mathematical language, and parents' beliefs and attitudes toward mathematics were seen as issues for parents. Parents could be lacking the motivation to assist learners because of a lack of content knowledge, being unfamiliar with methods and strategies used in class, and how to assist learners adequately. Coupled with this insufficiency of content, methods, and strategies is parents' lack of understanding of the terms used in the homework task resulting in parents being unable to understand what needed to be done within the task. That is why it is important that enough information is given about the homework activity and how parents can assist. This includes information regarding the terminologies used within the activity (Moschkovich, 2012; Tabaean, 2016). Concerning parents' beliefs and attitudes towards the subject of mathematics, it was found that parents believe that the mathematics taught currently is

different from the mathematics they were exposed to at primary school. This could influence their attitude towards the subject. Parents can influence the learners' beliefs and attitudes toward mathematics but then they must have positive beliefs and attitudes toward the subject. Assisting with mathematics homework allows parents the opportunity to cultivate beliefs and behaviours and create a positive view within the learner toward mathematics and schoolwork (Abah et al., 2018; Makur et al., 2019).

5.6. HOW CAN A FAMILY MATHEMATICS PROGRAMME (FMP) ASSIST PARENTAL INVOLVEMENT WITH GRADE 4 LEARNERS AND THEIR MATHEMATICS HOMEWORK IN THE WESTERN CAPE?

This research explored how a family mathematics programme can be of support to Grade 4 learners' parents regarding mathematics homework assistance. It highlights a variety of issues that prevent or hinder parental involvement in mathematics homework. The results of the sub-questions will be combined in this section to address the main study question, with a focus on the concerns that converged during parents' participation in the FMP. These particular issues are parent motivation, beliefs and attitudes, and language used in mathematics. Many of the other challenges are intertwined with these issues.

The findings suggest that when parents are directly exposed to what the learners encounter within the mathematics classroom, the content that is taught, and the methods used to teach the content, they feel more prepared to help learners with mathematics homework. A FMP can provide an opportunity for parents to be exposed to the content and methods dealt with in the mathematics classroom (Otani, 2019). Teachers have the opportunity to give parents the appropriate resources and tools that they can use at home in addition to helping parents get the knowledge and skills necessary to help learners with mathematics (Epstein et al., 2019). According to Hoeke (2017), the chance of parents confusing learners by resorting to alternative methods other than those taught in class decreases. Furthermore, it allows for the improvement of both parental involvement and learners' understanding of mathematics and the enhancement of learners' overall mathematical development (Bronfenbrenner, 1994).

By acquiring the needed skills with the supporting resources, parents' confidence improved when dealing with homework tasks. Parents began to overcome their insecurities about mathematics and mathematics homework which can encourage them to foster a mathematical atmosphere at home (Epstein et al., 2019). Additionally, a FMP is also an opportunity for teachers to introduce parents to the mathematical terminology used in the classroom. It gives parents the chance to enhance their mathematics vocabulary so that it is easier to understand the homework tasks when assisting the learners (Vukovic & Lesaux, 2013).

This will not be possible if there is no communication between parents and teachers. Otani (2019) argues that parents may hesitate to approach teachers about the content because of their limited knowledge and understanding of what the learners are taught at school. Parent responses in this study also showed that communication between parents and learners improved due to the FMP. Parents and learners now had a similar understanding of the content, terminologies, and methods used in mathematics. This could result in parents speaking openly to the teacher about the challenges when they assist with mathematics homework, which improves communication and the relationship between the parent and teacher. Parents need to communicate their expectations of the teacher and vice versa for the learner to achieve academic success. Together, parents and teachers need to collaborate to achieve the goals set out for the learners because it will influence the future development of the learners. However, this can only be achieved through communication and if the relationships between schools and homes are strengthened (Bronfenbrenner, 1994).

A FMP is also a platform that can be used to shift parents' beliefs and attitudes about mathematics to a more positive viewpoint and address misconceptions that might exist. The parents in this study believed that mathematics taught currently is different from when they were in primary school. Parents might have a negative opinion of mathematics, and this negative opinion and attitude could be transferred to the learner (Makur et al., 2019). However, by participating in a FMP, this belief can be addressed. The findings suggest that the FMP helped parents reduce their anxieties about mathematics due to their participation in the programme, resulting in both the parents and learners having a more positive attitude toward the subject (Epstein et al., 2002; Kgosidialwa et al., 2016).

The FMP has the potential to change parents' views of mathematics by receiving the needed skills, knowledge, resources, and regular communication. This could result in parents being more motivated to assist learners due to having a greater level of confidence. Being confident gives parents a more positive attitude towards mathematics as their beliefs about the subject changed, a mind-set that will hopefully be shared by the learners (Epstein et al., 2019). This could have an overall positive effect on parental involvement with mathematics homework and the quality of the assistance will improve, which will benefit the learners. Mathematics homework is the opportunity for parents to cultivate the needed attributes within the learners to develop educationally and, in the case of this study, mathematically as well (Bronfenbrenner, 1994; Bempechat, 2019; Pfeiffer, 2019).

