# A FRAMEWORK FOR OPTIMISING MATHEMATICS TEACHING ENVIRONMENTS IN THABA NCHU SECONDARY SCHOOLS

Bу

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## DEDICATION

I dedicate this thesis to my husband, Brent, for always believing in me and supporting me in every possible way.

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## **DECLARATION OF ORIGINALITY**

I, Joleen Hamilton (Student Number: 1993093069), hereby declare that the Doctoral degree research thesis entitled "A framework for optimising mathematics teaching environment in Thaba Nchu secondary schools", which is submitted here, for the Philosophiae Doctor degree at the University of the Free State, is the result of my own, independent investigation. I further declare that the work is being submitted for the first time at this university and has never been submitted to any other university in part or in its entirety for the purpose of obtaining a degree. All sources I used or quotes have been acknowledged by means of complete references. I hereby declare that I am aware that the copyright is vested in the University of the Free State.

amilton

SIGNATURE OF STUDENT

DATE: 18 June 2019

#### ABSTRACT

My educational perspective is based on my background and training. Being a teacher for more than 13 years had a direct influence on my perspectives and, when my own children started school, my whole perspective changed, as my focus shifted from being the teacher of other children, to being the teacher of my own children. For a number of years, I was part of a school partnership programme, where I mentored mathematics teachers in Thaba Nchu township secondary schools. Mentoring the Thaba Nchu mathematics teachers changed my educational perspective once again. These teachers implemented a unique way of teaching, and face a variety of obstacles and challenges. They struggle with problematic situations that teachers in cities take the absence of for granted. Township schools are contextually different from urban schools in many respects, including its geographical features, practices, learners' support systems at home, and socio-economic status. Despite the challenges that township secondary school mathematics teachers face, they still go the extra mile. Many of them teach seven days a week, they assist learners with regular informal assessments, and they prepare properly for lessons.

With the aforementioned in mind, an in-depth literature review indicated that the focus of research in this field has been mainly on the learners and the learning environment, and how the latter can be improved. Teachers are seldom given the opportunity to reflect on the challenges they encounter, or to make suggestions for overcoming these challenges. There is, furthermore, a desperate need in education for better communication and for establishing relationships between teachers, learners and their parents. Unfortunately, one of the realities is that some parents never visit their children's schools, are undereducated themselves, with Grade 8 or lower school certificates, or are simply not interested in their children's academic achievements, or the lack thereof.

The primary research question of this study was, "What would constitute a framework for the establishment of improved Thaba Nchu secondary school mathematics teaching environments?" To answer this question, an autoethnographic, qualitative research design was used. Observations, field notes, interviews and questionnaires were used to collect data. In aiming to answer the primary research question, the study focused on four major parts. The first part was to determine what literature reports

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about the experiences of mathematics teachers and their teaching environments. Considering that it was an autoethnographic study, the next part focused on my own background. I used my perspectives as reference framework to understand the experiences of the teachers who participated in the study. Another part of the study focused on how teachers at Thaba Nchu secondary schools experience their teaching environments. To collect data about these attitudes and perspectives, interviews were used. The interviews were transcribed and coded to identify the challenges and positive aspects of the participants' teaching environments. The data from the interviews were used to develop individualised questionnaires that focused on the fourth part of the study, namely, giving participants an opportunity to make recommendations for improving their teaching environment. The recommendations were ideas about how to address challenges in the Thaba Nchu secondary schools' mathematics teaching environments, as well as suggestions for ways to nurture the positive aspects of the teaching environments. The questionnaires were transcribed and coded to develop and present a framework based on participants' recommendations to optimise the mathematics teaching environments of Thaba Nchu secondary schools and, thereby, answering the primary research question. The framework aims, furthermore, to assist mathematics teachers from other township schools in similar situations and environments, to address the challenges they face, and to nurture the positive aspects they experience in their teaching environments.

The framework consists of six main themes, namely, resources, parent/guardianrelated aspects, classroom-related aspects, learner-related aspects, teacher-related aspects and school-related aspects. The framework consists of independent parts, which means that each part can be addressed on its own. If all the themes are addressed, optimised teaching environments could be within reach of Thaba Nchu secondary school mathematics teachers.

#### **OPSOMMING**

My opvoedkundige perspektief is gebaseer op my agtergrond en opleiding. Ondervinding van meer as 13 jaar as onderwyser het 'n direkte invloed gehad op my perspektief, en toe my eie kinders begin skoolgaan het, het my perspektief verander, aangesien my fokus verskuif het, van onderwyser vir ander kinders, na onderwyser vir my eie kinders. Ek was vir 'n aantal jare betrokke by 'n skolevennootskapsprogram, waartydens ek 'n mentor was vir wiskunde-onderwysers van sekondêre skole in die Thaba Nchu-township. Dié rol, as mentor van Thaba Nchu-wiskunde-onderwysers, het weer eens 'n verandering in my perspektief veroorsaak. Die Thaba Nchuonderwysers het 'n unieke manier van onderrig geïmplementeer, en moet vele uitdagings en struikelblokke hanteer. Hulle worstel met problematiese situasies waarvan onderwysers van stadskole onbewus is. Die konteks van township-skole verskil in vele opsigte van dié van stadskole, waaronder geografiese eienskappe, praktyke, leerders se ondersteuningstelsels tuis, en sosio-ekonomiese status. Ten spyte van die uitdagings wat hulle moet trotseer, doen wiskunde-onderwysers van township-skole ekstra moeite. Baie van die wiskunde-onderwysers gee sewe dae van die week klas, hulle laat hulle leerders gereeld informele assessering doen, en hulle berei goed voor vir klas.

In ag genome die voorafgaande inligting, het 'n diepgaande literatuurstudie aangedui dat die fokus van die meeste navorsing op die leerders en die leeromgewing, en hoe laasgenoemde verbeter kan word, is. Onderwysers word selde die kans gegun om na te dink oor die uitdagings wat hulle teëkom en hoe om dit te hanteer. Daar is, verder, in die onderwys 'n ernstige behoefte aan beter kommunikasie en die vestiging van verhoudings tussen onderwysers, leerders en hulle ouers. Ongelukkig is dit so dat party ouers nooit hulle kinders se skole besoek nie, dat baie ouers onder-geskool is, met 'n graad 8 of laer skoolsertifikaat, of selfs nie belangstel in hulle kinders se akademiese prestasies, of die afwesigheid daarvan, nie.

Die hoof- navorsingsvraag van die studie was, "Hoe sal 'n raamwerk vir die daarstel van 'n beter onderrigomgewing vir wiskunde by Thaba Nchu se sekondêre skole daar uitsien?" Om die vraag te beantwoord, is 'n outo-etnografiese, kwalitatiewe navorsingsontwerp gebruik. Waarnemings, veldnotas, onderhoude en vraelyste is gebruik om data te versamel. Met die doel om die primêre navorsingsvraag te

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beantwoord, het die studie hoofsaaklik op vier hoofdele gefokus. Die eerste deel was om uit te vind wat die literatuur rapporteer oor wiskunde-onderwysers se ervarings van hulle onderrigomgewings. Omdat dit 'n outo-etnografiese studie was, het die volgende deel op my eie agtergrond gefokus. Ek het my eie perspektiewe gebruik as verwysingsraamwerk om die ondervindings van die deelnemende onderwysers te verstaan. 'n Ander deel van die studie het gefokus op hoe die onderwysers van Thaba Nchu se sekondêre skole hulle onderrigomgewings ervaar. Om data oor hierdie perspektiewe en houdings te versamel, is onderhoude gebruik. Die onderhoude is getranskribeer en gekodeer om deelnemers se uitdagings en positiewe aspekte van die onderrigomgewings te identifiseer. Die data wat uit die onderhoude verkry is, is gebruik om individuele vraelyste te ontwikkel, wat gefokus het op die vierde deel van die studie, naamlik, om die deelnemers die geleentheid te gee om aanbevelings te maak vir die verbetering van die onderrigomgewing. Die aanbevelings wat gemaak is, spreek die uitdagings in Thaba Nchu se sekondêre skole se wiskundeonderrigomgewings aan, en stel voor hoe om die positiewe aspekte van die onderrigomgewings te koester. Die vraelyste is getranskribeer en gekodeer, om sodoende 'n raamwerk te ontwikkel en voor te stel. Die raamwerk is gebaseer op aanbevelings van die deelnemers ten opsigte van verbetering van die wiskundeonderrigomgewings van Thaba Nchu se sekondêre skole - só beantwoord die raamwerk die primêre navorsingsvraag. Die raamwerk poog verder om wiskundeonderwysers van ander township-skole met soortgelyke situasies en omgewings te ondersteun om uitdagings aan te spreek en positiewe aspekte te koester wat hulle moontlik in hulle onderrigomgewings ervaar.

Die raamwerk bestaan uit ses hooftemas, naamlik, bronne, ouer/voogverwante aspekte, klaskamerverwante aspekte, leerderverwante aspekte, onderwyserverwante aspekte en skoolverwante aspekte. Die raamwerk bestaan uit dele wat onafhanklik van mekaar is, wat beteken dat elke deel afsonderlik aangespreek kan word. As elk van die temas aangespreek word, kan wiskunde-onderwysers van Thaba Nchu sekondêre skole moontlik hulle onderrigomgewings verbeter of optimaliseer.

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# LIST OF ACRONYMS AND ABBREVIATIONS

ACE	Advanced Certificate in Education
ACT	Advanced Certificate in Teaching
AIDS	Acquired immunodeficiency syndrome
CAPS	Curriculum and Policy Statement
ССК	Common content knowledge
FET	Further Education and Training
FSDoE	Free State Department of Education
GET	General Education and Teaching
НСК	Horizon content knowledge
HIV	Human Immunodeficiency Virus
HOD	Head of department
IBP	Internet Broadcast Project
KCC	Knowledge of content and curriculum
KCS	Knowledge of content and students
КСТ	Knowledge of content and teaching
MKT	Mathematical knowledge of teaching
PCK	Pedagogical content knowledge
PGCE	Postgraduate Certificate in Education
SACE	South African Council for Educators
SA-SAMS	South African School Administration and Management System
SCK	Socialised content knowledge
SGB	School governing body
SMGD	School management governance and development

- SMT Senior management team
- SPP Schools Partnership Programme
- UFS University of the Free State

## **CHAPTER 1: ORIENTATION TO THE RESEARCH STUDY**

#### 1.1 INTRODUCTION

An education is one of the most powerful tools in a person's life. Children spend 12 years at school and depend on teachers to assist them to become holistically developed human beings who can fulfil roles that contribute to society. Angie Motshekga, South Africa's minister of Basic Education and Training, reflected on the value of quality education by stating that education plays a fundamental role in human development, poverty alleviation, economic expansion and social change (Du Toit 2013:2).

#### 1.2 BACKGROUND AND LITERATURE

My educational perspective is based on my background and training. Being a teacher for more than 13 years has had a direct influence on my perspective. When my own children started school, my whole perspective on education changed, as my focus shifted, from being the teacher of other children, to being the teacher of my own children. Another factor that played a part in shaping my educational perspective is the hearing loss experienced by my son, and all the challenges it brought into his life and our home. Suddenly, I had to be a remedial teacher too. This raised my awareness of the barriers to learning learners face.

I have been part of a school partnership programme since 2013, where I mentored mathematics teachers in Thaba Nchu township secondary schools. Mentoring these teachers changed my education perspective once again. The Thaba Nchu teachers have implemented a unique way of teaching, and have to overcome many obstacles and challenges. They struggle with problematic situations, which teachers in cities take the absence of for granted.

A township school is contextually different from urban schools in many respects, including its geographical features, practices, learners' support systems at home, and economic status (Pillay and Saloojee 2012:44). Another serious problem is language (Van der Walt and Klapwijk 2015:298). English is not the home language of the township school learners in general; it is usually their second or even third language. In the majority of cases, this is also true of the teachers. Language skill is crucial for

teaching mathematics well. Learners need to have a good understanding of the language of instruction to be able to understand mathematics concepts, especially when it comes to reading assessment tasks. Many parents want their children to be taught in English, as few South African languages are perceived to have the same status as English (Van der Westhuizen 2009:1). Teachers, furthermore, have to teach large numbers of learners in classrooms with too few tables, chairs, and/or textbooks. Makgato and Mii (2006:254) suggest that outdated teaching strategies, teachers' lack of basic content knowledge, underqualified teachers, and insufficiently equipped and overcrowded classrooms are the main reasons for low teaching standards in South African township schools, especially in the subject of mathematics. According to Waller and Maxwell (2017:745), South Africa was ranked last of 148 countries in mathematics by the World Economic Forum in 2014. Waller and Maxwell (2017:745) mentioned that it seems that the Department of Basic Education does not acknowledge that mathematics education in our country is not up to standard. In a media statement released by the Department of Basic Education on 29 November 2016 (online), Angle Motshekga indicated that the areas of mathematics and science are priorities in the South African Education. She acknowledged that South Africa's scores in mathematics and science, as given by TIMSS 2015, are low but improving (DBE,2016). Me. Motshekga indicated that the Department of Basic Education is continuously supporting identified schools and districts with large numbers of underperforming learners (DBE,2016). According to her teachers are receiving clear guidelines on content, pedagogy and assessment through CAPS, which provides stability in the education sector (DBE,2016).

Despite the challenges that township secondary school mathematics teachers face, they still go the extra mile. Many mathematics teachers teach seven days a week, they assist learners with regular informal assessments, and they do proper preparation for lessons. Regardless of the extra time that some teachers invest in the teaching of content, learners still obtain poor results. According to literature, key factors for improving the achievement of learners are the skills, knowledge, beliefs and content understanding of teachers (Ministry of Education 2007:1). Of course, not all teachers in township schools are on the same standard in terms of qualifications, experience and expertise, which leads to some of them underperforming, because they are underqualified to teach mathematics content.

2

With the aforementioned in mind, an in-depth literature review indicated that the focus of most research in this field is mainly on learners and the learning environment, and how it can be improved (Ediger 2012:235; Shamaki 2015:41; Sharma 2015:291; Winheller, Hattie and Brown 2013:50). Because the focus is mainly on learners and the learning environment, literature on the teacher's outlook is scarce. Therefore, I believe that teachers are seldom given the opportunity to reflect on the challenges they encounter and on suggestions for overcoming these challenges. There is, furthermore, a desperate need in education for better communication and establishing relationships between teachers, learners and their parents (Fan and Chen 2001:1). One of the realities is that some parents never visit their children's schools (Pillay and Saloojee 2012:44), are undereducated themselves, with Grade 8 or lower school certificates, or are simply not interested in their children's academic achievements, or the lack thereof.

Taking into consideration the factors mentioned above, there is a pressing need to provide teachers at Thaba Nchu secondary schools with opportunities to express their feelings, anxieties, challenges and observations, and to elicit their recommendations about ways to address their teaching situation, while, at the same time, nurturing the positive elements they experience in their teaching environments. The data collected, combined with the recommendations of the teachers and my personal experience of teaching, will provide guidance to teachers in similar teaching environments. The guidance will be presented in the form of a framework.

This study did not focus on the school mathematics content per se, or on the learning thereof by learners. Rather, the study is the result of the relationships that I built with the mathematics teachers at three selected schools over the course of four years, while we were involved in the Thaba Nchu mentoring programme project, and the need we identified to improve these teachers' mathematics teaching environments.

#### **1.3 RESEARCH FOCUS**

The focus of this study was on improving the mathematics teaching environments of Thaba Nchu secondary school teachers. This improvement will be addressed by compiling a framework that is based on the recommendations of the teachers who participated in this study. In my experience, teachers seldom get the opportunity to give their inputs about challenges and how they can be overcome. The framework aims to assist teachers at Thaba Nchu secondary schools to flourish in their teaching environment, and to motivate them to strive to improve their teaching environment.

#### 1.4 RESEARCH QUESTIONS

To accomplish a comprehensive study with the abovementioned focus as guideline, the following research questions were investigated.

#### 1.4.1 Primary research question

What constitutes a framework for the establishment of improved Thaba Nchu secondary school mathematics teaching environments?