To conclude this section of the study the overall research question will be addressed which was, how can a FMP assist parental involvement with Grade 4 learners and their mathematics homework in the Western Cape? The FMP directly exposed the parents to what the learners

are taught, and the teaching methodologies used in the mathematics classroom. Parents received suitable resources with the needed strategies on how best to assist learners with mathematics at home. The FMP gave parents the confidence to assist with mathematics homework and overcome their insecurities and anxieties toward mathematics. Parents became more willing to assist learners with mathematics homework because they feel more prepared to help learners. Parents were more motivated to assist because they were more confident due to what they learned during the FMP. Furthermore, parents became familiarised with the mathematical terminology used in the classroom and enhance their mathematics vocabulary so that it is easier to understand the homework tasks when assisting the learners. The FMP gave the parents the confidence to speak more openly, improving the communication and the relationship between the parent and teacher. Lastly, it also changed parents' beliefs and attitudes about mathematics to have a more positive view of the subject while clarifying any misconceptions they might have regarding the subject, mathematics.

5.7. THE LIMITATIONS OF THE STUDY

This study was focused on the parents' experiences and the challenges they faced when assisting with mathematics homework and how a FMP can better equip parents to help with mathematics homework. Despite the positive results of the FMP with regards to upskilling parents and improving their involvement with mathematics homework, the study had some limitations which are discussed next.

Firstly, the sample size could have been larger as the projected sample size was not achieved. There were approximately 320 parents in Grade 4, but only 24 parents completed the online pre-workshop questionnaire. This could be because parents may not have internet access at home, but hard copies were available and no requests were made. Of the 24 parents, 5 parents volunteered to be part of the focus group interview. This could be because the data collection took place during the COVID-19 pandemic and parents did not want to expose themselves by coming in close contact with other parents which could place them at risk of contracting the virus.

The FMP was attended by 7 parents (the 5 parents from the interview and 2 additional parents) and their children (the learners). This resulted in fewer parents taking part in the study than was expected and might be viewed as a poor representation of the parent population. However, the sample represents those parents who want to be involved in the learners' mathematics homework as they have chosen to be involved in the FMP, regardless of Covid. Moreover, the study was unable to access the perspectives of the parents who are less motivated or less able to be involved in the learners' mathematics homework, which also impacts the data of the study.

Secondly, there was a limitation in terms of the duration of the FMP. The programme consisted of four sessions. The FMP could have yielded a greater influence on parental involvement if it was over a longer period such as the South African Numeracy Chair Project after implementing a parent innovation in Grahamstown in the Eastern Cape. The project started in 2011 and ended in 2015 (SANCP, 2011).

Lastly, although parents completed a post-workshop questionnaire, there was no follow-up interview conducted to get a deeper insight into and understanding of their experience regarding the FMP. In addition, no consideration was given to the learners, concerning their experiences with the FMP and how they found the FMP and their parents' involvement with their learning of mathematics at home. The study was focused on parents and their involvement and how their involvement with mathematics learning can be improved to be more beneficial for the learners. This is suggested as a future topic for research in the section that follows.

5.8. RECOMMENDATIONS AND FUTURE RESEARCH SUGGESTIONS

This section offers proposals for further research as well as useful recommendations for teachers and schools on how to increase parental involvement in mathematics learning at home, based on the study's findings.

Before a FMP can be considered, schools and teachers need to conduct a needs analysis survey with parents. Teachers can determine the need of parents by giving them questionnaires to complete or by interviewing parents and discussing the challenges they face. Teachers may be able to address the issues mentioned through the implementation of a FMP. This may allow teachers the opportunity to show parents how mathematics is taught in the current curriculum regarding the methods used, and provide parents with the necessary tools and resources to be able to confidently and adequately assist learners at home with mathematics. Furthermore, teachers can show parents how to foster a more mathematics-orientated atmosphere at home. If teachers do not have time to support parents in this regard, then teachers need to explore alternative ways that will address the need of the parents.

Teachers can alternatively create a WhatsApp chat group dedicated to parental involvement. This chat group is where the teacher can share videos on what must be done, with explanations. Alternatively, the teacher could find content-related videos that can be shared, post explanatory notes to assist parents, and send pictures of examples of how problems must be solved. Furthermore, the teacher could also share links to websites that deal with content topics and articles related to improving assistance at home, etc. This chat group should also allow for discussion amongst parents and teachers regarding successes or challenges. However, teachers still need to be available to assist parents, and to give guidance and

information if the need arises even after the implementation of a FMP or after the information is shared on a group chat. Making this a standard procedure might increase and enhance the level of parental involvement.

The following suggestions could be considered for future research concerning parental involvement with mathematics homework. A longer FMP could be designed and implemented to include parents participating in the FMP to be interviewed before, during the implementation, and after they completed the FMP to get a more in-depth understanding of the role of a FMP in supporting parents' involvement in mathematics homework. There could be interviews with learners before and after the FMP to understand how parents are assisting them with mathematics homework. Learners' mathematical ability could also be evaluated using pre- and post-programme content tests as part of the FMP, to determine if increased parental involvement has an impact on learners' mathematical achievement. As it is important to understand whether this improves learner achievements (including learner attitudes to the subject), or whether learner achievements stay the same, or perhaps whether it is detrimental to their mathematical performance.

5.9. FINAL CONCLUSION

This study investigated how a FMP can assist Grade 4 parents in the Western Cape to become more involved in helping with mathematics homework and overcome the challenges they experience in doing this task. The study results indicated that the parents who participated in this study are helping with mathematics homework. The findings also indicated that these parents want an active role and want to contribute positively to the learners' success in mathematics. However, teachers need to conduct a needs analysis survey with parents before a FMP can be introduced. Teachers can do so by giving parents questionnaires to complete or by interviewing parents and discussing the challenges they face when assisting with mathematics homework. Teachers may be able to address the issues mentioned through the implementation of a FMP. Nonetheless, it cannot be disregarded that parents have multiple challenges that either place limitations on their ability to assist with mathematics homework or entirely prevent them from assisting.

All these influencing factors tend to add additional degrees of frustration not just to the parents but also to the learners when parents want to help with mathematics homework. A FMP can help address the challenges and ease the frustration that comes from assisting with mathematics homework. Increased and better quality parental involvement in mathematics homework can be achieved with the use of a FMP. As parents will be exposed to how mathematics is taught in the current curriculum regarding the methods used, and teachers can provide parents with the necessary tools and resources to confidently and adequately assist

learners with mathematics homework. This will only be possible if schools make a greater effort to implement initiatives such as a FMP. Furthermore, teachers can also show parents how to foster a more mathematics-orientated atmosphere at home.

If time is preventing teachers from introducing initiatives such as a FMP, alternatively, teachers can create a WhatsApp chat group dedicated to parental involvement. Where the teacher can share videos on what must be done, with explanations. Additionally, content-related videos can be shared, explanatory notes can be posted to assist parents, and pictures of examples of how problems must be solved can also be sent. Links to websites that deal with content topics and articles related to improving assistance at home, etc. can also be shared. This chat group should also allow for discussion amongst parents and teachers regarding what worked well and what did not. However, guidance and assistance must still be provided to parents by teachers even after the implementation of a FMP or after the information was shared on a group chat. This gives teachers and parents the chance to accept parental involvement as a standard school practice. Making parental involvement a standard procedure might be advantageous for everyone concerned, the teachers, the parents, and particularly the learners.

The study's results also coincide with Epstein's theory of the diverse types of parental involvement, including parenting, communication, and learning at home. Parents are a resource that may be exploited by schools to help learners achieve greater success in mathematics classes, and this concept has to spread across the school. To build this link, teachers and parents must collaborate to enhance the exchanges between the home and the school. This is a long-term goal for the relationship between parents and learners to improve so that parents can have a greater influence over the learners' overall development. Additionally, parents and teachers need to understand that it will take time, patience, and dedication from everyone involved for the learners to develop (Bronfenbrenner, 1994)

Lastly, the theories that were used in this study were important as they contributed greatly toward the analysis of the data for the study. It made it possible to identify the different systems of development that are needed to improve, within the context of the study, both relationships between parent and learner and parent and teacher, the micro-system and meso-system for the advancement and development of the learners' mathematical ability (Bronfenbrenner, 1994). Furthermore, the sub-components that needed improving for parental involvement with mathematics homework to be more beneficial for the learners, were investigated. Epstein's six types of parental involvement provided a framework for these elements, with a particular emphasis on parenting, communication, and learning at home (Epstein et al., 2002). Additionally, how these factors influence the relationships within the systems of human

development were investigated. The challenge with using these theories was that there was a lot of overlapping and it was often difficult to categorise the data which resulted in repetition, but for the most part, the role of the theories within the study was crucial and highly beneficial.

This study shows that a FMP yields a variety of benefits, not just for parents but, for teachers also. Parents are exposed to what learners are taught and the methods used to teach the content. They gain confidence and motivation to help learners more adequately and improve the quality of the assistance being provided. Their mathematics vocabulary is being enhanced by being exposed to the terminologies used in the mathematics class. This allows parents to understand mathematics homework activities better. This results in parents having a more positive belief and attitude toward the subject of mathematics and overcoming the challenges they face when assisting with homework and the insecurities and anxieties they have about mathematics. In addition to these benefits, a FMP also contributes to the improvement of communication and the relationship between parents and teachers. This allows parents to receive information on how best to assist the learners with mathematics at home, along with supporting resources to do so, adequately. In return, teachers receive information from parents regarding the learners' mathematical progress, and if any, the challenges that learners are facing with the content, including the parents themselves. This allows teachers to put the necessary interventions in place so that the learners receive the needed support within the classroom and parents receive the needed guidance from teachers on how to improve the assistance at home even further when helping with mathematics homework. A FMP can promote the collaboration between parents and teachers so that the learners' mathematical ability can develop holistically and improve their performance in the subject and their education overall.

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APPENDICES

APPENDIX A: PARENTAL INVOLVEMENT LETTER OF PERMISSION



TO WHOM IT MAY CONCERN

RE: **RESEARCH STUDY**

Dear Sir/Madam

I am a teacher at a primary school in Westridge, Mitchell's Plain. Furthermore, I am also a master's student (student no. 209012013) at the Cape Peninsula University of Technology studying for a master's degree in mathematics education.

The topic of my area of study is **Parental involvement in Grade 4 mathematics homework in the Western Cape**. The aim of the study is firstly to: identify the challenges parents face when assisting learners with mathematics homework. Secondly, provide strategies and skills so that parents can be more involved in their children's learning of mathematics at home and assist learners more effectively. Lastly, increase parental involvement in assisting with mathematics homework by bridging the gap between Grades 3 and 4.

This letter serves as a request asking permission to conduct my research at your school with the parents of those learners who will be entering grade 4 in 2021. No learners will be part of the official study but they will be allowed to accompany their parents to the family mathematics programme that will be provided to the parents. The learners' presence in the family mathematics programme will allow parents to practically implement what will be demonstrated.

I hope this letter reaches you in good favour and I trust to hear from you at your earliest convenience.

Yours in Education

Mr. J. Grandly

Please complete the section below and return it to the sender

Principal to complete

I, hereby grant the above mentioned student permission to conduct the above mentioned research at my institution I also grant the student permission to use one of the classrooms and the computer lab of the school to aid in the conducting of his research.