#### 1.4.2 Secondary research questions

- 1) How does literature describe mathematics teaching environments?
- 2) How does 17 years' exposure to all aspects of teaching, on personal and professional levels, direct the researcher's perspectives of teaching and facilitation?
- 3) How do practicing mathematics teachers at Thaba Nchu schools experience their teaching environments?
- 4) What are the recommendations of practicing mathematics teachers for addressing the challenges they face and nurturing the positive aspects they encounter in Thaba Nchu secondary school mathematics environments?

#### 1.5 AIM AND OBJECTIVES OF THE STUDY

In order to answer the research questions stated in Section 1.4, a primary research aim and research objectives were formulated.

#### 1.5.1 Primary research aim

The primary research aim of this study was to construct a framework for establishing improved Thaba Nchu secondary school mathematics teaching environments.

#### 1.5.2 Research objectives

In order to achieve the primary research aim, the following objectives were set, which guided this study:

- To **determine** how mathematics teaching environments, with regard to all aspects of teaching, are described in literature;
- To **explain** how 17 years' exposure to all aspects of teaching, on personal and professional levels, directed the researcher's perspectives on teaching and facilitation;
- To **understand** how practicing mathematics teachers in Thaba Nchu schools describe their teaching environments; and
- To consolidate the recommendations of practicing mathematics teachers for addressing the challenges and nurturing the positive aspects they encounter in Thaba Nchu secondary school mathematics teaching environments.

## 1.6 CONCEPTUAL AND THEORETICAL FRAMEWORK

Babbie (2013:57) is of the opinion that there are many different ways to make sense of matters in one's daily life. People explain the same situation or experience in different ways, based on their individual beliefs and opinions. In research, a conceptual and theoretical framework forms part of the structure used by researchers to understand the phenomenon being researched.

## 1.6.1 Paradigm

According to Creswell (2009:26), individuals develop subjective meanings of experiences and situations. Many of these meanings are formed as the result of interactions with other individuals or groups of people. The paradigm of this study is social constructivism. Social constructivism focuses on determining how people interpret and understand their experiences in the environment they live in, and how these experiences impact on the meanings that are socially constructed. A researcher's interpretation of findings can be influenced and is sometimes limited by the boundaries instilled by the researcher's own experiences, subjectivity and the

construction of views through interactions between the researcher and other role players (Grbich 2013:7).

My ontological perspective for this study was relativism. I realise that the data in this research is not fixed, but flexible. Reality, in this case, is socially constructed. Reflecting on my interactions with the participants in their environment made it easier for me to understand their perspectives and intended meanings (Gray 2013:35).

My epistemological conviction regarding this study was that of subjectivism. This implies that my grounds for rational belief were those of the community, in this case, the mathematics teachers at Thaba Nchu secondary schools. As the researcher, I was interactively linked with the participants, leading to the data being created as the research study progressed (Gray 2013:35). The study is, therefore, a social form of subjectivism informed by my knowledge convictions.

I focused on the specific situations and environment of the participants, in order to understand their views and perspectives. My own background and experiences shaped my interpretation of the participants' views and perspectives. I thus positioned myself within the research, so that I was able to acknowledge my interpretation of the participants' inputs.

#### 1.6.2 Theories

The two theories forming the theoretical framework of my study are rurality and structuralism.

Structuralism refers to the belief that things cannot be seen in isolation – it is difficult to understand them independently; instead, they have to be seen in relation to the other structures they form part of. The structures in this research are those imposed by the researcher's way of perceiving the world, and the teachers' organisation of their experiences, rather than objective entities that already exist in the external world (Barry 2009:39). I used structuralism because I believe that nothing can be understood in isolation – everything has to be seen in the context of the larger structures, which they form part of. A typical structural process is inductive in nature (Barry 2009:39), and moves from the general (the teachers' and my perspectives of a positive and

enhanced teaching environment) to the specific (a positive and enhanced teaching environment in Thaba Nchu schools).

A big part of this thesis focuses on my perspectives and views of teaching and learning, which I acquired over many years of teaching and observing the teaching environment. These perspectives are reported in the format of a story, hence, a narrative.

#### 1.7 DELIMITATIONS OF THE RESEARCH AREA

This study was concerned with the experiences of mathematics teachers' teaching environments at Thaba Nchu secondary schools. The study involved mathematics teachers of three schools in Thaba Nchu which forms part of the Motheo district of the Free State. Thaba Nchu is a small town approximately 80 km from Bloemfontein. All three schools have Grade 8 to Grade 12 learners in the schools. I chose these three schools because they were part of the Schools Partnership Project (SPP) of the University of the Free State (UFS). As part of the SPP, I mentored the mathematics teachers working at the three schools. The teachers I mentored mainly taught learners in the further education and training (FET) phase. Even though the teachers taught mathematics, this study does not focus on mathematics content, but on the experiences of the teachers in their teaching environment. It was due to the good, positive trust relationships I had with the mathematics teachers that I chose to study their environment, not because of the subject.

#### 1.8 RESEARCH DESIGN AND METHODS

In conducting a valuable study and to contribute to answering the research questions, the research design and research methods play an important role.

#### 1.8.1 Research design

The research design of this study was a qualitative research design that used case studies as part of the design. Nieuwenhuis (2007a:51) defines qualitative research as a methodology that focuses on comprehending the processes and the social and cultural environments that form the structure of certain aspects or issues. Qualitative research requires the researcher to study the participants in their natural environments

(Nieuwenhuis 2007a:51). According to Nieuwenhuis (2007a:51), the focus of qualitative research is on the quality and depth of the data collected. Denscombe (2007:333) agrees, by defining qualitative research as using data text instead of numbers, and interpreting information, so that it leads to socially constructed knowledge. Qualitative research emphasises the meanings and understandings of individuals and uses social and cultural actions and experiences to find a deeper understanding.

Yin (2013:4) believes that case studies add to what we know about a person, a group of people or a social or cultural situation. The aim of case studies is to find out what the case is, how the case works and how the case fits into the bigger framework. The case, in this study, constituted the teaching environments of three identified schools. All three schools are situated in the same geographical area; they faced the same challenges and the same factors influenced their teaching environments. The learners were from the surrounding community.

#### 1.8.2 Research methods

In this study, a literature review and an empirical investigation were done. In the literature study, primary sources, such as books, journals and official documents, including policy documents, were consulted. Secondary sources, such as theses and dissertations, were studied too. Research articles were obtained by using search engines, such as EBSCOhost, Google Scholar and Google.

Autoethnography, narratology and qualitative research were used for the empirical investigation. A large part of the study is based on my own experiences and opinions, which I linked to those of the participants in the study. By using autoethnography as a method, I described and analysed my own experiences in such a way that it was possible for me to understand and relate to the cultural experiences (Ellis *et al.* 2011:1) of the mathematics teachers at the three Thaba Nchu secondary schools. This methodology gives the researcher a place in the research design, allowing the experiences and thoughts of the researcher to assist in understanding teaching and teacher education (Hamilton, Smith and Worthington 2008:17).

The most obvious form of autoethnography that I used in this study is reflexive, dyadic interviews, during which the focus was on the meanings and emotional inputs of the
interviewees (Ellis *et al.* 2011:4). According to Reed-Danahay (in Ellis 1998:49) autoethnographies show social processes and the formation of concepts, and describe life experiences. Autoethnographies, as a result of research done in groups of people living in similar circumstances, are easily understood by interpreting concrete and intimate information of a participant's life or environment. The focus was on the participants and their thoughts, feelings and ideas, and these were combined with the researcher's personal motivation, emotional responses and thoughts. The researcher's reflection added to the depth and context of the participants' stories (Ellis *et al.* 2011:4). My own experiences helped the participants to understand the reason for my research and made the research more valid, because I understood the world they work in (Plowright 2011:10). Because I worked with human beings, it was necessary to use methods that would ensure that the participants' opinions and experiences were valued and interpreted in the best possible way when the data were analysed.

Another aspect guiding the study is narratology that focuses on the story itself (Barry 2009:214). An explanation of narratology is given by Fludernik (2009:8), who explains that narratology investigates how the different parts of the narrative connects to the bigger framework. Park (2016:474) supports this meaning, by saying that reality is formed by connecting parts of our experiences of a social aspect, to the bigger picture.

According to Polkinghorne (1989, in Nieuwenhuis 2016:53), the aspects of qualitative research that make this form of research stand out clearly from other methodologies, are that qualitative research relies on words rather than numbers to describe situations, occurrences, and possibilities, and that it is meaning-based, rather than statistics-based. Qualitative research uses various methods to gain an in-depth understanding of and find answers to the research questions (Denzin and Lincoln 1994:2). In this study, observations, interviews and questionnaires were used as qualitative methods. Qualitative researchers value the relationship between the researcher and the participant, the social influence of reality, and the fact that the outcome of the research often changes the researched situation's course. My research focused on the input and influence of my own observations, meanings and thoughts, as well as on that of the participants.

#### 1.8.3 Population of the study

The population from which data were collected consisted of all FET mathematics teachers in Thaba Nchu and the surrounding rural areas. The sample consisted of FET mathematics teachers at three schools in a particular district: School A (2 teachers), School B (2 teachers) and School C (1 teacher).

As a mentor of the SPP, I mentored mathematics teachers of five schools in Thaba Nchu. To choose three schools, I considered the overall performance of the five schools. A well-performing school, a school with average performance, and a poorly performing school were selected. The school with the best results and overall performance was chosen as the well-performing school. The school with the worst results and overall performance was chosen as the well-performing and poorly performing school. The school with results between that of the well-performing and poorly performing schools was chosen as the school with average performance.

For the purposes of my study, the schools were named School A, School B and School C, where the A, B and C were allocated to the schools according to the alphabetical order of their names, and not according to the school's performance. All three schools were located in previously disadvantaged communities and were no-fee schools, which had to function on grants from the government.

The reason why I chose teachers from these schools was because we had built up strong, positive relationships over the years I mentored the teachers at the schools. They felt confident enough to share their thoughts and feelings with me, and we had a relationship of trust and mutual respect. The sampling was, therefore, purposive (Plowright 2011:41). The choice of sampling was substantiated through reference to relevant and recent literature, and focused on its appropriateness to this study.

## 1.8.4 Data collection

Different data collection techniques were used to gather information for analysis and interpretation in this qualitative study.

#### 1.8.4.1 Literature review

One of the first things that was crucial to the study, was to determine what had been done in this field of research to date. Not only did I want to learn from other researchers, I also wanted to find out how they theorised and which methods they had used. Existing measuring instruments (e.g., questionnaires) guided me when I developed my own instruments. The most important reason for doing a literature review was to ensure that I did not duplicate a previous study (Mouton 2001:50). I wanted to contribute something new to the field of my study. I searched for literature on the internet using search engines such as Google Scholar and Google, used the resident library system, including books and journals, as well as theses and dissertations by other researchers in the field of education. All these sources were used to determine how the ideal mathematics teaching environment is described in literature.

## 1.8.4.2 Using my own experiences and observations

To answer the second secondary research question, I used personal experiences gained from teaching at a secondary school for 13 years, and I assisted my own children with their everyday schooling challenges. Furthermore, I observed individual mathematics teachers in their classrooms, from 2013 to 2016, experiencing and relating to their obstacles and challenges in their everyday lives at school. This data facilitated the formation of my own ideas and opinions, so that I developed a deeper understanding of the participants' experiences of their teaching environments.

#### 1.8.4.3 In-depth interviews with five interviewees

I bonded with individual mathematics teachers while being part of a mentoring programme, which led to us having comfortable relationships. These bonds gave me the confidence to conduct interviews with them, and I believe that the data I collected were valid, reliable and applicable. Through the interviews, I wanted to collect the teachers' opinions and suggestions, which were based on their perspectives of an ideal teaching environment, taking into consideration their circumstances, challenges and other factors influencing their teaching. It was also important to learn why the teachers entertained their specific opinions about their teaching environment (Cai, Perry, Wong, and Wang 2009:5).

Discourse analysis focuses on making meaning of the written and spoken word to reveal why a situation is the way it is. To generate the discourse, semi-structured interviews were conducted with the teachers chosen from Schools A, B and C. In the

semi-structured interviews, the teachers were asked to informally answer a predetermined list of questions. Using less structured interviews was an appropriate way of exploring interviewees' opinions (Plowright 2011:16). The data collected were transcribed and translated, as some of it were provided in a language other than English, namely Afrikaans. The information gathered from the interviews was used to develop individualised questionnaires for the five interviewees to complete, as explained in Section 1.8.4.4.

#### 1.8.4.4 Completion of questionnaires by participants

A hard copy of an individualised, open-ended questionnaire was given to each research participant to complete. The basic aim of completing these questionnaires was to obtain recommendations from the practicing mathematics teachers for addressing the challenges and nurturing the positive aspects they encountered in a Thaba Nchu secondary school mathematics teaching environment. The advantage of a personal questionnaire was that the researcher was not involved while the participants completed the questionnaire, except, perhaps, for a few words of encouragement to the participants to continue with their contribution. This approach provided data about the participants' independent opinions and lead to the development of the proposed framework (Strydom and Delport 2002:331).

#### 1.8.5 Data analysis, interpretation and reporting

Data analysis, interpretation and reporting were done with the aim of answering the relevant research questions.

#### 1.8.5.1 Literature review

An in-depth study of all available and applicable literature in journals, books, internet sources, theses and dissertations was done to familiarise myself with the data and to enable me to use it as a foundation and reference base for my own study (Mouton 2001:50). It is valuable to acknowledge research already done and to compare the results with one's own findings. It can guide a researcher in terms of methods, techniques and obstacles that should be avoided. By doing this literature review, I answered the first secondary research question: How does literature describe mathematics teaching environments?

# 1.8.5.2 Report on own perspectives regarding, as well as my experiences and interpretations of, my observations

Considering that Chapter 4 is in narrative form, I told my story, with reference to all my experiences and observations of teaching and facilitation, as well as my interpretations thereof. I interpreted the notes that I had made of my observations of the teachers whom I mentored in the three Thaba Nchu schools. These notes included observations of non-verbal behaviour and interactions between the sample teachers and learners in the mathematics classrooms (Plowright 2011:16). Using observations has several advantages, of which one is to assist the researcher to blend into the research community. By observing, a researcher obtains an objective view of the community. Many participants are less self-conscious when a researcher is simply observing (Schurink 2000:282). The researcher was a participant in the lesson as an observer, with the aim of becoming an "insider", while remaining an "outsider". By reporting on my own perspectives and experiences, I answered the second secondary research question, about how 17 years' exposure to all aspects of teaching, on personal and professional levels, directed my perspectives on teaching and facilitation.

## 1.8.5.3 Coding after interviewing the participants

It was important to have access to every word spoken by every interviewee, therefore, I recorded each interview and carefully transcribed the interviews. The transcribed data were analysed to identify the challenges and positive aspects experienced by the participants. This analysis provided an understanding of how the participants experienced their teaching environments and, thus, answered the third secondary research question, about how practicing mathematics teachers at Thaba Nchu schools experience their teaching environments. The information gained from the interviews was used to develop individualised questionnaires for each participant.

#### 1.8.5.4 Coding questionnaire responses according to themes

Data were collected by using individualised, open-ended questionnaires, of which hard copies were provided to each individual participating teacher. The collected data were transcribed and analysed carefully, by identifying main and sub-themes. These themes presented a framework of recommendations given by the participants and, therefore, answered the fourth secondary research question: What are the

recommendations of practicing mathematics teachers for addressing the challenges and nurturing the positive aspects they encounter in Thaba Nchu secondary school mathematics environments? This framework was refined further, and lead to the presentation of the final framework in Section 7.3.

#### 1.8.6 Ethical issues

According to McMillan and Schumacher (2006:17), the researcher is primarily responsible for enforcing all ethical requirements. Application for ethical clearance, as required by the UFS and other leading universities (Wassenaar 2006:61), was done and approved by the UFS ethics committee. Permission to conduct research in the three specific schools was given by the Free State Department of Education.

The participants could decide whether to take part in the study, or not. The process was explained to each individual, after which all participants decided to take part in the study. Participation was, therefore, completely voluntary. The names of the participants and their schools are confidential and are not used in the report of this study. Participants were ensured that their identities would not be used in any publication or conference presentation. Participants were informed beforehand about the date on which the interviews would take place and that it would be recorded. The questions that were asked during the interviews, as well as in the questionnaires, were selected carefully, and focused on the topic of the study. The questions did not probe into personal matters, and the privacy of the participants was taken into consideration. Confidentiality was of the utmost importance, and will be maintained, even after completion of the study. The principals of the schools were signed by the principals as well as the participants.