Signature: (principal)

Date:.....

APPENDIX B: PARENTAL INVOLVEMENT LETTER OF PARTICIPATION



LETTER OF PARTICIPATION

RE: RESEARCH STUDY

Dear Parent/Guardian

I am a teacher at a primary school in Westridge, Mitchell's Plain. Furthermore, I am also a master's student (student no. 209012013) at the Cape Peninsula University of Technology studying for a master's degree in mathematics education.

The topic for my area of study is **Parental involvement in Grade 4 mathematics in the Western Cape**. The aim of the study is firstly to: identify the challenges parents face when assisting learners with mathematics homework. Secondly, provide strategies and skills that parents can use to be more involved in their children's learning of mathematics at home and assist learners more effectively.

This letter is an invitation for you to be part of the study in the following way:

- 1) Complete a questionnaire to get an overall understanding of your current involvement in homework, which can be completed online or written form at home.
- 2) Volunteer to be part of a more in-depth follow-up small focus group interview. (no more than 6 people per group)
- 3) Attend a Family Mathematics program which will take place over four Saturdays, where you will be shown games, methods, and strategies to help your child with mathematics homework. At the end of each session, you will be asked to complete a short reflection slip.
- 4) Complete a final questionnaire which will be given after the last Saturday workshop to be completed online or on paper after the session.

All the information acquired from the above-mentioned sources will be used confidentially for the final write-up of the study. Dates and times will be communicated accordingly closer to the commencement of the study. Parents are not obligated to participate but your participation will be highly appreciated. You are free to withdraw from the study if you feel uncomfortable with the implementation of the study or for personal reasons. No personal information of parents will be used within the study and no personal information will be asked or required at any point throughout the study (e.g. ID no, address, working information, etc.). Names and surnames will only be used for the set-up of a What's App group to communicate all information about the study but will not be used in the final writing of the thesis. Should you choose to be part of the study What's App "YES" to 0727076304 with your name and surname so that you can be added to the group.

Yours in Education

.....

Mr. J Grandly

APPENDIX C: PARENTAL INVOLVEMENT PRE-WORKSHOP QUESTIONNAIRE

**PARENTAL INVOLVEMENT
PRE-WORKSHOP QUESTIONNAIRE**

1. How old are you?
 - a. Less than 30
 - b. 30 – 35
 - c. 36 – 40
 - d. More than 40 <
2. What is your gender?
 - a. Male
 - b. Female
3. What is your relationship status?
 - a. Single
 - b. Married
 - c. Divorced
4. Did you as a parent do Mathematics at school?
 - a) Yes, I did do mathematics at school.
 - b) No, I did not do mathematics at school.
5. Until which grade (standard) at school did you as a parent have Mathematics as a subject? (just indicate grade/standard)

.....

6. Did you enjoy or did you not enjoy Mathematics when you did it at school?
 - a. Yes, I enjoyed doing Mathematics at school.
 - b. No, I did not enjoy doing mathematics at school.

Briefly describe why you say so.

.....
.....

7. Do you think speaking to your child about mathematics can emphasize the importance of the subject?
 - a. Strongly disagree
 - b. Disagree
 - c. Agree
 - d. Strongly agree

Briefly describe why you say so.

.....
.....

8. Do you think it is important to help your child with his/her mathematics homework?

If yes, why do you say so?

.....
.....

If not, why do you say so?

.....
.....

9. Do you help your child/children with mathematics homework?

If yes, briefly explain how?

.....
.....

If not, briefly explain why?

.....
.....

10. If you do help your child/children with mathematics homework, how often do you help them?

- a) Once a week
- b) Between 2 – 4 times a week
- c) Everyday

Briefly describe why you do it in this way.:

.....
.....

11. When you try to help your child/children with mathematics homework, how often do you struggle to help him/her?

- a. I never struggle to help my child.
- b. Sometimes, depending on what has to be done
- c. I always struggle to help my child.

Briefly explain why you say so?:

.....
.....

12. How often do you speak to your child's teacher about their mathematics performance/results?

- a. I never speak to my child's teacher about his or her performance.
- b. I only speak to my child's teacher if he or she performs poorly.
- c. I always speak to my child's teacher about his or her performance.

Briefly explain why you say so?:

.....
.....

13. Do you speak to the teacher about how you struggle when trying to help your child with mathematics homework?

- a. I never speak to my child's teacher about how I struggle to help my child.
- b. I only speak to my child's teacher about how I struggle at teacher-parent meetings.
- c. I always speak to my child's teacher about how I struggle to help my child.

Briefly explain why you say so.

.....
.....

14. Do you think speaking to your child's or children's teacher about how you struggle could help you to help your child better?

- a. Strongly disagree
- b. Disagree
- c. Agree
- d. Strongly agree

Briefly explain why you say so.

.....
.....

15. Rate how confident you think you are in the following areas when you help your child with Mathematics homework. (1 = not confident at all, 2 = moderately confident, 3 = confident)

- a) Addition
- b) Subtraction
- c) Division
- d) Multiplication
- e) Working with fractions
- f) Solving word problems.....

16. If the school provided mathematics workshops to empower you to help your child better with mathematics, would you be interested in attending?

No, I would not be interested in attending

Yes, I would be but I don't have the time.

Yes, I would be interested in attending

17. Would you be willing to be part of a group discussion, to discuss with other parents how they help their children with mathematics homework?