## 1.9 VALUE OF THE STUDY

Teachers in Thaba Nchu face many obstacles and challenges, which differ from those experienced by teachers at city schools. With this research, I was able to give teachers an opportunity to make recommendations to improve the Thaba Nchu secondary school mathematics teaching environment. Literature of research in the field of this study focuses mostly on learners and what they need or experience in relation to the learning environment (Jacob, Frenzel and Stephens 2017:461). Today, there is greater interest in teachers' affective states, however, empirical findings are not available (Jacob *et al.* 2017:461). Teachers' affective states are closely linked to what happens in the classroom (Brady 2011:56; Jacob *et al.* 2017:462).

Mathematics teachers' affective states are influenced by a number of factors, such as learners' mathematics skills, learner engagement, and organisation of the learning environment (Jacob *et al.* 2017:468). All these factors are, in turn, influenced by other factors, such as socioeconomic status, resources and learner numbers in classrooms. I believe that teachers seldom have the opportunity to give their inputs on what is challenging and how it can be overcome. No research has been done on Thaba Nchu mathematics teachers' views of their teaching environments, the challenges they face, the positive aspects they experience, or recommendations by teachers to improve their teaching environments. This constitutes a gap in the literature that I addressed through this study.

#### **1.10 CHAPTER DIVISION**

This section will provide an overview of the chapters of this study.

Chapter 1 offered an orientation to the study.

**Chapter 2** reports on a literature review that was undertaken to provide background to the theoretical framework underpinning this study, as well as the concepts teacher, teaching, rural school and teaching environment, to answer the first secondary research question.

**Chapter 3** discusses the methodology used in the study, and describes autoethnography and qualitative research approaches.

In order to answer the second secondary research question, a narrative approach is taken in **Chapter 4**. The narrative includes my experiences, observations and perspectives of teaching and facilitation.

The aim of **Chapter 5** is to present qualitative findings using interviews, and focusing on determining how the teachers of Thaba Nchu experience their teaching environments. This chapter, therefore, answers the third secondary research question.

**Chapter 6** deals with further qualitative findings, by presenting the recommendations of the practicing mathematics teachers regarding the challenges they experience, and reporting on the positive aspects they encounter in Thaba Nchu secondary school mathematics teaching environments, thereby answering the fourth secondary research question.

In **Chapter 7**, the framework I developed, based on the information provided in Chapter 6, is presented. Conclusions are drawn and recommendations made. The primary research question is answered in this chapter.

## **1.11 CHAPTER SUMMARY**

This chapter aimed to orient the reader to the study and to provide an overview of what can be expected in this research report. The focus of the study, as well as the aims and objectives, were given in this chapter. The research methodology was discussed briefly. Ethical issues formed part of the discussion of this chapter. The chapter concluded with a chapter outline of this written thesis. The next chapter will present the information available on the field of study in literature, which was investigated during the literature study.

## **CHAPTER 2: LITERATURE REVIEW**

## 2.1 INTRODUCTION

Merriam (2009:5) describes qualitative researchers as researchers who want to understand how participants in the research make sense of their experiences in social and cultural contexts. This explanation of qualitative researchers represents my view of my study precisely. For me to validate my data and to ensure it is reliable, I had to search literature to understand how other researchers view teachers and mathematics teaching environments. This chapter aims to give me and the reader an overview of literature that is available and to answer my first secondary research question: How does literature describe mathematics teaching environments?

## 2.2 THEORETICAL FRAMEWORK

Searching literature is not only necessary to find out what other researchers have written on a certain topic, but also to explore theories one could possibly use to investigate the research questions of a study (Creswell 2009:58). Anfora and Mertz (2006:xiv) define a theory as a group of linked concepts, hypotheses and ideas presenting a step-by-step view of occurrences. The view of occurrences is presented by emphasising relationships between variables, which explain and anticipate the outcome of an occurrence. Creswell (2009:69) states that qualitative researchers use theories as a comprehensive explanation for reactions and beliefs. Qualitative researchers also use a theoretical lens, which serves as a supporting approach that guides and structures the questions asked and the methods used to collect and analyse data. The theoretical lens also gives information about the researcher's position in the study (Creswell 2009:69). Strauss (1995:9) views theory as a framework that explains a phenomenon in a simple way, with the purpose of defining and explaining certain concepts.

In the sections to follow, I will describe rurality and structuralism which form the theoretical framework of this study.

#### 2.2.1 Rurality

Rural communities are unique. Clear cultural differences are seen between rural communities and urban centres, as well as among rural communities (Couper 2018). Rural communities have their own special qualities, including personal and enduring relationships and a high loyalty-level to friends, relatives and the community and its members (Couper 2018). People in rural communities have self-sufficiency, self-reliance and independence high on their priority lists. Tradition and/or religious practices are often the basis of a clear sense of behavioural norm seen in rural communities (Couper 2018).

The participants of this study taught at schools in rural or township areas. Therefore, it is necessary to include rurality in the theoretical framework used as lens. Couper (2018) defines rurality as a lived experience, a matter of perception and a state of mind. Brann-Barrett (2015:763) express rurality in two ways, namely from a physical perspective and as the representational rural. From a physical perspective rurality means spaces or areas of land with low population densities and communities relying on local economies. Rural is seen as spaces with definite borders which clearly tell the rural areas apart from the urban areas (Brann-Barrett 2015:763). According to Brann-Barrett (2015:763) a physical perspective of rurality is important, but insufficient on its own. She gives two reasons for this statement. The first reason is the dependency of the physical perspective on an urban-rural contrast. Urban is generally seen as the norm, with rural perceived as 'the other'. The second reason is that the physical perspective of rurality ignores the reality of rural and urban spaces being intertwined (Brann-Barrett 2015:764). The second way Brann-Barret (2015:764) expresses rurality is as the representational rural. Rurality seen as the representational rural focuses on how the people living in rural areas perceive the space. These perceptions are based on people's access to social support systems and socio-economic status.

Rurality is usually associated ideas like space, isolation, community, poverty, disease, neglect, backwardness, disempowerment, exclusion, depopulation, conservativeness, racism, relocation, crime and entropy (Balfour, Mitchell and Moletsane 2008:101; Brann-Barrett 2015:764). Clark (2017:30) refers to rurality as complex because it addresses the cultural, economic, geographical, political and social aspects or rural communities. Odora-Hoppers (2004:19) is of meaning that the focus of available

literature on rurality is on space, rather than people. People's conception of rurality is seldom linked to words such as effectiveness and powerful. Rurality is seldom seen as a space with value independent of urban influences (Balfour *et al.* 2008:101). Balfour *et al.* (2008:102) state that one of the defining characteristics of rurality, is its intensity. For example, poverty is present in urban spaces as well as in rural spaces. The difference is that in urban spaces better support and infrastructure are available, whereas in rural spaces support is often absent or inaccessible due to distance and poor transportation (Balfour *et al.* 2008:102).

Three variables were identified by Balfour et al. (2008:103) in a generative theory of rurality as education research. The parts forming this theory are referred to as variables, making them dynamic, positive, connected and concerning feelings and intuition rather than categories which are fixed and unconnected (Balfour 2012:14). The three variables are forces, agencies and resources. The first variable, forces, in rurality refer to space, place and time (Balfour 2012:14; Balfour et al. 2008:104). Space is defined as both that which is inhabited as well as that which is move within. For example, when adults move from rural to urban for employment reasons, their space is still rural with them being loyal to their culture and the authority systems of the rural community. However, their place is the city where they have an employed life and identity linked to this employed life (Balfour et al. 2008:104). A significant component of rurality is the time it takes to move from place to place in space. This elongation of time impacts not only identities of members of the rural space, but also leads to a higher level of isolation from urban areas (Balfour et al. 2008:104). The second variable used to address challenges in rurality is agencies (Balfour et al. 2008:105). The defining property of agencies is the ability to change the connection between space, place and time. Agency includes compliance and disruption, activism and entropy, basically an exercise of will towards both ends of a situation (Balfour et al. 2008:105). For example, the majority of people perceive rurality as negative, being in need of rescue, pity and charity. That is one side of rurality. At the other side rurality is transformative, capable of changing behaviour and affecting motivation of rural community members (Balfour et al. 2008:105). Balfour (2012:14) mentions that agencies became the method people use to sustain relationships between space, place and time. The third variable used to address challenges in rurality is resources (Balfour et al. 2008:106). Resources do not only include material and emotional

resources, but conceptual and physical resources as well. Resources can either be bought or made, but the effectiveness of the resources is mainly dependent on the influences of the agencies and forces (Balfour 2012:14; Ndebele, Muhuro and Nkonki 2016:130).

Rurality offers a multilayering of positioning and self-awareness. These multiple layers are filled with possibilities in spite of the inheritance of stereotypical characteristics linked to rurality. These stereotypical characteristics are typically seen as damaging and disempowering in rural communities (Balfour 2016:16).

#### 2.2.2 Structuralism

Structuralism originated within the language context in the 1900s, with Ferdinand de Saussure (Lesenciue and Roman 2016:87). De Saussure stated that the different parts of a language are interrelated and must be studied as a system, not as isolated parts (Lesenciue and Roman 2016:88). Structuralism is a complex theory and many researchers have contributed to its shape (Maranda 1972:332).

Using structuralism enables a researcher to understand parts of culture through its relationship with other parts to form a larger structure. Mann (1994:online) gives a simple explanation of structuralism in which he states that structuralism understands experiences using language. According to Mann (1994:online), words are explained by words and the meaning of words are understood using different structures. Foucault (1972:22) argues that science cannot be understood logically if it is not understood socially first. Foucault states that understanding systems of thought require the investigation of information of the systems, to indicate how the different parts connect to each other. Information identifying a truth in a system is not sufficient for proper understanding -- a truth is not something we can discover, own or start from; instead, other elements must also receive attention. A truth is a structure created by a community (Mann 1994:online).

The Shmoop Editorial Team (2008:online) points out that a structuralist's aim is to find and study the structures that are fundamental to all cultural experiences. A structuralist wants to understand the deeper structure of cultural and social aspects (Barker 2004:online; Shmoop Editorial Team 2008:online). The father of structuralism, Ferdinand de Saussure, said that language is a sign system consisting of patterns and

rules (Shmoop Editorial Team 2008:online). Structuralists adopted this theory and concluded that language can take any form of signs, not necessarily only words. According to structuralists, structuralism can be used in any situation, and for any experience or aspect, to find out about the deeper structure that defines the structure as we know it (Shmoop Editorial Team 2008:online). To me, structuralism refers, therefore, to the understanding of the essential patterns that influence our behaviour, the way we speak, and our actions.

Gough (2010:819) also explains structuralism, as a conceptual and methodological perspective that can be used to study and explain different aspects of inquiry. These aspects of inquiry can include culture, literature and communities. Structuralist analysis can make meaning of the different aspects of inquiry by making use of fundamental structures (Barker 2004:online; Gough 2010:819). These fundamental structures comprise systems of interconnected parts. The systems can be understood by studying the relationships between the different parts of the system. Structuralism emphasises the relationships between different components in a system. It acknowledges the composition of each component and that each component cannot form a system on its own (Maranda 1972:330). Culler (1999:online) and Klages (2012:80) report that one must make sense of an experience's structure and the relationships between an experience and this experience with other experiences which form a bigger structure. Once the relationships are understood, one will be able to understand the experience (Culler 1999:online).

Satar (2015:113) states that the application of structuralism in social sciences does not come as a surprise, because structuralism investigates the deeper structure of matters of communication experienced by people every day. Therefore, the structuralist theory supplies a great deal of information about communication undertaken by people.

Many of the characteristics of structuralism relate to general ways of thinking about education (Cherryholmes 1988:16). This statement can be used to link the use of structuralism as a theory to my study. Education consists of many aspects, of which the teaching environment is one. Teaching environments consist of many elements, such as teachers, teacher training, physical aspects of the environment, social aspects of the learners, teachers, and community and affective aspects. Not one of the aspects can, on its own, provide a proper understanding of the teaching environment as a whole. By studying all the aspects and understanding the relationships between the aspects, an understanding of the system (teaching environments) and its underlying structures will become clear.

The purpose of the following sections is to serve as background to the research, with specific emphasis on the teacher, effective teaching, township and rural schools and teaching environments in townships and rural schools. In Sections 2.3 - 2.5, I describe to the reader what a teacher is and what teaching entails; I also address teacher training and what effective teaching is. By discussing the characteristics, explaining unique challenges and illustrating situations in township and rural schools in Section 2.7, I provide background information, in order to enable the reader to relate this information to the schools in this study. This information will give the reader an idea of the components of teaching environments, in general, and in township and rural schools, which will answer the first secondary research question of the study, namely, How does literature describe mathematics teaching environments?

#### 2.3 UNDERSTANDING TEACHING AND THE TEACHER

One of the best-known quotes of education, "Education is the most powerful weapon one can use to change the world", is wisdom that is often forgotten or ignored by learners. A child spends 12 years at school, with the aim of becoming a holistically developed human being who can fulfil a contributing role in society – this aim is one of the outcomes of the Curriculum and Policy Statement (CAPS) currently used in South African education (Department of Basic Education 2011a:4; Department of Basic Education 2011b:4). Becoming a holistically developed person will only be possible if children have quality teachers assisting them throughout their school years.

#### 2.3.1 Definition of teacher

According to Clement (2010:43), learners see teachers as people who should treat learners with respect, treat all learners equally, accommodate different learners with different abilities and characteristics, support learners, give learners the opportunity to take part in lessons and discussions, and who act as role models for learners.

Teachers also have their own perceptions of a "good" teacher (Fajet, Bello, Leftwich, Mesler and Shaver 2005:718). Teachers see a good teacher as a teacher with two main characteristics, namely, professional competence and affective qualities. Professional competence means a teacher has good content knowledge, the ability to teach the content to learners, and good classroom management skills. A teacher with professional competence will treat all learners fairly. He/she will motivate learners and be well organised. The affective qualities of a good teacher include patience, kindness, caring, enthusiasm and being positive (Fajet *et al.* 2005:719-720).

## 2.3.2 Definition of teaching

To teach mathematics does not only involve standing in front of a class, writing on a board and marking tests. It also requires a teacher with a sound knowledge of the mathematics content that has to be explained to learners (Ball and Forzani 2010:10; Goos 2013:972; Hill and Ball 2009:68). Another necessary requirement for a teacher is the knowledge to unpack the content for learners with different abilities. Teaching, furthermore, means to create a learning environment in which learners can feel safe and secure and have enough confidence for learning to take place. Knowing the learners, knowing how to treat them and how to let them actively construct knowledge are only a few of the aspects of teaching expected of teachers. Assisting learners should leave enough space for learners to do the work themselves (Ball and Forzani 2010:11).

#### 2.4 TEACHER TRAINING

The education of learners involves a huge responsibility and that means a teacher's work is far from simple. Teachers are in high demand, especially mathematics teachers. The teaching profession is one of the occupations with the greatest number of employees in a country (Ball and Forzani 2010:8; NPFTED 2007:6). The fact that there are many teachers shows how great the need is for training excellent teachers. Unfortunately, this need is not addressed adequately and sufficiently, as the need for teachers is greater than the need to fine-tune the training of teachers. The effect of this shortcoming is seen in schools where teachers are underqualified or unqualified (CPRE 2001:2).

#### 2.4.1 Government policy relating to practicing teachers

Before 1994, many teachers at previously disadvantaged schools in South Africa had been trained and had entered the teaching profession during the apartheid years. Teachers from previously disadvantaged areas were trained differently than those from affluent environments. The previous government (before 1994) believed that separating the different ethnic groups would give each group a chance to develop within their own culture and traditions. As a result, 10 self-governing, independent homelands were established within the boundaries of South Africa (Wolhuter 2006:127). Every homeland had its own government, school system and universities. Another big change that took place was the handing over of responsibility for education of black citizens from the church to the state (Wolhuter 2006:128). To assist with this new arrangement, a Department of Bantu Education was brought into being in each of the homelands. Teacher-training colleges were rapidly established in the homelands after 1948 (Wolhuter 2006:128) to meet the need for trained teachers, and these colleges were a direct result of the new Departments of Bantu Education. Training black teachers was one of the few ways available to uplift people in the homelands socially. To study at the established colleges that engaged in education, became a form of status and liberality (Wolhuter 2006:129).

One of the main differences between the homeland colleges and the colleges for white students was the duration of education studies. For white teachers, three-year and, later, four-year programmes were implemented, whereas, for black teachers, two-year and, later, three-year programmes were implemented (Welch 2002:19). At the end of the apartheid years, a total of 18 Departments of Education and 15 ministers of Education were functioning in South Africa (Welch 2002:24), which, in 1994, lead to one of the major challenges of the government, namely, to rationalise education into a single national system (NPFTED 2007:6). Despite efforts to improve the qualification outline of all teachers, most of the reports on South African education conclude that the majority of teachers were not sufficiently trained to deliver the desired outcomes – this finding could be the result of the training that teachers had received before 1994.

South African government policy states that, currently, the standard qualification a person needs to qualify as a teacher, is a four-year B.Ed. degree (Adler 2017:2; MRTEQ 2015:16; NPFTED 2007:14; Nyaumwe, Ngoepe and Phoshoko 2010:66).

This training must include a year's practical teaching experience in schools. Another acceptable way to qualify as a teacher is by having a Bachelor's degree with a major in a school subject, together with a Postgraduate Certificate in Education (PGCE). Teachers who are already in service with a Certificate in Education will continue to teach. These teachers, however, are urged to enrol for an Advanced Certificate in Education (ACE) or an Advanced Certificate in Teaching (ACT), which will enhance a teacher's qualifications and be equal to one of the two other ways to qualify as a teacher.

Another initiative of the South African government policy is the implementation of a new continuing professional training and development system. This new system will ensure that plans to improve the professional development of teachers are effective and have a direct impact on the quality of teaching. The system will also protect teachers from dishonest providers and promote the professional stature of teaching. Professional development activities will give teachers the opportunity to earn professional development points. The professional development points method is an internationally recognised method of acknowledging individual professional development activities that will assist with their own professional development and which are recognised by the South African Council for Educators (SACE). All teachers need to be registered with SACE to practice – registration serves as their licence to teach.

#### 2.4.2 Perceptions and beliefs of mathematics teachers when they start teaching

Teachers were also learners at some stage, and learnt from other teachers who stood in front of them in the mathematics class. This forms a frame of reference for any learner who wants to be a teacher. Prospective teachers develop a network of linked ideas about mathematics, including about content and how to teach the content, about learning mathematics and about schools and how they operate (Ball 1988:40; Clark, DePiper, Frank, Campbell, Campbell, Smith, Griffin, Rust, Conant and Choi 2014:248; Fajet *et al.* 2005:717-718). Teachers' experiences with the subject affect the way they see the subject and its content, as well as their perceptions of their relationship with the subject (Ball 1988:40). Prospective teachers' beliefs influence the way they gain knowledge during their years of studying education (Ball 1988:40; Pajares 1992:323) and can even have an effect on their classroom practices at the start of their careers. Teachers might teach mathematics in the same way they were taught (Ball 1988:40). For this reason, teachers must be made aware that they should be critical and reflective about their own and other teaching practices, so that they can develop their own strategies. It is necessary that teachers are receptive to new ideas, especially if these ideas differ from the ones in their frame of reference.

The way a teacher teaches a mathematics concept is a direct result of what he/she believes learners need to know. This influences the way learners learn (Cai *et al.* 2009:2). It is of the utmost importance that higher education institutions collaborate with government to produce qualified teachers who can fulfil their role in the classroom. Professional development must be a priority wherever teachers are trained.

#### 2.5 EFFECTIVE TEACHING

If a doctor does not keep up with developments in the medical field, he or she will be unsuccessful in his/her work. The same principle is applicable to teaching. If a teacher teaches like it was done 30 years ago, the teacher will not connect with today's learners. The way learners learn changes over time. For teaching to be effective, teachers need to adjust their strategies to be on par with learners (Zemelman, Daniels and Hyde 2005:iv). How teachers see "effective" teaching will influence what happens in the teacher's class (Stols, Ono and Rogan 2015:225). No lesson, regardless of the effort the teacher puts into planning it, will be successful without the main properties of effective teaching (Protheroe 2007a:52). Some of the most important properties of effective mathematics teaching are mathematical content knowledge, the classroom environment, motivation, qualities/skills of teachers in the mathematics class, and the practice of teaching. These elements are discussed in Sections 2.5.1 - 2.5.5.

#### 2.5.1 Knowledge

Teachers' mathematics knowledge is not enough to ensure effective teaching. Teachers also need to adjust content, in other words, break content up into smaller pieces, to make it easier for learners to understand. According to Goos (2013:973), a teacher must have seven kinds of knowledge to teach effectively, namely, content knowledge, pedagogical knowledge, curriculum knowledge, knowledge of students, pedagogical content knowledge, knowledge of educational contexts and knowledge of the purposes of education. All seven mentioned types of knowledge are essential for any teacher who wishes to enhance their teaching. However, mathematics teachers also need another type of knowledge, namely, mathematical knowledge of teaching (MKT).

This study is focused on the teaching environments of mathematics teachers. Therefore, a discussion of MKT and pedagogical content knowledge (PCK) is important, to give the reader an even better overview of what effective teaching entails. MKT and PCK are discussed in Sections 2.5.1.1 and 2.5.1.2.

#### 2.5.1.1 Mathematical knowledge for teaching

Many prospective teachers are puzzled when they are asked, "What is mathematics and what does it mean to 'know' it?" For prospective teachers, being able to determine the answer, means they know mathematics. Only a few of them will really think about the method or concepts that are used to produce the answer. Having the ability to find a correct answer does not mean the person will be able to explain or teach the concept to someone else (Ball 1988:43-44). To be able to teach a concept to someone else, a person needs to be able to reason, interpret, ask questions, speak a special mathematics language, and to see the content from the other person's frame of reference (Hill and Ball 2009:70). All these requirements mean that the understanding and knowledge a teacher needs to explain mathematics to a learner is not the same as that needed for self-explanation, or for use by mathematicians (Ball 1988:44; Hill and Ball 2009:69). In other words, if a teacher understands a concept, he/she needs a special skill and way of reasoning to be able to explain the concept to learners in a way that they will understand. The explanation method required to promote learner understanding might be different from the method the teacher uses to understand the concept him/herself (Hill and Ball 2009:69). The knowledge needed to teach mathematics, specifically, is called MKT.

MKT divides teacher knowledge into two main groups, namely, subject content knowledge (SCK) and PCK (Hill and Ball 2009:70; Koponen, Asikainen, Viholainen and Hirvonen 2017:1949). Each of these two knowledge aspects are divided into three detailed parts, as shown in Figure 2.1.



Adapted from Ball, Thames and Phelps (2008:403)

## Figure 2.1: Domains of mathematics knowledge for teaching

Common content knowledge (CCK) refers to that part of a curriculum that contains mathematics that can be used by other people too – not only learners -- such as mathematicians (Koponen *et al.* 2017:1950). CCK consists of knowledge of concepts and proofs, referred to as pure mathematics. Specialised content knowledge (SCK) includes that specific knowledge and skills that a mathematics teacher needs in order to evaluate, set and mark mathematics tasks, to explain certain problems, rules and concepts, and to understand different methods used by learners to solve the same problem (Hill and Ball 2009:70; Koponen *et al.* 2017:1951). The last part of SCK is horizon content knowledge (HCK). Koponen *et al.* (2017:1951) explain that mathematics teachers must become experts in the framework of mathematics, that is, they must know how concepts are linked to form different topics. Teachers who teach mathematics must have the ability to teach the same concepts to learners on different levels, as represented by grades or phases. To be able to do this, a teacher does not

only need content knowledge or pedagogical knowledge, but MKT, more specifically HCK, as well.

#### 2.5.1.2 Pedagogical content knowledge

The absolute necessity for teachers to have good, dependable content knowledge, is generally agreed on (Goos 2013:973). However, having sound content knowledge, in other words, understanding the mathematics content, does not mean a teacher automatically has the ability to teach the content. A combination of content knowledge and knowledge of teaching the content in a way that learners understand, is referred to as PCK by Shulman (1986:6; 1987:8). PCK also involves other skills, such as interpreting, evaluating and responding to learners' thinking processes (Goos 2013:973).

In Figure 2.1, the detailed parts of SCK and PCK are illustrated. One of the components of PCK is knowledge of content and students (KCS) (Koponen *et al.* 2017:1951). A teacher needs to be able to understand the way a learner learns and reasons, and what possible misconceptions or mistakes could be part of this thought process (Ball, Hill and Shilling 2008:375). Teachers should be able to explain the same topic in different ways, to accommodate learners who do not grasp the concept effortlessly (Ball and Forzani 2010:10). Although teaching requires subject knowledge and the ability to interpret it, it also needs a special kind of knowledge that will equip teachers with the ability to break the subject open to learners and to make learners aware of problems that they could possibly encounter with a specific concept or topic. Such knowledge will assist teachers to use different strategies to assist learners to construct knowledge in such a way that they will understand the concept.

Knowledge of content and teaching (KCT) is referred to as the ability of a teacher to choose the best method and teaching strategy, to do good planning for each lesson and to adapt methods in the classroom based on learners' participation and understanding (Hill and Ball 2009:70; Koponen *et al.* 2017:1951). Understanding mathematics for teaching means that teachers also think pedagogically about the content, and about strategies to explain the content (Ball 1988:9).

An essential part of teaching is knowing the curriculum as well as what is expected of a teacher with regard to effective teaching (Koponen, *et al.* 2017:1952). Knowing the

curriculum relates to knowledge of contents and curriculum (KCC). To know the curriculum does not only mean knowing the policy document concerning the contents of mathematics per grade – knowledge of textbooks and teaching aids, such as blackboards and technology in the mathematics classroom, are also part of KCC.

In summary: PCK is not needed to know the subject content, but PCK is redundant without subject knowledge. Mathematics content will stay mathematics content, but to teach that content requires skills and a specific way of thinking (Koponen *et al.* 2017:1950).

#### 2.5.2 Classroom environment

Under this heading emphasis is placed on classroom atmosphere and classroom culture, because of this study focusing on the teachers and their experiences. Both classroom atmosphere and classroom culture are part of classroom environment. A teacher is the heart of a classroom. Teachers determine the atmosphere of a classroom and, thus, have a big influence on the learning that takes place inside. One of the biggest contributors to a positive classroom atmosphere is a teacher's relationship with learners (Winheller *et al.* 2013:50). A teacher who trusts, respects, shows compassion for and supports learners and their learning will gain the learners' trust, respect and support. This will lead to an optimal classroom atmosphere, and create a positive culture for teaching and learning.

Teachers must also create a classroom culture conducive to discussion (Maguire and Neill 2006:online). This culture can be created by encouraging learners to explain and validate their answers. The teacher must underline the importance of participation by everyone, as well as the importance of the process, rather than merely the answers to problems. To emphasise the process tends to be a good platform for teaching learners to listen to each other and to try to understand each other's reasoning behind answers. A classroom culture of discussion also gives the teacher an opportunity to teach learners how to ask clear and probing questions in their attempts to understand the explanation. Learners can also disagree with statements made by others, which provides the teacher with an opportunity to teach them another skill, namely, to give everyone space to think in their own way, but to be confident enough to give opposing statements or arguments (Maguire and Neill 2006:online). All of the above could lead

to a situation where the teacher assesses learners' understanding informally. It also teaches learners to reason and debate, which will contribute to the learners' holistic development.

#### 2.5.3 Motivation

Motivation is one of the most critical properties of effective teaching (Erdogan and Tunaz 2012:147) - perhaps even the most necessary part of teaching. Without motivation, even the person (teacher or learner) with good abilities and skills will experience difficulties reaching long-term targets. Motivation can be defined as the combination of effort, desire and a positive orientation towards reaching a target or goal (Gardner, Lalonde, Moorcroft and Evers 1987:46). If one of the elements of motivation is missing, it means that there is a crack in the motivation foundation, which can lead to teachers being less effective, and even demotivated. It is, therefore, important for teachers to have strong intrinsic motivation. They must have a calling for teaching and for being a teacher. Intrinsic motivation is influenced by many factors, such as beliefs, a passion for education and the will to influence children positively. Extrinsic motivation of teachers is often closely linked with intrinsic motivation (Erdogan and Tunaz 2012:148), and is influenced by various factors that influence teaching. Some of the factors that influence extrinsic motivation include the physical environment, being respected by learners, colleagues and the principal, as well as being recognised for their skills and knowledge (Blasé and Blasé 2001:22).

#### 2.5.4 Qualities/skills needed by teachers in the mathematics class

To be an effective mathematics teacher demands skill. Practical experience that is gained over time can contribute to effective teaching (Nyaumwe *et al.* 2010:63). The contribution of practical experience can, however, only be positive if teachers reflect on their teaching and adjust their strategies or methods accordingly. The quality of a teacher's experience, knowledge and good judgement will lead to insight and an understanding of working with multiple learners and their thought processes. Teachers can use sound judgement to ask probing questions, thereby assisting learners to grasp concepts, to answer questions asked by other learners, and to explain by using different methods. In this way, different learners with varying abilities and different ways of learning can be accommodated in the classroom. These observations

illustrate that good communication skills are imperative for effective teaching (Nyaumwe *et al.* 2010:63).

Research done by Yesildere-Imre (2017:36-39) on the qualities of effective teachers, according to learners, teachers and administrators, found that a good teacher teaches mathematics on a level that accommodates all the learners' abilities in a positive, enthusiastic and non-aggressive way. By setting an example and being enthusiastic about the subject, a good teacher could lead learners to love mathematics. Learners are individuals, and each learner thinks in a unique way. Seeing learners as people and following their thought processes should be part of a good teacher's strategies. A positive teacher-learner relationship is important, and essential for leading learners to emotional comfort, feelings of being taken care of and supported, being confident, experiencing approval and being embraced (Davis 2003:211).

A good teacher should have solid content knowledge, good pedagogical skills to teach the content, and the ability to accommodate all learners by teaching at a tempo at which learners can stay focused. Taking the time and effort to develop professionally should be important to all teachers. With regular professional and personal development, a good teacher should be able to adjust to any environment he/she finds him/herself in.

Talking, explaining and discussing are the order of the day in a classroom, which points to another vital quality a good teacher should have, namely, good communication skills. Yesildere-Imre's study (2017:40) found that, according to learners, a good mathematics teacher connects mathematics to real life and takes the time to find visual examples, such as pictures and graphs. Using visual tools is extremely important, especially for problem-solving, as confirmed by a study by Naidoo (2012:2). Naidoo's study found that experienced teachers use visual aids to assist learners to understand certain abstract mathematical concepts or topics better. Elia and Philippou (2004:332) support this finding by saying that pictures often create questions, which lead learners to solve problems successfully. Solving problems are the result of learners' active interaction with pictures (Elia and Philippou 2004:333). For problem-solving with pictures to be effective, the picture must serve a purpose in the problem and the learners must have the prior-knowledge needed for the specific

concept or topic. Good teachers should, therefore, guide learners to practise this method of problem-solving, by using good-quality pictures.

#### 2.5.5 Practice of teaching

The practice of teaching is the fifth of five aspects relating to effective teaching discussed in this chapter. Mathematics classes taught by teachers comprise learners with varied mathematics abilities. This variation creates frustration for the teacher, who wants to teach at a faster tempo, but realises that there are learners in the class who will not be able to keep up the pace (Ediger 2012:235). If the pace is too fast, some learners will not make meaning of or understand the content. On the other hand, if the teacher's pace is too slow, some learners will be bored, which can lead to other challenges, including disruptions. It is, therefore, of the utmost importance that a teacher knows the learners and their abilities, so that a pace can be set that will accommodate all the learners to master the content.

Learners learn better when they are active participants, rather than passive recipients (Ediger 2008:988). For this reason, teachers should involve learners in teaching. To promote the involvement of learners, the teacher should facilitate group work as often as possible. Vygotsky (1987:86) emphasises the importance of learners working with others, and explains how well learners learn when they interact with adults or more capable peers.