Yes

No

Please explain why you say so.

.....
.....
.....

APPENDIX D: PARENTAL INVOLVEMENT FOCUS GROUP INTERVIEW QUESTIONS

FOCUS GROUP INTERVIEW QUESTIONS

1. Describe how you help your child with mathematics.
2. Describe what methods you use, and how they help.
3. Describe what materials you use to help make your child the mathematics homework, and how does that help?
4. What do you struggle with the most in maths when you try to help your child with Mathematics homework?

APPENDIX E: OUTLINE OF FAMILY MATHEMATICS PROGRAMME

FAMILY MATHEMATICS PROGRAMME

The programme ran over 4 Saturdays from 20 March 2021 until 17 April 2021, excluding the Easter weekend as there was no workshop on that Saturday

The following content areas were emphasised: mental mathematics, operations involving whole numbers, and fractions including calculations with fractions. These concepts were identified through informal conversations and interviews with the grade 4 teachers and data collected from pre-workshop questionnaires as some of the areas that parents tend to have challenges with although each topic has many aspects involved, however, the basics were presented to the parents that parents can promote what was taught in class. Furthermore, parents were presented with ICT resources that parents can use so that learners can also work independently and parents can just supervise the learning as parents do not always have time to sit with learners and assist with mathematics homework. These ICT resources are also useful for days when learners may not have received homework but can continue their learning of mathematics.

This programme was designed to expose parents to the current mathematics curriculum and provide parents with the necessary skills to increase their involvement when assisting with mathematics homework as well as the quality thereof. Parents were provided with all reading material after each workshop as an aid if revising of the workshops was needed.

The workshops aimed to:

- Inform parents about CAPS mathematics curriculum requirements for learners in Grade 4
- Expose parents to the terminologies used within the current mathematics curriculum.
- What activities parents can do at home with everyday objects and how to implement them to support work taught in the mathematics classroom.
- What technological programs are available that parents can use to also assist with learners' mathematics skills at home and homework.
- Provide parents with the needed skills, methods, and strategies to be facilitators of mathematics in the homework environment through homework.

WORKSHOP 1: MENTAL MATHS

This workshop aimed to make parents aware of some of the strategies that can be implemented to therefore strengthen both the learners counting and their number concept development.

The strategies will assist parents to help learners to develop mental processes that enhance logical and critical thinking, accuracy and problem-solving

Parents were provided with a deck of playing cards and were introduced to the following

MENTAL MATHS ACTIVITY ONE: I SPY!

This activity can be done with two players or more

Shuffle the deck of cards

**Decide what operation must be used: addition, subtraction, multiplication, or division.
(Recommend starting with addition)**

Decide who will go first

A card will be selected from the deck by player one, the selected card may not be seen and placed against the forehead of the player who selected the card.

The other player must use a number sentence (equation) to describe the number that is being held up by the player holding card. The number sentence will be a clue as to what card is being held up.

The player who can obtain 5 correct answers in a row wins but the number of correct answers can be determined by the players.

Example: 6 is selected by player one. Player two will then do the following this number will be the answer is you add 5 to 1 or $4 + 2$ or $3 + 3$

Suggestions:

If mastery is shown by the learner increase the number to a 2-digit number. If mastery is shown change the operation. If mastery is shown increase the number to a 3-digit and last mix up the operations however operation must be stated before the next card is selected. Time limits can be added to make the play more interesting.

MENTAL MATHS ACTIVITY TWO: NUMBER SNAKE

This activity can be done with two players or more

Addition and multiplication can be used for this activity

Shuffle the deck of cards

Decide who goes first

Each player selects a card and places it face down on the table making a line (recommend starting with 3 cards)

The first two cards are flipped over and either added together or multiplied together.

If the addition or the multiplication is done correctly then flip over the next card and either add or multiply that to the answer for the previous calculation.

To increase the difficulty of the activity more cards can be added.

Do this until the player answers incorrectly or if the time elapses then the next player can start.

Suggestions:

Award points for each correct answer given and keep a record to see who wins at the end. Time limits can be added to make the activity more interesting.

MENTAL MATHS ACTIVITY THREE: MATHS BINGO

(Recommendation: Laminate the bingo cards and use a whiteboard marker so that the bingo cards can be reused.)

This activity can be done with two or more players

This activity works the same as normal bingo but just with maths sums.

The sums are read on the question sheet if the learner has the answer on his or her charts they can cross out the answer

If they have the required number of answers in a row they have bingo and need to shout it out to win the game.

Please note that this activity has a limitation as the answers and the sums were planned and they cannot be edited.

WORKSHOP 2: CALCULATIONS INVOLVING WHOLE NUMBERS: ADDITION AND SUBTRACTION

ADDITION AND SUBTRACTION ACCORDING TO CAPS

Number range for calculations

- Addition and subtraction of whole numbers of at least 4 digits

Calculation technique

- Building up and breaking down numbers

Although there is much more to whole numbers according to CAPS the focus was only on the basics of addition and subtraction. A topic like estimation, using a number line, rounding off and compensating, and doubling and halving was not included in this workshop due to time constraints and that parents are competent in this area of mathematics.