Teachers need to encourage learners to form their own connections with content, and find ways to solve problems based on those connections. According to De Corte (1996:98-99; 2011/2012:33), learning is, among other things, constructive and cumulative. By emphasising that learners build their own knowledge by being actively involved, he supports the views of Vygotsky and Ediger. Cumulative learning refers to the building of new concepts using previously gained knowledge. Building on previous knowledge not only assists learners with meaning-making for new concepts, but also, often, to master new skills (De Corte 1996:99).

The order in which concepts and skills should be introduced to assist learners to understand, should be clear to teachers. To get the clarity needed in this area, teachers should be well-prepared for every lesson. Different strategies should be identified as part of the lesson plan, to explain in more than only one way. Different strategies must be used to assist learners to master concepts (Ediger, 2012:236) and, in this way, the teacher accommodates learners with different abilities.

Another part of the practice of teaching is choosing textbooks and teaching aids. Teachers must have the confidence to choose textbooks and teaching aids that are of a good standard and which will enhance their teaching (Ediger 2012:236). A teacher's confidence in him/herself is strongly influenced by his/her knowledge, experiences and beliefs (Cai, *et al.* 2009:2; Yesildere-Imre 2017:35), as discussed in Sections 2.4.2, 2.6.1 and 2.6.2.

Teachers must, furthermore, know how to assess learners' work, and must use different formal and informal strategies for the assessment (Ediger 2012:236). Assessing learners' work provides teachers with information they need about learners' abilities. It could also point out problem areas in teaching, as well as gaps in learners' knowledge. The most important part of being a teacher is setting a good example regarding attitude towards the subject, and persevering, especially when trying to solve a problem. Teachers serve as role models to many students (Ediger 2012:237), and are often the only reliable role models a learner has.

Learner-centred lessons should be a high priority for teachers, as this kind of lesson makes it possible for learners to participate (Education Alliance 2006:5). Different strategies and approaches must be part of the teacher's planning, and cooperative learning must also be included (Protheroe 2007b:4). Teachers, especially mathematics teachers, must give learners enough time in class to practise the concepts they were taught in that lesson. It is worthless for learners to listen to the lesson and the explanation of the concept if they don't have time to work through problems themselves. This interaction with problems helps learners to make a connection between the lesson and their own knowledge, which they construct by practising the concept (Zemelman *et al.* 2005:115).

Even in low socio-economic-class schools, learners can achieve good results if they have well-prepared teachers (Wong 1999). The teacher must be prepared for each lesson, and must spend enough time on preparation, to search for new ideas and methods to use in class.

This concludes the discussion of literature relating to effective teaching. The following section will provide more insight on affective factors that influence teachers and their teaching.

## 2.6 AFFECTIVE FACTORS INFLUENCING TEACHERS AND THEIR TEACHING

Being a teacher does not only mean that a person needs skills or qualities, such as good content knowledge, and knowledge of how to manage a classroom and of the practice of teaching. Other factors, such as a teacher's values, attitudes and beliefs, and stress caused by certain aspects of the teaching environment, also have a big influence on a teacher's teaching. These affective factors are addressed in Sections 2.6.1 - 2.6.3.

## 2.6.1 Values and attitudes

Values are defined as an individual's beliefs about what is right and what is not, and about the most essential aspects of life. These beliefs influence how an individual acts and reacts (Lai 2015:1424). Values include diligence about work, feeling safe and secure, attitudes about success and self-realisation, and open-mindedness. These values form a framework that an individual uses to compare behaviours or events. If events or behaviours do not suit the framework, the individual can avoid the events or behaviours, and even make different choices (Lai 2015:1425). Values have been found to have a great influence on people's ways of life, habits and behaviour, and can also influence teachers' teaching.

Teachers who rate their skills and capability to execute educational tasks to be at a low level, tend to have cynical, pessimistic attitudes towards these tasks. These attitudes may lead to poor teaching practices, or avoidance of certain tasks (Alkharusi, Kazem and Al-Musawai 2011:115; Trehan and Paul 2014:17). Some teachers determine whether their teaching is effective or not by focusing on how learners react to their teaching (Jacob *et al.* 2017:461).

High stress levels can have a negative impact on teaching. In addition to the influence of the teaching environment (refer to Section 2.5.3) on a teacher's stress levels, other factors that cause stress include the absence of gratuity, appreciation and acknowledgement, dissatisfaction with salary levels, and the low ranking of teachers

by society (Mujtaba and Reiss 2013:627). Personal values can cause stress, as they are the measures that an individual uses to measure themselves and the people and environment around them (Klassen and Chiu 2010:742). These internal measures give teachers a goal for achievement; if they fail to reach it, teachers can experience stress, and even feelings of failure.

According to Brady (2011:56), the practice of teaching involves continuous consideration of values. Teachers are not only teachers of a subject, but also teachers of ethics and general aspects of life. Researchers describe the ideal teacher as an emotional and psychological human being with qualities that include realness (teacher must be without pretence), trust (have a positive, reliable relationship with learners), and compassion (care for learners' feelings and thoughts) (Brady 2011:58). Other values that a teacher must have are humility, affection for learners, boldness to conquer fears, the patience to accept learners as they are, ability to make decisions to the advantage of the learners and the teacher, and joy and peace, not only in teaching, but also in life (Freire 1998:42; Palmer 1998:13).

#### 2.6.2 Teachers' beliefs about mathematics and teaching

In Section 2.3.2, the beliefs and perceptions of prospective teachers were discussed. In-service teachers have their own beliefs about mathematics and the relationships between mathematics and themselves (Cai *et al.* 2009:2). Confident teachers who believe in their ability to teach mathematics, achieve more (Koponen *et al.* 2017:1943; Winheller *et al.* 2013:65). Teachers' beliefs influence their teaching. Many teachers use their cultural beliefs as a frame of reference for values and goals, to lead them on their teaching path (Cai *et al.* 2009:2).

An individual's character is influenced by knowledge and experiences (Yesildere-Imre 2017:35). A teacher's understanding of him/herself and of other individuals, as well as an individual's understanding of a teacher, shape character. Da Ponte and Chapman (2008:242) state that professional character comprises two categories, namely, personal professional character, and public professional character. A teacher's personal professional character includes acceptance of the standards and guidelines of the teaching profession, and their central beliefs about teaching and themselves as teachers. It also includes a perception of what it means to be an exceptional teacher

and of the teacher they want to be (Da Ponte and Chapman 2008:241; Stols *et al.* 2015:225). A teacher's professional character in the classroom gives also an indication of how a teacher sees him/herself as a learner, as well as the ability to deliberate on his/her experiences. The teacher's professional character in the classroom, as well as the characteristics of a good teacher, are formed and moulded by the beliefs, thoughts and viewpoints of the community with which the teacher collaborates (Da Ponte and Chapman 2008:241).

Many research studies on teachers' beliefs about the learner-centred approach, as embodied in South African policy documents (Department of Basic Education 2011a:5; Department of basic Education 2011b:5), such as the CAPS, indicate that teachers' beliefs about learner-centred teaching methods are important; however, teachers still use conventional and old teaching strategies (Morar 2003:169-170; Van Putten, Stols and Howie 2014:388; Webb and Webb 2004:17).

Prosser and Trigwell (1997:34) report that there is a comprehensible relationship between teachers' beliefs about teaching and the teaching profession, and the way teachers teach. Teachers are more likely to change from using a teacher-centred approach to a learner-centred approach when they believe that they can manage what and how they teach. The tendency to change will also be influenced by teachers' beliefs that the size of their classes will allow interaction with learners, and that their learners have the ability to master the subject content. Other factors that might change teachers' approaches are beliefs that their teaching is appreciated by the school and subject department, and that their workload is reasonable and achievable (Prosser and Trigwell 1997:30-33).

Pajares (1992:324-326) summarises conclusions, observations and statements by several researchers on teachers' educational beliefs. This summary includes a statement that some beliefs are more indisputable than others. First, if a belief is embodied at an early stage of a teacher's development, it will be more difficult to change. Second, beliefs are used to make sense of a task and to choose the necessary cognitive instruments, make a plan and take charge of doing the task. In other words, beliefs play a vital role in clarifying the way a teacher acts and reacts, and affects how knowledge and information is ordered. Furthermore, the beliefs that

teachers have of themselves and their teaching are affected by perceptions, which can be an untrustworthy source regarding the essential features of real life.

#### 2.6.3 The teaching environment

Some of the general causes of stress in a teacher's life include teaching learners who are not interested in the subject, disciplinary problems, time constraints, the multitude of tasks that demand attention, adjusting to changes in the environment, the curriculum, teacher-evaluation processes, interaction with fellow workers, low self-respect and self-confidence, and a substandard working environment (Mujtaba and Reiss 2013:628). Other aspects that can influence teaching include low motivation in learners and insufficient time to complete the curriculum and assessments (Mujtaba and Reiss 2013:28).

Learners also form part of the teaching environment. In addition to learners' ability to master the content, learners' low self-efficacy is something a teacher must deal with in the classroom (Winheller *et al.* 2013:51). Self-efficacy refers to the ability of learners to work on a specific topic. Having learners in a mathematics class who are not really enthusiastic about the subject, can lead to lower academic performance of those learners (Winheller *et al.* 2013:51).

Unqualified or underqualified teachers pose a challenge at many South African schools (CPRE 2001:2), and leads to ineffective teaching and, thus, to ineffective learning. Schools need principals who are qualified to give proper guidance and show good leadership skills; however, there is a shortage of principals with these qualities (CPRE 2001:2). Some of the reasons for teacher shortages include the underpayment and ill-treatment of teachers. Teachers who are qualified and part of the immediate community of a school are often overlooked, and inadequate training leads to teachers who are not properly prepared for the realities of the classroom (Merrow 1999). Many other factors, including too few textbooks, technology (photocopiers and computers) not functioning optimally and ill-mannered learners can have a huge influence on teachers and their teaching. Such physical factors are discussed in Section 2.7.3.

An understanding of township and rural schools, and factors that influence teaching and learning in such environments, are addressed in Section 2.7. This investigation is necessary because the participants of this study taught in township and rural schools and, therefore, provided data relating to township and rural schools, which were their frame of reference.

## 2.7 UNDERSTANDING TOWNSHIP AND RURAL SCHOOLS

The schools that were part of this research are located in a township and a rural area, therefore, I decided it was necessary to discuss township and rural schools and the challenges associated with teaching at these schools. This section aims to define township and rural schools and to summarise the challenges faced by teachers teaching at these township and rural schools.

## 2.7.1 Definition of township and rural schools

Often, the terms rural schools and township schools are used in similar and confusing ways. Township residential areas are defined by Mampane and Bouwer (2011:114) as areas originally formed to isolate certain races. Townships are areas characterised by low-cost housing, and which provide accommodation for black workers close to their places of employment. Schools in these areas are referred to as township schools. Another definition is given by Badenhorst and Badenhorst (2011:2). According to them, township schools refer to schools in black communities; the schools were established during the apartheid era (see Section 2.4.1). Ndimande (2012:540) agrees, and defines township schools as schools that exist in urban areas which were previously, during the apartheid era, isolated.

People, in general, have an idea what a rural area is, but an official definition is not available. Rural area is defined in different ways by different countries, which creates a challenge when rural areas are compared (Adedeji and Olaniyan 2011:18). Rural areas are more commonly referred to as areas that are characteristic of the countryside, rather than the town. In other words, rural areas are removed from cities and bigger towns and often underdeveloped (Du Plessis, 2014:1109). Pillay and Saloojee (2012:44) classify rural settings as areas inhabited by unqualified workers and unemployed people. Schools within these settings are referred to as rural schools. Monk (2007:155) agrees with the above-mentioned definitions, and summarises rural as everything that is not urban or metropolitan. In general, in South Africa, both the terms township and rural areas refer to areas developed during apartheid, and are

characterised by low socio-economic circumstances, a low percentage of qualified residents and low levels of employment.

From here on, I will consider township and rural schools as synonyms. The schools I used for this research have the same main characteristics, whether they are in a township, or in a rural area.

## 2.7.2 Influence of apartheid on education in township and rural schools

In 1948, the National Party became the controlling political party in South Africa (Waller and Maxwell 2017:742). During the apartheid era, schools with white learners received good resources and could offer a good education (Ndimande 2006:145; Waller and Maxwell 2017:742), while schools with black learners did not have enough resources or qualified teachers. The National Party governed for almost 40 years before the apartheid era came to an end in 1994. In the post-apartheid era, the new government promised equal and quality education for all (Ndimande 2006:145). However, according to Van der Berg, Burger, Burger *et al.* (2011), the schools that formed part of the group of schools for black learners during apartheid, are still underperforming. The schools in Thaba Nchu are also part of the group of schools for black learners is the fact that the majority of schools in South Africa are part of this group of schools.

According to literature, the physical and socio-economic challenges faced by learners and teachers in township and rural schools greatly impact the quality of teaching and learning taking place in these areas. The following two sections will expose these challenges, with evidence from literature.

# 2.7.3 Physical challenges faced by learners and teachers in township and rural schools

A Ministerial Committee on Rural Education was tasked to investigate the state of rural schools in South Africa. The report produced by the Committee records that the state of rural schools influences teaching and learning negatively (Department of Basic Education 2005:7). Other findings of the report are that buildings had been badly built, and that basic resources, such as usable water, electricity and telephone connections,

were unavailable. These shortcomings form part of the physical challenges faced by teachers and learners in township and rural schools.

In some schools, running water is a luxury unknown to them (Lumadi 2014:245; Moloi and Kamper 2010:258; Mukeredzi 2016:92). Schools rely on boreholes and rainwater for basic needs, such as washing hands, which can lead to health issues. Teachers and learners can be infected with serious diseases. Another challenge linked to water, is not having toilets, or not enough toilets (Lumadi 2014:245; Mukeredzi 2016:92). Teachers and learners must often use bushes as toilets. In one school, a learner was bitten by a cobra while using a bush as a toilet during break, and she had to be treated at a clinic (Lumadi 2014:245). Lumadi (2014:245) also reports the case of a female teacher being raped in a bush. In some schools, there are too few toilets, which leads to the ratio of people per toilet being very high (Mukeredzi 2016:92).

Electricity is also a basic service without which some township and rural schools must often function (Adedeji and Olaniyan 2011:68; Du Plessis 2014:1109; Mafora 2013:229). Lack of electricity will influence lighting, temperature and other basic functions, including photocopying and telephone services.

Christie (1998:289) reports that one of the four main problems identified in township and rural schools is substandard facilities, especially physical and social facilities. Mukeredzi (2016:92) agrees that most township and rural schools lack basic facilities. Lacking facilities, or facilities that are poorly maintained, can affect the ability of teachers to teach, the ability of learners to learn, the overall morale of teachers and learners and the safety and health of teachers and learners (Buckley, Schneider and Shang 2004:1). Maintenance and building of facilities are determined by the availability of funds (Adedeji and Olaniyan 2011:64; Du Plessis 2014:1114; Lockheed and Verspoor 1991:36). Principals and teachers cope with the minimum facilities, and realise the challenges related to facilities will continue for the foreseeable future (Moloi and Kamper 2010:271).

Some schools do not even have staff rooms, which means that teachers must store valuables, books and teaching aids in their cars. Sometimes, if staff rooms are available, the furniture is old, broken and inadequate. Teachers need to share tables (Lumadi 2014:246).

Another concern in most township and rural schools is the physical state of classrooms. Factors, such as thermal comfort, proper lighting and quality of buildings, have an influence on the teaching and learning taking place in those classes (Buckley *et al.* 2004:3). The report of the Ministerial Committee on Rural Education notes that most school buildings of township and rural schools are poorly built, because many of them were built by the communities themselves (Mafora 2013:229). Adedeji and Olaniyan (2011:68) explain that most rural school buildings were built with mud blocks, which makes the buildings dangerous. They elaborate on the physical conditions of some of the classes, which have holes in the floors and roofs, and ceilings either irreparable or absent.