WHOLE NUMBERS: ADDITION AND SUBTRACTION

There are two types of methods used to add and subtract numbers

- 1. Expanded notation**
- 2. Vertical or column method**

Expanded notation: when numbers are broken up into their individual place value groups

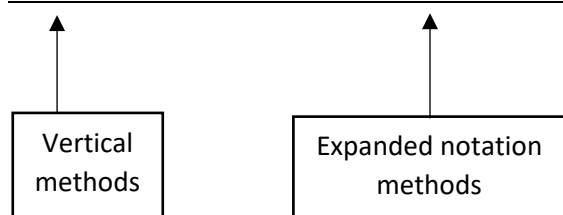
A place value group is a group that the number represents e.g. hundreds, thousands, and units.

In Grade 4 Learners work with the following place value group

Ten thousand, thousand, hundred, tens, and unit (which is the smallest of all place value groups)

Example using expanded notation

	Place values			
Number	Tho.	Hun.	Tens	Units
2518	2000	500	10	8
+ 1356	1000	300	50	6
3874	3000	800	60	14



Example: Using the vertical (column) method for addition and subtraction

Using the vertical (column) method for addition

Example

$$12\ 456 + 10\ 876$$

$$\begin{array}{r} 1\ 12\ 14\ 15\ 6 \\ +\ 1\ 0\ 8\ 7\ 6 \\ \hline 2\ 3\ 3\ 3\ 2 \end{array}$$

When using the vertical (column) method for adding what is known as **carrying forward** is used.

An example of carrying forward is when two numbers are added and the answer is 10 or more. The number on the right will be part of the answer and the number on the left will be carried forward and added to the next calculation.

Example: $6 + 6 = 12$, the 2 will be part of the answer and the 1 will be carried forward and will be added to the next calculation.

Using the vertical (column) method for subtraction

Example

$$12\ 484 - 7\ 756$$

$$\begin{array}{r} \cancel{1}1\cancel{2}\ 14\ \cancel{7}8\ 14 \\ -\ 7\ 7\ 5\ 6 \\ \hline 4\ 7\ 2\ 8 \end{array}$$

When dealing with the vertical method for subtraction, borrowing or carrying back is used. This is done so that all the top digits are bigger than the bottom digits as subtraction cannot happen if the top digits are smaller than the bottom digits.

If one of the top digits is smaller than the digit below it then borrow 1 from the digit in front of it to increase its value.

Example: 2 is smaller than 7 so we borrowed from the 1 to make it 12 and 12 is a bigger number than 7. Now subtraction can take place but should multiple digits be smaller borrowing will continue until all the digits are bigger.

Example: 4 is smaller than 7 so we borrow 1 from 12, 12 now becomes 11, and 4 becomes 14 which is bigger than 7.

WORKSHOP 3: MULTIPLICATION AND DIVISION

MULTIPLICATION ACCORDING TO CAPS

Number range for calculations

- Multiplication of at least whole 2-digit by 2-digit numbers
- Division of at least whole 3-digit by 1-digit numbers

Calculation techniques

- Use a range of techniques to perform and check written and mental calculations of whole numbers including
- Using multiplication and division as the inverse operation

MULTIPLICATION AND DIVISION

MENTAL MATHS GAMES

Card games: needed is playing cards

Hold up the cards for example 6

Asking learners which two numbers multiplied together will give them 6

Use single-digit numbers in the beginning and then move on to the double digits

Example: hold up playing cards 1 and 2 this will give you 12

Ask learners which numbers can be multiplied together to give you 12

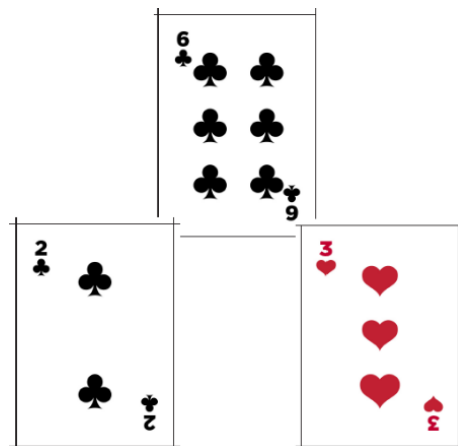
If the learner gets the answer correctly, he or she can keep the card. Do this for about 5 to 10 minutes

The same can be done for division hold up a card example 2 and ask the learner what numbers can be divided that will give you and product (answer) of 2

Another way of doing this is to place the number down on the table and then ask the learner to find two cards within the deck of cards that can be multiplied together to will give the given numbers

Example

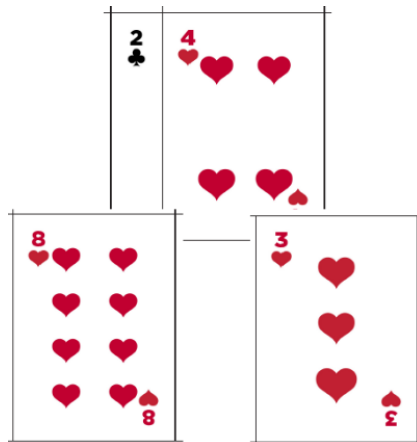
Once this part has been completed, this is a good opportunity to ask learners what other numbers multiplied together will give you 6. (Let the learner do this without the help of the cards, let learners write it down in their activity book). Once the learner has mastered single-digit multiplication, move on to two-digits



Once this part has been completed, this is a good opportunity to ask learners what other numbers multiplied together will give you 6. (Let the learner do this without the help of the cards, let learners write it down in their activity book).

This also allows for inverse operations and division to be practiced. By showing learners that if $8 \times 3 = 24$, then $24 \div 3 = 8$, and $24 \div 8 = 3$. The same can be done with 6, and every other example you as the parent use.