In township and rural schools, resources for teaching and learning, both textbooks and technology, are limited (Mampane and Bouwer 2011:114; Moloi and Kamper 2010:266; Mukeredzi 2016:92; Waller and Maxwell 2017:748). According to teachers interviewed by Waller and Maxwell (2017:748), the resources their school lacked the most, relate to technology. Computers and projectors are some of the items teachers, especially mathematics teachers, see as essential. Other teachers say that their schools are not suitable for technology use, because the learners do not have access to technology at their homes (Waller and Maxwell 2017:748). Du Plessis (2014:1110) supports this statement, by saying that one of the characteristics of a township or rural profile is the lack of access to information technology.

Difficulties reaching the school is another challenge many township and rural schools face. Roads are sometimes in a poor condition and the school is far from the nearest town (Mafora 2013:229). This remoteness requires learners to walk long distances to school (Moloi and Kamper 2010:258), consequently, learners are late and often absent. One of the characteristics Du Plessis (2014:1109) assigns to township and rural areas is the absence of basic infrastructure relating to roads and transport.

## 2.7.4 Socio-economic challenges faced by learners and teachers in township and rural schools

According to the Constitution of South Africa (RSA 1996a:1257), the South African Schools Act (RSA 1996b:10) and other official documents, including CAPS (Department of Basic Education 2011a:4; Department of basic Education 2011b:4), all

South African learners must have the same standard teaching and learning opportunities, the same facilities and equal education possibilities. This is, unfortunately, currently not the case in South Africa. Poverty, unemployment and other socio-economic factors are linked to the problems experienced by education offered by township and rural schools (Du Plessis 2014:1109; Mampane and Bouwer 2011:114).

According to the South African Schools Act (RSA 1996b:2), the term parent refers to the parent or guardian of a learner – the person legally appointed to care for the learner or the person who accepts the responsibility for the learner's education as stipulated by the Schools Act. Parental involvement, which involves parents participating in school activities, supports teachers in different aspects of teaching, and supports learners in their schoolwork, and can have a considerable influence on making teaching and learning more effective (Cotton and Wikelund 1989). Forms of parental involvement include parent meetings, assisting learners with schoolwork, motivating and encouraging leaners at home and keeping an eye on learners doing homework (Cotton and Wikelund 1989:1; Singh, Mbokodi and Msila 2004:301).

Modisaotsile (2012:3) reports that there are many reasons why parents must be involved in their children's education. Parents need to provide a support system for learners by being actively involved in children's everyday activities, the friends children associate with and the tasks and projects given to the child. A number of researchers report that a child's performance is positively influenced by good parental involvement (Anderson and Minke 2007:311; Bafumo 2003; Desforges and Abouchaar 2003:8; Mncube 2009:84; Modisaotsile 2012:3). Often, parents and teachers view involvement from different angles. Parents may feel that their level of involvement is high when they ensure learners' safety and bring them to school, whereas teachers will feel that parental involvement is good when parents are visible at school (Anderson and Minke 2007:311; Hornby and Lafaele 2011:39). These different views on the same matter make it clear that communication with teachers or the management of the school is another important area of education that requires parents' involvement (Lemmer and Van Wyk 2004:183).

Teachers of township schools identify parental involvement as a problem area (Waller and Maxwell 2017:748). One of the reasons for low parental involvement is that

parents had often not attended school themselves, or had attended school in the apartheid era, under the Bantu Education Act of 1953, and do not know how to read or write or, even worse, they do not attach enough value to a good education to be involved in their children's educational development (Modisaotsile 2012:3; Singh et al. 2004:301; Taylor and Mulhall 2001:136; Waller and Maxwell 2017:748). Another reason for lack of parental involvement is that parents work long hours. When they return home after a long day's work, they are too tired and not motivated to participate in their children's education (Modisoatsile 2012:3). Unemployment, the opposite of working long hours, is also a challenge faced by many households in township or rural areas (Moloi and Kamper 2010:258) and a reason for low parental involvement. The socio-economic status of parents influences their level of involvement (Brown and Duku 2008:436). Parents with low socio-economic status are often in the background when important decisions are made concerning the school's functioning or their children's education. These parents often feel inferior to teachers. This feeling of inferiority can be the result of parents' social status, or the superior behaviour of teachers. Another reason for parents feeling inferior is the way parents were raised and educated during the apartheid era, to see teachers as experts. Parents tend to leave decisions and involvement regarding education to teachers (Brown and Duku 2008:436; Mncube 2009:84; Waller and Maxwell 2017:748).

Parents must realise that, by being actively involved in their children's education, they play an important role in building partnerships with the school (Mahlangu 2014:176). Parents are the link between the school and the community, and they can assist teachers with the monitoring of school attendance and their children's behaviour (Clarke 2012:174).

Another essential role in encouraging parental participation is played by principals. Principals must have excellent communication with parents, by informing them about issues related to the school and their children's learning. Principals must, furthermore, make use of various methods of communication (Mahlangu 2014:177) to ensure that all parents receive information, and to take various socio-economic levels in the community into consideration. According to Smar (2002:53), the advantages of good communication with parents include forming a solid base to encourage learner learning, handling of issues or stumbling blocks successfully and intercepting potential
problems before they arise. Communication with parents must, however, flow both ways. Two-way communication is crucial if teachers are to have an influence on parental involvement, so that parents understand classroom matters in such a way that they can support teachers and learners (Mncube 2009:84). It can happen that parents feel they are being forced in a certain direction that the teachers or principal want; this will leave parents with little or no space to give inputs or opportunities to make an impact on learning (Plevyak 2003:34), and might even lead to a decrease in parental involvement.

Another aspect of parental involvement relates to setting a standard at home. Learners from households with parents who possess an average to good education, are likely to attend school and have higher achievement levels (Shepard 2011:21). To support learners in achieving higher levels of achievement, Shepard (2011:26) identifies parental education and employment status, together with the learner's own will to work hard, as some of the factors influencing performance of learners in township and rural schools.

The community a learner lives in has a strong influence on the learner's performance (Van der Berg et al. 2011:5). This finding is supported by the results of a study done by Taylor and Yu (2009:2), who report that the socio-economic status of a learner's family has an impact on the learner's academic achievement. Learners from a community with low socio-economic status attend a school that is close to their homes. The two main factors that can influence this choice, are the distance a learner needs to travel between home and school, and cost implications (Van der Berg et al. 2011:5). Shepard (2011:8) and Taylor (2011:3) state that learners who attend poor schools, struggle to achieve higher marks. Taylor and Mulhall (2001:138) emphasise that the relationship between the three main learning environments of any learner, namely, home, school and community, must be strengthened to ensure better learning and better achievements. The ideal learning environment for a learner to perform optimally is one that has a strong and balanced link between the home, school and community. There are many different, though connected, reasons, for the challenges faced by teachers and learners functioning in township and rural schools. These reasons can originate in the home, community, school and society, and in all the customs and traditions linked to society (Moletsane 2012:4). It is important to realise the influence of a community on a learner's academic performance.

One of the biggest challenges faced by township and rural education is insufficient funding. Adedeji and Olaniyan (2011:64) confirm that declining funding for township and rural schools (Du Plessis 2014:1114; Lockheed and Verspoor 1991:36) is causing widespread problems, including neglect of maintenance of school facilities. Due to the low socio-economic status of the communities around township and rural schools, parents cannot afford to pay school fees (Mampane and Bouwer 2011:114). Consequently, many township schools are in a challenging financial position, because they do not receive additional income. The schools are dependent on payments by government; if these payments are delayed for any reason, certain obligations, such as electricity bills, cannot be met.

A harsh reality that has an impact on teaching and learning in South Africa, is HIV/AIDS. Eastern and southern Africa has the highest number of people living with HIV in the world (UNAIDS 2018:22). In 2017, an estimated 7,2 million people were living with HIV in South Africa (AVERT 2019:online) and an estimated 13,1% of the total population of South Africa was recorded as being HIV positive in 2018 (STATS SA 2018:7). STATS SA reports, furthermore, that about a fifth of South African women between the ages of 15 and 49 are HIV positive. However, a decline of HIV prevalence among young people aged 15 - 24 was seen from 2002 (6,7%) to 2018 (5,5%) (STATS SA 2018:7). Schools are severely influenced by HIV and AIDS. Not only are learners at risk contracting the disease, but teachers are too.

HIV is exerting serious strain on the effective functioning of the education system. Lumadi (2014:247) interviewed HIV-positive teachers, who reported that they were treated differently by learners because of their HIV status. It became clear that the HIV-positive teacher must not cope only with the illness, but with psychological issues as well. During the interviews, some teachers complained that antiretroviral treatment was not available, and this lead to the deaths of HIV-positive teachers (Lumadi 2014:247). The impact of losing an adult in a household is immense. The financial implications include a decrease in the household's income, which may lead to a reduced ability to care for the children in the household, and an impact on learners' functioning overall (Lumadi 2014:247). If teachers lose a colleague, it could cause an increase in the workload of the rest of the teachers (Louw, Shisana, Peltzer and Zungu 2009:207). The increased workload leads to more learners in a class, or even more classes per teacher to teach. Larger classes can add to the challenges experienced by teachers, which include maintaining discipline in the class and paying individual attention to learners. Another result of an increased workload is greater stress for teachers, which can lead to teacher absence (Louw *et al.* 2009:207). Teachers' absence has other negative effects on teaching and learning. HIV and AIDS are not only restricted to learners and teachers, but to parents too. Moloi and Kamper (2010:258) identify the high number of parent deaths due to HIV and AIDS as a socio-economic challenge faced by some learners.

Another major problem in South Africa that affects education, is child-headed families (Pillay and Nesengani 2006:131). A child-headed family is defined as a family or household that has a person under the age of 18 as the head of the family, who takes responsibility for heading the family (Maushe and Mugumbate 2015:34; Pillay 2016:online). The problem of child-headed families is exacerbated by the reality of AIDS in South Arica (Pillay and Nesengani 2006:131). Children, in general, rely on their parents for social development, affection and education. Parents are the primary caregivers and, when the parents are absent, the children do not have role models at home or someone they can confide in. The study done by Pillay and Nesengani (2006:144) found that learners in child-headed families experience challenges with academic performance, self-esteem, being able to provide necessities for school, and discipline at school. Some of these learners drop out of school before completing Grade12, due to pregnancy or having to work.

Learner absence is a major problem in township and rural schools (Du Plessis 2014:1115), due to a number of reasons. One of the reasons is that learners in township and rural schools mostly come from low-income or poor households, and the family cannot afford to send the learners to school (Lockheed and Verspoor 1991:147). Another reason for high learner absenteeism is that many households need the children to work with the parents during peak times of the agricultural year (Taylor and Mulhall 2001:136). The school timetable expects learners to be in class for the biggest part of the day, which does not fit in with the household's timetable. Parents do not

always realise the importance of their children attending school (Taylor and Mulhall 2001:136).

Because families have low income levels, and because parents are often illiterate, households are mostly ill-equipped to support learners and their educational needs. Learners are often hungry, and cannot complete tasks due to lack of electricity at home. Learners frequently choose not to attend school (Taylor and Mulhall 2001:136). The curriculum lacks context (Taylor and Mulhall 2001:137), which leads to high learner absenteeism, because learners find the context of the content irrelevant, they find it difficult to relate to the context, they are bored, and eventually stop attending school.

## 2.7.5 A safe teaching and learning environment

Children have the right to a high-quality education. For the children to make use of this opportunity, the school environment must be safe and secure (Masitsa 2011:163). As soon as a child enters the school grounds, the child becomes the responsibility of the teacher. The teacher is, therefore, legally obliged to ensure learners' safety (Masitsa 2011:166).

Researchers suggest that a safe and secure school environment is a prerequisite for effective teaching and learning. Xaba (2006:565) states that a safe and secure school environment is a priority for most communities. This claim is supported by Prinsloo (2005:5), who explains that a school must be a safe and secure environment, not only for learners, but also for teachers and other staff. A teacher will not be able to protect a learner properly if the teacher also feels unsafe in the school environment (Masitsa 2011:167). A safe school environment contributes to effective teaching and learning. Dillon (2006:26) emphasises that learners need to be protected and that schools must be safe, so that learners can learn. Trump (2008:66) explains that, when learners and teachers feel unsafe in the school environment, the emphasis of a school can easily move from academics, to discipline and safety.

Xaba (2006:566) reports that township and rural schools are at even greater risk of safety challenges. Straining economic conditions, poor infrastructure and the location of the schools contribute to making conditions unsafe and increasing the possibility of intimidating remarks or warnings of violence (Squelch 2001:138; Xaba 2006:566).

Violence in the community is reflected in schools, where violence, carrying weapons and unmanageable behaviour by learners are visible (Netshitahame and Van Vollenhoven, 2002:313).

### 2.7.6 Challenges faced by teachers in township and rural schools

In this section, challenges experienced in township and rural schools are discussed from the teachers' perspective.

## 2.7.6.1 Teacher attrition and teacher retention

Manuel (2003:142) describes teaching as a calling, and not a stepping-stone or doorway into another profession. The decision to teach is often associated with a lifelong commitment. However, teacher attrition is a major problem in schools globally (Croasmun, Hampton and Herrmann 1997:1). Teacher attrition refers to the percentage of teachers who leave the profession in a school year. Ewing and Smith (2003:15) agree that teacher attrition is a major challenge, and state that beginner teachers tend to leave the teaching profession in the first three to five years of teaching. The rate of attrition in less privileged schools or township and rural schools is even higher (Ewing and Manuel 2005:2; Ewing and Smith 2003:16).

The decision of beginner teachers to leave teaching is mainly influenced by five factors: workload, teachers wanting a new challenge, the school, salary, and personal reasons (Ewing and Manuel 2005:4). According to Smithers and Robinson (2003:49), workload is indicated by teachers as the most important reason for leaving the teaching profession. Salary and difficult parents are identified as the least important reasons. Adding to these factors, O'Brien, Goddard and Keeffe (2008:2) report that burnout at the beginning of a teaching career is a real and obvious reason for teacher attrition in a number of countries. Burnout was identified by Hudson and Hudson (2008:67) as a factor that influences attrition of teachers teaching in township and rural schools.

Furthermore, beginner teachers are often judged for struggling and making embarrassing missteps (Johnson 2018:online). The new and creative inputs beginner teachers bring into education are mostly overlooked and seldom acknowledged. Being labelled and not mentored have a significant influence on beginner teachers, causing

them to leave the teaching profession in the first five years of teaching (Johnson 2018:online).

Stakeholders must find ways to address teacher attrition. Buckley *et al.* (2004:1) grouped factors that could possibly influence retention of teachers in the following categories: teacher factors, school factors and community factors. Teacher factors that influence retention include the salary of teaching jobs compared to non-teaching jobs, and teachers' unrealistic pursuit of perfection. The latter has a particular influence on the teaching careers of teachers with a strong will to serve the school, learners and the community; these service-driven teachers are often frustrated in the school environment, due to a lack of proper guidance to achieve their goals and their desire to serve (Buckley *et al.* 2004:2). The second group of factors, namely, school factors, refer to, for example, the level of organisation in the school, conditions teachers must work in, availability of resources, and values, such as accountability (Buckley *et al.* 2004:2). The last group of factors, community factors, include aspects such as government policies – more specifically, unclear information and confusing statements – government cuts in school budgets, and the low social status of teaching among members of the community (Buckley *et al.* 2004:3).

Frequent rotation of teachers or the introduction of new teachers could lead to confusion among learners. This confusion results because learners need to adapt to different teachers' teaching methods, and it leads to less effective teaching and learning.

### 2.7.6.2 Teacher attrition and retention in township and rural schools

It is becoming more difficult to attract and retain good pre-service teachers to township, rural and remote locations (Dorman, Kennedy and Young 2015:16; Richards 2012:53; White 2011). Pre-service teachers are hesitant to give up teaching positions in urban schools in order to teach in township, rural or remote schools (Richards 2012:53). The teachers who are placed in township or rural schools often lack experience. These young, inexperienced teachers often find it difficult to teach in township or rural schools and urban schools, where most of the differences between township or rural schools and urban schools, where most of them do the practical part of their teacher training (Dorman *et al.* 2015:16). Du Plessis (2014:1111) believes that it is a big challenge to find teachers who will be able to adjust to township or rural communities, mainly because a teacher

at a township or rural school must cope with teaching different grades and/or subjects and with fitting into the environment (Mafora 2013:229; Richards 2012:53).

In order to attract and retain teachers at township and rural schools, it is important that higher education institutions and government education departments collaborate in considering strategies to motivate pre-service teachers to think about teaching in a township, rural or remote school (Richards 2012:53). Good graduates and teachers with experience should be encouraged to teach in township, rural and remote schools (Hudson and Hudson 2008:68; Richards 2012:54) and to address the challenges faced by these schools. In Australia, Queensland uses the approach of offering statebased scholarships as incentives to pre-service teachers, to attract teachers to rural and remote schools (Richards 2012:55). These scholarships give final-year education students the opportunity to complete their studies, after which they are placed in rural or remote schools that struggle to attract teachers. The pre-service teachers are required to commit to two years of teaching at that school (Richards 2012:55).

The literature reports several reasons why teachers leave township and rural schools. Collins (1999:2) reports that teachers feel isolated in township and rural schools. In addition to social isolation, they also experience professional and cultural isolation. Monk (2007:155) explains that certain properties of rural and remote communities have an influence on teacher retention, among which the poverty of communities, the small size of the community and living far away from bigger communities. Monk's study was done in schools in the United States (2007:156). On the positive side, he reports that classes of these schools are small, that teachers are satisfied with the teaching environment, and that discipline is seldom a problem (Monk 2007:155). Monk's findings contradict that of Mestry and Khumalo (2012:98), who found discipline to be one of the biggest problems identified by all stakeholders in township and rural schools in South Africa.

According to Monk (2007:155), teacher turnover rate in rural and remote schools is often high. This finding is supported by Wallace and Sartono (2010:230) and Dorman *et al.* (2015:16), who report that retaining teachers in township and rural schools is a big challenge all over the world. Reasons for high turnover rate include low remuneration in township and rural schools, increasing numbers of learners with special needs in classes, and many learners who struggle with English (Du Plessis

2014:1114; Monk 2007:155). Monk (2007:159) adds that teachers in township and rural schools have lower educational achievements, and are unlikelier to have graduated from highly ranked universities or colleges than teachers at urban schools.

Township and rural schools experience greater teacher attrition than urban schools. Many of the factors that influence attrition are linked to the characteristics of township and rural communities and environments.

### 2.7.6.3 Teacher training

One way to attract and retain good teachers in township and rural schools, is by teaching pre-service teachers how to teach in township and rural schools (Reid, Green, White, Cooper, Lock and Hastings 2008:1). Teachers must be properly prepared to teach in township, rural and remote schools during their training (Mukeredzi 2016:89). One way of preparing teachers, is to provide pre-service teachers with the skills and knowledge they need to teach effectively in township, rural and remote schools (Mukeredzi 2016:89). Once a new teacher reports at a township or rural school, it is the principal and other teachers' responsibility to build good relationships to assist the new teacher. Building good relationships with the community can also assist the new teacher to settle into the new environment. (Dorman *et al.* 2015:16). Providing an effective, proper mentor to support beginner teachers is also pointed out as important and necessary by O'Brien *et al.* (2008:13).

To emphasise the importance of assisting new teachers in township and rural areas, White (2011) explains the Renewing Rural and Regional Teacher Education Curriculum project, which was implemented by a group of teacher education faculties of participating universities in Australia. The aim of this project is to assist teachers, not only to teach in township and rural schools and classes, but also to prepare them for township or rural life and different communities. One way of doing this is to give pre-service teachers practical experience in the real-life situations of living and teaching in township or rural communities (Mukeredzi 2016:89). In the absence of personal, practical experiences at township, rural or remote schools, pre-service teachers might have the wrong impression of living and teaching in a township or rural area (Richards 2012:60), which might cause teachers to leave the school soon after starting teaching there, or even to leave the teaching profession altogether.

### 2.7.6.4 Discipline

To achieve optimal teaching and learning in a class, the teaching and learning environment should be well-organised. Mestry and Khumalo (2012:97) state that an environment that is trusted by learners to be safe, secure, constructive and encouraging, is needed for effective teaching and learning. One of the factors that impacts on the teaching and learning environment, is learner behaviour and conduct (Rossouw 2003:414). Therefore, factors that influence teaching and learning negatively must be controlled and minimised as far as possible (Serame, Oosthuizen, Wolhuter and Zulu 2013:1). Factors that influence teaching and learning negatively include misconduct, violence, and disruption of classes by misbehaving learners. Some of the most frequent forms of violence include bullying, gender-based violence, sexual harassment, gangsterism, drug use and violence against other learners and teachers (Mestry and Khumalo 2012:98; SACE 2011:6; SAHRC 2008:5; Wolhuter, Oosthuizen and Van Staden 2010:180).

Learner discipline in South African schools is becoming a serious problem (Wolhuter and Steyn 2003:521). According to Wolhuter and Van Staden (2008:390), teachers at South African schools are not only confronted by extreme violence, they are also faced by minor disciplinary problems every day, including unmanageable behaviour by learners, disrespect for teachers, dishonesty, foul language, failing to do homework, and learner absenteeism. Mestry and Khumalo (2012:106) agree that learner disciplinary problems can be divided into disrespect for teachers, and intolerable learner behaviour. According to teachers who took part in a study done by Serame et al. (2013:5), the most prevalent form of misconduct is disruptive learner behaviour, though a more serious problem that they must handle daily, is absenteeism (see Section 2.7.4). Absent learners miss valuable learning experiences, which has a negative influence on their performance. Wolhuter et al. (2010:172) report research that found that learners from township and rural schools consider the discipline at their schools to be less than ideal. Many teachers who teach at township and rural secondary schools admit that they struggle to discipline learners and that they are disheartened about the need to handle disruptive behaviour (Van Wyk 2001:197). One of the findings of the study by Mestry and Khumalo (2012:106) is a lack of discipline amongst learners. In township and rural schools, as in urban schools, disrespect for

teachers leads to disciplinary problems, mainly because learners show disrespect by rebelling against authority (Mestry and Khumalo 2012:105).

Prew (2009:2) states that the media contributes to the negative perception of the teaching profession, which can lead to disrespect of teachers by learners. The media reports about teachers' lack of proficiency, their unethical conduct and absence from lessons. Exacerbating the negative perception, the media reports about teachers' poor and unacceptable qualifications. Rossouw (2003:413) reports that learners appear to have feelings of superiority and disrespect, not only towards teachers, but also towards parents. What complicates the situation even further, is the excessive exposure of children to children's rights (Mestry and Khumalo 2012:106). Another claim by Mestry and Khumalo (2012:106) is that children who are ill-disciplined at home, are also likely to indulge in undisciplined behaviour at school.

Intolerable learner behaviour is often seen as a means of gaining the attention of peers or teachers. This kind of behaviour is often experienced in townships and rural villages, where children are raised by grandparents or live in child-headed households, where domestic violence is often prevalent (Mestry and Khumalo 2012:106). Pienaar (2003:266) adds to this discussion by suggesting that disciplinary problems that the teacher must deal with will be reduced if parents are involved at home, and impose specific boundaries, systems and habits. Pienaar supports the importance of parents or guardians being involved in their children's schoolwork, as discussed in Section 2.7.4. Mestry and Khumalo (2012:106) agree with Pienaar, by identifying a lack of support by parents, and family history, as factors that influence discipline. Parents and schools that join hands and work together to improve discipline at schools, can have a considerable impact on learners' behaviour (Blandford 1998:32; Sheldon and Epstein 2002:4).

Mestry and Khumalo (2012:108) state that elements such as overfull classrooms, insufficient or inappropriate training of teachers and a greater number of learners with special needs in the mainstream, can increase disciplinary problems that teachers must handle. The physical conditions in township and rural schools, as outlined in Section 2.7.3, combined with poor discipline, definitely influence learners' achievement, as well as the school's achievement overall (Van Wyk 2001:195).

## 2.7.6.5 Sufficient and trained teachers

Finding qualified mathematics and science teachers is a growing problem in South Africa (Lumadi 2014:243). Schools attempt to overcome the challenge posed by the deficit in mathematics and science teachers by appointing underqualified teachers, or by appointing teachers with mathematics or science diplomas, but who lack teaching experience (Lumadi 2014:244). Another alarming situation is that teachers enter the teaching profession with self-taught teaching knowledge – a phenomenon caused by the growing shortage of qualified mathematics and science teachers. Badenhorst and Badenhorst (2011:1) agree that many teachers in township and rural schools are underqualified, and that many of the schools do not have enough teachers in scarce subjects. Pillay and Saloojee (2012:44) confirm that teachers at township and rural schools often lack qualifications, with some of them possessing only Grade 12 certificates as a highest qualification. Teachers who are not qualified to teach, place a strain on promoting quality education in township and rural schools.

## 2.7.6.6 Overcrowded classrooms

Teaching large and overcrowded classes is a reality in township schools (Badenhorst and Badenhorst 2011:2; Moloi and Kamper 2010:258). In research conducted by Lumadi (2014:246), one of the interviewees reported a teacher-to-learner ratio in schools of between 1:125 and 1:202. Not only does overcrowding in classrooms influence the quality of teaching and learning and the maintenance of good discipline, it also raises concerns about fair assessment. Teachers have to assess large numbers of tests and assignments (Lumadi 2014:246), and the concern is whether teachers can spend enough time on every assessment to understand the methods learners used to answer the questions.

## 2.7.6.7 Teacher absenteeism

Another factor that influences effective teaching is teacher absenteeism (Du Plessis 2014:1112; Morar 2003:28; Pillay and Saloojee 2012:44). If some teachers are absent, other teachers face challenges maintaining discipline, and they have to teach extra classes to stand in for absent colleagues. Even if it is only a temporary arrangement, extra classes result in an increased workload.

### 2.7.7 Management of township and rural schools

Two main concerns in South Africa that are related to the increasing number of challenges faced in township and rural environments, in particular, are rural poverty and education. Township or rural school principals must address both concerns in their schools (Du Plessis 2014:1109). However, the process of managing township and rural schools involves many stakeholders. The government, parents, teachers, learners, communities, principal and school governing body (SGB) are all needed, and all play an important part in this process (Mahlangu 2014:175). Principals have a key role in this process, and have to establish and maintain good relationships between stakeholders. According to Mahlangu (2014:175), in managing township and rural schools, the emphasis must be on the state of the relationships between the stakeholders. Good relationships will have trust as an outcome. Trust among stakeholders is needed for spontaneous participation of stakeholders, and to create unity in decision-making, to the benefit of the school (Mahlangu 2014:175). If communication between the stakeholders of a school.

Section 16 of the South African Schools Act 1996 (RSA 1996b:23) states that professional management of a school is the task of the principal and heads of departments. Supervising and providing direction to the school are the responsibilities of the SGB (Mahlangu 2014:176; Mestry and Khumalo 2012:98). The SGB comprises spokespersons of each of the groups involved in a school, namely, parents, teachers, learners, administrative staff and the community (Mahlangu 2014:176). However, if aspects in a school need to change, the new direction for the school must be introduced and managed by the principal. This necessity could give rise to conflict between the principal and other stakeholders, who may have opinions and values that differ from those of the principal (Mahlangu 2014:176). Good communication and positive relationships must, therefore, be the underlying structure of the management process.

#### 2.8 CHAPTER CONCLUSION

In the past, researchers mainly focused on learners' emotions, whereas focus on teachers' emotions, and the empirical evidence to support these findings, have been

lacking (Chang 2009:193; Frenzel 2014:494). Moletsane (2012:4) states that the challenges faced by learners and teachers in township and rural contexts must be studied and acknowledged. Furthermore, the resources and assets of the schools and the communities must be utilised in a way to bring about the social change the schools and communities want to see. Moletsane also states that the most important focus of studies on the challenges faced by learners and teachers in township and rural contexts must be the perspectives of the people living in a particular community.

Being a teacher in a township or rural school requires teachers with nerves of steel. Despite all the challenges they face, teachers are expected to be productive and to deliver high-quality education. If the school's results are below expectations, explanations are required from the teachers (Lumadi 2014:247). Very few teachers can keep on doing their best in such conditions.

I used all the above to group the challenges into five main categories, namely physical challenges, socioeconomic challenges, teacher-faced challenges; management challenges and affective aspects influencing teaching, teachers and the teaching environments.

In Chapter 3, the methodology used to collect, analyse and interpret the data that are needed to answer the research questions, is discussed in detail.

# **CHAPTER 3: METHODOLOGY**

## 3.1 INTRODUCTION

In Chapter 2, a review of applicable literature was undertaken, in order to achieve a better understanding of teachers, the teaching environment and certain aspects of rural schools as they relate to teaching environments. It was necessary to study the literature to be informed about the research already done by other researchers on the topic of this study. Chapter 2 answered the first secondary research question, namely, How does literature describe mathematics teaching environments?

In this chapter, I focus on specific research methods that were appropriate for this study. This research focused particularly on human experiences (Mack, Woodsong, MacQueen, Guest and Namey 2005:1), more specifically, those experiences encountered in teaching environments in Thaba Nchu. By explaining the paradigm, the research design and the research methods used, I will motivate why I chose the research approach I did.

## 3.2 THE TERM RESEARCH

Leedy and Ormrod (2010:2) define research as the organised process of gathering and examining information. Research, furthermore, includes the interpretation of the information that was gathered, to expand our understanding of a specific aspect or situation we are interested in or concerned about. Research is defined by Creswell (2008:3) as the process of following logical steps to gather and examine data, with the aim of enhancing our understanding of a topic or a matter.

Gray (2009:3) describes research in the real world as the steps needed to solve a problem in areas such as hospitals, businesses, schools and communities. Gray (2014:4) states, furthermore, that a problem must be solved systematically. It is important to plan research thoroughly and to avoid doing anything impulsively. Each phase of the research must be defined properly, and the objectives must be clear. The phases of research include identifying the gap in literature, deciding on a topic, formulating research questions, determining the research approach, deciding on a research plan, collecting data, analysing data, interpreting and discussing results (Gray 2009:5).

Research can be divided into two main groups, namely, natural sciences and social sciences research. Natural sciences research is often referred to as "hard", quantitative or experimental research (De Vos, Strydom, Fouché and Delport 2005:5; Mabry 2008:215). The aim of natural sciences research is to test hypotheses using experiments. Social sciences research is referred to as "soft", qualitative or interpretive research (De Vos *et al.* 2005:5; Mabry 2008:215). The aim of social sciences research is to study people and their behaviour and to develop theories explaining these phenomena. The beliefs, behaviour and interaction of people are, in contrast with natural sciences experiments, difficult to measure with laboratory instruments (De Vos *et al.* 2005:5). Ragin and Amoroso (2011:3) define social sciences research as one of many ways to give information about society, in other words, to tell about communities.

My research investigated and tells stories about teachers and their experiences, beliefs and feelings about their teaching environments. Therefore, this study falls in the social sciences research category.

## 3.3 RESEARCH QUESTIONS AND RESEARCH AIM

To understand my choice of research approach and to ensure coherent logic throughout the chapter, I will refer shortly to the research questions and research aims that were discussed in Chapter 1 (see Section 1.5).

To answer the main research question of this study, a framework was compiled, based on the recommendations of the participating teachers, to improve the teaching environments of Thaba Nchu secondary school mathematics teachers. Teachers seldom get the opportunity to give their inputs about challenges and how to overcome them. I hope that the framework developed by this study will assist teachers at Thaba Nchu secondary schools to flourish in their teaching environment, and motivate them to work and strive to achieve an improved teaching environment.

The study's main research question, namely, What would constitute a framework for the establishment of improved Thaba Nchu secondary school mathematics teaching environments?, would be answered after answering the secondary research questions, namely,

1. How does literature describe mathematics teaching environments?

- 2. How did 17 years' exposure to all aspects of teaching, at personal and professional levels, direct the researcher's perspectives of teaching and facilitation?
- 3. How do practicing mathematics teachers in Thaba Nchu schools experience their teaching environments?
- 4. What recommendations do practicing mathematics teachers give to address the challenges and nurture the positive aspects they encounter in Thaba Nchu secondary school mathematics teaching environments?

To achieve the aim of the study, I chose social constructivism as research paradigm, which will be discussed in the following section.