As learners master the operations increase the numbers up to 100. However, learners must demonstrate mastery. Remember to move at the learner's pace.

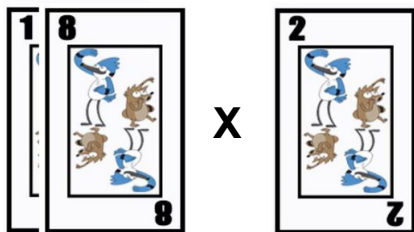


HOW TO USE THE FLARD CARDS TO DO MULTIPLICATION

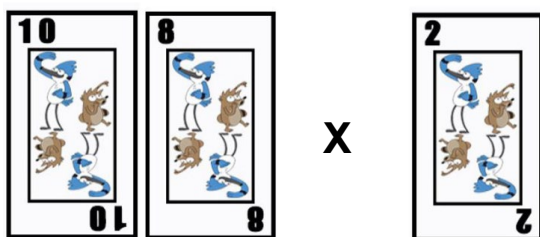
Example

$$18 \times 2 = 36$$

How can this be shown with flard cards



Separate the 10 and the 8 (expanded notation)



Let the learner multiply each number by 2 and add the individual answer together.

$$(10 \times 2) + (8 \times 2)$$

$$= 20 + 16$$

$$= 36$$

WORKSHOP 4: FRACTIONS

FRACTIONS ACCORDING TO CAPS

Describing and ordering fractions:

- Compare and order common fractions with different denominators (halves; thirds, quarters; fifths; sixths; sevenths; eighths)
- Describe and compare common fractions in diagram form

Calculations with fractions:

- Addition of common fractions with the same denominators
- Recognize, describe, and use the equivalence of division and fractions

Solving problems:

- Solve problems in contexts involving fractions, including grouping and equal sharing

Equivalent forms:

- Recognize and use equivalent forms of common fractions (fractions in which one denominator is a multiple of another)

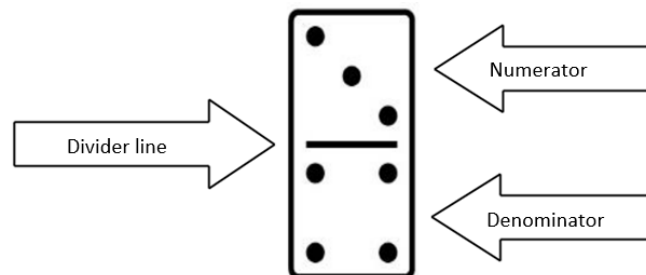
FRACTIONS

What is a fraction?

A fraction is an equal part of a whole.

A fraction has **3 parts**:

1. **The numerator** (the top number) – is the number to which the operation applies.
2. **The Divider line** (the line between the numbers) – is used to simplify the fraction if the numbers are divisible or change it into a mixed fraction.
3. **The Denominator** (the bottom number) – is the number that tells us how many equal parts there are.

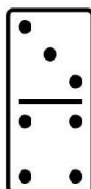


TYPES OF FRACTIONS

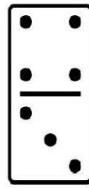
1. Common/Proper Fractions
2. Improper Fractions
3. Mixed Fractions

COMMON FRACTIONS AND IMPROPER FRACTIONS

A fraction is a common fraction when **the top number is smaller than the bottom number.**



If we turn the domino around it will give you an **improper fraction**. A fraction is an improper fraction when **the top number is bigger than the bottom number**.



When a fraction is improper then the bottom number (denominator) can be divided into the top number. This is known as the **SIMPLIFICATION OF THE FRACTIONS**.

Example

$= 1\frac{1}{3}$

← This type of fraction is called a **MIXED FRACTION**

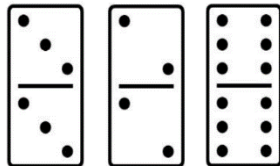
$= 2$

← The **divider line** allows 2 to divide into 4 = 2 because 2 can divide into 4

RULES ABOUT FRACTIONS LEARNERS MUST REMEMBER

RULE ONE

A FRACTION WHERE THE TOP NUMBER AND THE BOTTOM NUMBER ARE THE SAME WILL ALWAYS EQUAL ONE.

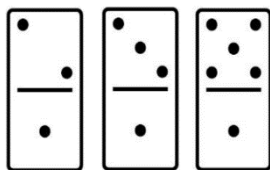


RULE TWO

ANY NUMBER OVER ONE WILL STAY THE SAME.

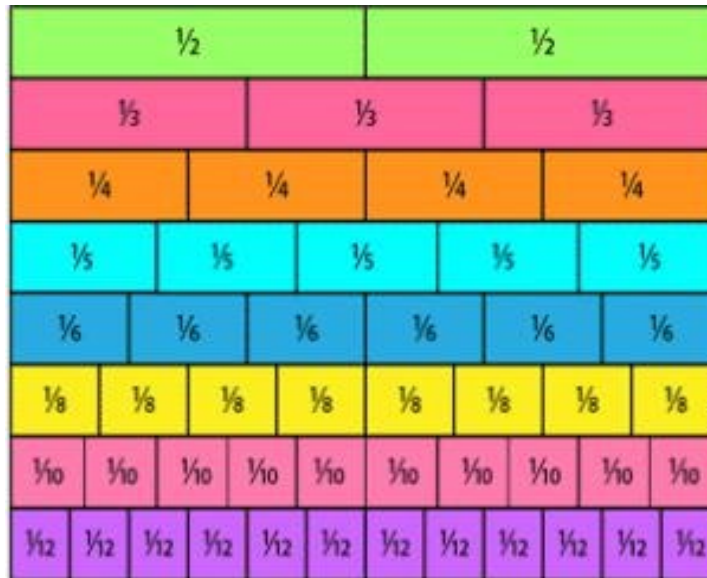
COMPARE FRACTIONS

If both numerators are 1 we use the denominators to compare the fractions. Then the following statement can apply:



The smaller the denominator the bigger the fraction.

The bigger the denominator the smaller the fraction.



EQUIVALENT FRACTIONS

Equivalent fractions are fractions equivalent in size but different in appearance. This can be done by either multiplying the numerator and the denominator of a fraction by the same number or dividing the numerator and the denominator of a fraction by the same number.

Example

The equivalent of 1 third is 2 sixths. This result was obtained by multiplying both the numerator and the denominator by the same number which was 2.

In some cases, we will be given the equivalent form of a fraction and we will need to simplify the fraction. This can be done by simply dividing the numerator and the denominator by the same number.

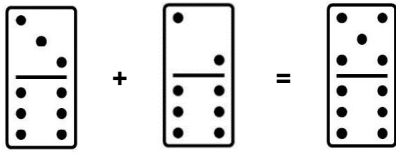
Example

ADDITION AND SUBTRACTION OF FRACTIONS

When we add or subtract fractions we must remember the following:

1. The denominators must be the same
2. The operation only applies to the numerator (the top number)
3. Always give your answer in the simplest form (smallest) if possible

Example



GRADE 4 MATHEMATICS WORKSHOP ICT RESOURCES

COMPARING AND ORDERING OF NUMBERS

<https://www.ictgames.com/mobilePage/countingCaterpillar/index.html>

SUBTRACTION

<https://www.ictgames.com/mobilePage/verticalSub/>

ADDITION

<https://www.ictgames.com/mobilePage/vertical/>

MULTIPLICATION

<https://www.ictgames.com/tablesTennis/mobile/index.html>

SKIP COUNTING

<https://toytheater.com/skip-count-race/>

<https://www.education.com/game/skip-counting-game-show/>

<https://www.ictgames.com/mobilePage/hundredSq/index.html>

ADDITIONS SUBTRACTION MULTIPLICATION AND DIVISION

<https://toytheater.com/math-flash-cards/>

MULTIPLICATION

<https://toytheater.com/magic-multiply/>

DIVISION

<https://www.ictgames.com/mobilePage/doggyDivision/index.html>

ROUNDING OFF

<https://www.topmarks.co.uk/maths-games/rocket-rounding>

<https://www.iknowit.com/lessons/b-rounding-nearest-ten-99.html>

MULTIPLES AND FACTORS

<https://www.topmarks.co.uk/maths-games/multiples-and-factors>

PLACE VALUES

<https://www.funbrain.com/games/place-value>

FRACTIONS

<https://www.splashlearn.com/fraction-games>

<https://www.sheppardsoftware.com/math/fractions/addition-game/>

**APPENDIX F: PARENTAL INVOLVEMENT IN A FAMILY MATHEMATICS PROGRAMME
REFLECTION SLIPS**

PARENTAL INVOLVEMENT FAMILY MATHEMATICS PROGRAMME REFLECTION SLIP

REFLECTION QUESTIONS

1. What about today's session did you find most interesting? Explain why.

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2. Did you find the methods and strategies shown useful? Explain which methods did you find helpful, and why?

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4. What did you dislike? Explain why?

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5. Was there something you did not understand, and what was it?

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6. Do you think you will be able to use what you learned here, to help your child with his maths homework at home? Explain why?

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APPENDIX G: PARENTAL INVOLVEMENT POST-WORKSHOP QUESTIONNAIRE

**PARENTAL INVOLVEMENT
POST-WORKSHOP QUESTIONNAIRE**

1. Which session(s) did you like the most?

- a) First session
- b) Second session
- c) Third session
- d) Fourth session
- e) All the sessions

Please explain what did you like?

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.....

2. Which session did you not like?

Please explain why?

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3. Can you now use the methods and strategies when you help your child with mathematics homework?

- a) Yes
- b) No
- c) Yes, it was useful but I struggled a bit.

Please explain why you say so.

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4. How do you feel now when you help your child with mathematics homework?

- a) not confident,
- b) moderately confident
- c) confident

Explain why you say so.

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5. Do you still struggle when you now help your child with mathematics homework?

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Explain why you say so.

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6. What is your overall impression of the workshops that you attended?

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Explain why you say so.

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7. Would you attend a workshop like this again in the future if the opportunity arises?

- a) Yes, I would like to attend another workshop in the future.
- b) No, I would not attend another workshop in the future.

Why do you say so?

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8. How do you feel now about your involvement in your child's mathematics learning overall?

Explain why you say so.

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9. Rate your involvement in your child's learning of mathematics before the workshop.

0 = not involved

1 = partly involved – assist at least once a week

2 = moderately involved – assist 2 – 3 times a week

3 = highly involved – assist 4 - 5 days a week

10. Rate your involvement in your child's learning of mathematics after the workshop.

0 = not involved

1 = partly involved – assist at least once a week

2 = moderately involved – assist 2 – 3 times a week

3 = highly involved – assist 4 - 5 days a week

11. Has any change happened with the level of assistance that you provide?

Explain why you say so.

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12. Have the workshops improved the quality of the assistance you provide your child?

Explain why you say so.

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