## 3.4 RESEARCH PARADIGM

Before I can discuss the research paradigm I chose for the study, it is necessary to determine what a research paradigm is. Babbie (2013:57) is of the opinion that there are different ways to make sense of matters in one's daily life. People explain the same situation or experience in different ways, based on their individual beliefs and opinions. These frames of references that we use to understand and to explain observations and logical thinking, are called paradigms (Babbie 2013:58). In research, researchers investigate issues using their knowledge. This knowledge can be seen as the frame of reference researchers use for their investigation or study (Henning, Van Rensburg and Smit 2004:12). Mertens (2010:7) mentions that a paradigm is a method people use to look at the world. Creswell (2009:62) describes a paradigm as a lens or perspective that gives orienting direction to the study, and Henning *et al.* (2004:14) refer to paradigms as theoretical frameworks. When summarising all the explanations of a paradigm mentioned above, a paradigm is, to me, basically a set of firmly held beliefs that give our thoughts and actions direction when doing research.

Mackenzie and Knipe (2006:194) state that a researcher must identify the paradigm that forms the framework of reference for a proposed study. Without a paradigm, there is no foundation and motivation for the choice of methods, literature and research design. The main paradigms structuring qualitative research are positivism and postpositivism, interpretivism, which is closely linked to constructivism, critical research, and feminism (Denzin and Lincoln 2005:22; Denzin and Lincoln 2011:13;

Henning *et al.* 2004:16). Each of the paradigms have expanded, giving rise to more paradigms (Denzin and Lincoln 2011:13). It is important to identify the best paradigm to suit the research study.

According to Scotland (2012:9), a paradigm consists of different parts, namely, ontology, epistemology, methodology and methods. Ontology refers to the nature of being and what reality is composed of (Gray 2014:54; Scotland 2012:9). Epistemology is concerned with attaining knowledge, its forms and nature, as well as how it can be communicated (Cohen, Manion and Morrison 2007:7; Scotland 2012:9). Methodology is more than just methods (Henning *et al.* 2004:36; Scotland 2012:9). Methodology is concerned with different methods that can be used to deliver data and results to support the research question and research aim. Babbie (2013:555) defines methodology as the answer to two questions: How do we know the world? and, How do we gain knowledge of the world? Methods, in turn, describe the techniques and procedures a researcher uses to gather and analyse information (Henning *et al.* 2004:36; Scotland 2012:9). Ontology and epistemology form part of the backbone, thereby structuring any research study; furthermore, it reflects some of the beliefs and views of the researcher.

Based on the explanations in the previous paragraphs, this study used social constructivism as paradigm. In the following three sections, I will motivate the choice of paradigm as well as explain my ontology and epistemology, and the way it is linked to the paradigm and the research aim.

### 3.4.1 Social constructivism

According to Creswell (2009:26), individuals form subjective meanings for experiences and situations. Often, these meanings rely on the interactions of people with other individuals or groups. Researchers who use social constructivism as framework, focus on determining how individuals make sense of and explain their experiences of the circumstances in which they live. The way in which these experiences impact on the opinions and thoughts of individuals is another point of focus of social constructivist researchers. Researchers also study the specific contexts participants live in, to make sense of the cultural environment of the participants (Creswell 2009:26). The researcher's interpretation of the information can be shaped by the researcher's own experiences, subjectivity and impact of the interactions between the researcher and the participants (Creswell 2009:26; Grbich 2013:7). Researchers position themselves as part of the research, to allow their own backgrounds and experiences to influence their analysis and evaluation of the data (Creswell 2009:26). In my study, my own experiences and exposure to teaching environments assisted me to make meaning of the teaching environments of Thaba Nchu mathematics teachers. I also used the opinions and views of the participants to assist me to gain a deeper understanding of the context the participants teach in.

## 3.4.2 Relativism as ontology

My ontological inclination is relativism. Relativism refers to the perception that reality is personal and different for each individual (Guba and Lincoln 1994:110). Scotland (2012:11) is of the opinion that our perceptions guide our realities. Scotland (2012:11) supports Guba and Lincoln's statement, and states that reality is individually constructed – the number of realities is linked to the number of people. De Vos *et al.* (2005:363) explain relativism as the ability to experience the environment through different views or frames of reference.

I realise that the data collected during this research is not fixed, but flexible. The participants are individuals with their own perspectives and opinions. Reality, in this study, is, thus, socially constructed. Reflecting on my interactions with the participants in their environments and using my own experiences and perspectives as framework, helped me to understand the participants' perspectives and meanings (Gray 2013:35).

## 3.4.3 Subjectivism as epistemology

My epistemological position in this study was subjectivism. Subjectivism is based on real-world experiences (Scotland 2012:11). Understanding is not discovered, but is constructed through interactions between mindfulness and the surroundings (Scotland 2012:11). Knowledge and significant understanding are constructed through interactions between people and their environments. These understandings are developed and socially communicated (Scotland 2012:12). Cohen *et al.* (2007:19)

state that the social world can only make sense if the individual investigating this world, is part of the action and research.

A framework for logical belief is the community and, in the case of my study, mathematics teachers at Thaba Nchu secondary schools, and their teaching environments. The participants and I, as the researcher, interacted in their environment to make meaning of experiences. These interactions lead to the data being created as the research progressed (Gray 2013:35).

## 3.5 RESEARCH DESIGN

A research design is the plan of how the researcher intends to do the research. Babbie and Mouton (2001:74) refer to this plan as the blueprint of the research. The research design is the starting point of the research process. The research design specifies the elements of research (e.g. participants, variables), the connection between the elements and the methods used to do the research (e.g. sampling, measurement) (Tredoux and Smith 2006:161). Babbie and Mouton (2001:75) explain that a research design is focused on the final result of the research study. Creswell (2009:5) states that the research design involves the plans and the methods used by the research to narrow down the options from a broad selection to specific, comprehensive ways to gather information and analyse it. Flick (2009:133) describes a research design as the process that is followed to reach the final result.

Creswell (2009:5) explains that three main types of research designs are used in research, namely, qualitative, quantitative and mixed methods. Qualitative research focuses on using words, whereas quantitative research focuses on using numbers. Mixed methods lies between qualitative and quantitative research, because it uses components of both research designs.

## 3.5.1 Qualitative research design

Qualitative research is appropriate when a problem or issue relating to an individual or a group or population needs to be investigated, to study or to make sense of aspects that cannot be easily measured, or to hear silenced voices (Creswell 2013:48). Qualitative research is conducted to gain a deeper understanding of the problem or issue being studied. The details needed for this deeper understanding are gained by

communicating with the individuals involved in person, by moving in their environments and giving them the opportunity to share their stories, opinions and experiences (Creswell 2013:48).

Nieuwenhuis (2007a:51) defines qualitative research as a methodology that focuses on comprehending the processes and the social and cultural environments that form the structure of certain aspects or issues. Qualitative research requests the researcher to study the participants in their natural environments, and the focus of qualitative research is the quality and depth of the data that is collected (Nieuwenhuis 2007a:51). Denscombe (2007:333) agrees by defining qualitative research as the use of text instead of numbers, and interpreting information so that it leads to socially constructed knowledge. Qualitative research emphasises the meanings and understandings of individuals, groups or populations, and uses social and cultural actions and experiences to gain deeper understanding.

My study investigated the teaching environments of mathematics teachers at Thaba Nchu secondary schools, and the way the teachers experienced these environments. To collect valuable, in-depth information, I chose qualitative research as my research design. Not only did this design focus on the use of words, but also on the input of the participants and the social interactions between me and the teachers, as well as interactions with the environment. The input of the participants, and their interactions, are much needed elements of a deeper understanding of the study's research focus, as stated in Section 3.3.

### 3.5.2 Characteristics of qualitative research

Qualitative research has a number of characteristics that contribute to the uniqueness of the research design (Creswell 2013:45; Marshall and Rossman 2011:2; Merriam 1998:6). These characteristics are discussed below.

### 3.5.2.1 Natural environment

Qualitative researchers gather information in the natural environments of the participants who are taking part in the research of a specific problem or issue. In other words, qualitative researchers collect data in the real world (Gray 2009:166; Leedy and Ormrod 2010:135). Marshall and Rossman (2011:2) agree that qualitative

research focuses on the context in which a problem or issue occurs. Qualitative researchers make use of methods that involve in-person communication with participants (Creswell 2013:45). The researcher, therefore, has the opportunity to study the participants in the environments that they experience as their world. In this study, all the data were collected in the natural teaching environment of each participant: I visited each teacher at his/her school.

# 3.5.2.2 Researcher as key instrument

Researchers who conduct qualitative research, collect the data themselves by means of observations, document analysis or interviews (Creswell 2013:45). If instruments like questionnaires are used, it is often designed by the researcher him/herself (Creswell 2009:175). I collected all the data myself, by doing observations, conducting interviews and collecting questionnaires in person from each participant. I had developed the questionnaires myself. I was a key instrument in my study.

# 3.5.2.3 Using multiple methods

Marshall and Rossman (2011:2) state that qualitative research uses multiple methods to ensure recognition and appreciation of the humanity of the participants. De Vos, Strydom, Fouché and Delport (2011:171) elaborate on the different methods used by qualitative researchers. They state that observations, field notes, interviews and questionnaires are essential methods to use when conducting qualitative research. The data in this study were collected using multiple methods, including observations, field notes, interviews and questionnaires.

# 3.5.2.4 Complex reasoning through inductive logic

Leedy and Ormrod (2010:103) state that research requires logical reasoning. Qualitative researchers make use of inductive reasoning by building their themes from the "bottom up" and organising their data in more abstract units of information (Creswell 2013:45; Merriam 1998:9). Ary, Jacobs and Sorenson (2010:425) agree that the process of inductive reasoning moves from data to interpretation, as was done in this study.

## 3.5.2.5 Values participants' meanings

Researchers value and treasure the meanings of the participants throughout the research study (Creswell 2013:47). Qualitative researchers use these meanings to gain a deeper understanding of the problems or issues being studied. The participants in this study and their meanings were extremely important. I used their meanings to link to my own perspectives, which gave me a better understanding of what the participants experienced and how they feel about these experiences in their teaching environments.

## 3.5.2.6 Emergent design

The qualitative research process is emergent, meaning that the initial process cannot be described precisely (Creswell 2009:176; Creswell 2013:47; Marshall and Rossman 2011:2). As the process progresses, it is likely to change, based on the data collected. Qualitative research focuses on the information the researcher obtains from the participants and uses to make meaning of the data. The researcher will use the best possible methods to obtain the most valuable information, even if it means that the research process needs to be adapted (Creswell 2013:47). The questionnaires developed for this study were based on the information gained from previous interviews with participants. I had to adapt thoughts or ideas I had had prior to the data collection, to accommodate the information I gathered.

# 3.5.2.7 Reflexivity of the researcher

Qualitative research and social constructivism, in particular, are characterised by subjectivity. Reflexivity points to the bond between the researcher and the participants (Denscombe 2007:333). The researcher's understanding of the social environment being studied, and the way different experiences are interpreted, are shaped by the researcher's personal experiences, beliefs and values (Creswell 2013:47). By using my own experiences, background and interpretations, I positioned myself in the qualitative research domain. By doing so, I could stay sensitive to my own biography and how this shaped my interpretation of the problem or issue being researched (Marshall and Rossman 2011:2).

## 3.5.2.8 Holistic account

Researchers doing qualitative research strive to determine how the phenomena they are studying fits into the bigger picture (Creswell 2013:47; Marshall and Rossman 2011:2). Qualitative researchers aim to identify the interactions between different factors forming part of a situation. Throughout this study, I identified interactions between teachers and their colleagues, teachers and the learners, teachers and the content, and teachers and other role players (e.g. parents and the school governing body) of the school. By using my own interpretations, and those of the participants, I aimed to place all the pieces in the bigger picture of the school and teaching.

As part of the qualitative research design I chose for the study, I made use of case studies, which are described in Section 3.5.3.

## 3.5.3 Case study

Literature defines and understands case studies in many different ways. Nieuwenhuis (2007b:75) defines the concept of a case study from an interpretivist view, as a way to gain a holistic understanding of the relationships and interactions between individuals in a situation. Case studies also explain how the researcher and the participants understand the problem or issue being studied. Qualitative researchers acknowledge the influence of participants' views and perspectives on their own interpretation and understanding of certain social phenomena (De Vos *et al.* 2011:320). To consider the influences of the participants, researchers need to be part of the social context the participants find themselves in. Case studies give researchers the opportunity to become part of the participants' worlds (De Vos *et al.* 2011:320). Creswell (2013:97) explains that a case study is a qualitative approach that is used by a researcher to investigate a real-life, present-day system or case. This investigation is executed over time using various methods to gather information.

The case in my study constituted the teaching environments of identified secondary schools in Thaba Nchu. All the schools had the same geographical characteristics. The learners originated from the surrounding communities and the schools faced the same challenges and factors that influenced the teaching environments.

The specific type of case study used in this research was the intrinsic case study. This type of case study is done to interpret a case that differs from the norm in some way, and is unique or uncommon (Ary *et al.* 2010:455). De Vos *et al.* (2011:321) support this description of an intrinsic case study, by adding that the intrinsic or descriptive case study aims to represent, evaluate and interpret a specific situation. One of the advantages of using a case study approach was that I could study all the aspects of the case (the teaching environments) as part of the bigger environment (the school) (Ary *et al.* 2010:455).

### 3.5.4 Autoethnography

In many literature resources, autoethnography is referred to as a qualitative research method. I believe the method needs to be part of this study's methodology, because I used my own experiences and perspectives to understand the social and cultural aspects of teaching environments. Ellis and Bochner (2000:739) refer to autoethnography as a combination of personal stories and interviews.

### 3.5.4.1 Nature of autoethnography

Autoethnography is a research proposition that is used to investigate (graphy) the researcher's personal involvement (*auto*), to make meaning of cultural experiences (ethno) (Ellis 2004:31; Ellis et al. 2011:online; Holman Jones 2005:767). Roth (2009:4) explains autoethnography by saying that auto means self or "by oneself". The difference between biography and autobiography enhances the explanation of autoethnography. Biography refers to the life story of a person written by someone else, whereas, an autobiography is the life story of a person written by him/herself. Ethno refers to culture and graphy means describing or writing. Ethnography is, therefore, writing about a culture (Roth 2009:4). Autoethnography is, thus, writing about the culture of which the author is part (Munro 2011:162). Ellis et al. (2011:2), furthermore, describe autoethnography as a combination of aspects of autobiography and ethnography. The researcher, thus, writes an autobiography to give background of his/her personal experiences that are linked to the aspect being researched. The researcher also does ethnography by studying a culture's traditions, values, beliefs and shared experiences. Therefore, the aim of such studies, that is, autobiography and ethnography, is to understand a culture better (Ellis et al. 2011:2; Maso 2001:142).

Pace (2012:2) agrees that autoethnography is a way of combining ethnography and autobiography. Researchers who conduct autoethnography willingly investigate their personal experiences and relationships with others. This investigation takes place in a specific social area and, in this way, the researcher tries to understand the culture or social aspect being researched (Méndez 2013:280; Munro 2011:161; Pace 2012:2).

According to Ellis *at al.* (2011:2), autoethnographers acknowledge the many ways a researcher's personal involvement and experience can have an impact on the research process. Sparkes (2000:21) defines autoethnography as research that uses the researcher's personal experience to understand the social context. Laslett (1999:392) states that autoethnography is a mixture of the researcher's personal experience with what the community contributes, which makes a new contribution to the social sciences.

In a study done by Clandinin and Connelly (1994:417), the researchers conclude that the need for researchers to share their feelings and thoughts on a topic, is more urgent when there is a special relationship between the researcher and the participant. Clandinin and Connelly (1994:419) claim that, without the researcher's perspectives, writing about research tends to be a summary of the research of others. An autoethnographer can experience different feelings throughout the course of writing. The writer must, thus, deal with his/her own feelings, which can sometimes be painful, as well as with the feelings experienced by participants in the same situation (Custer 2014:1).

Dyson (2007:40) and Trahar (2009:5) mention that researchers using autoethnography expose themselves to criticism due to the absence of objectivity. The autoethnographer must take care to present his/her work in a way that does not claim that his/her work is the only truth. In this way, the writer will give a message to and guide the reader to understand reality. Douglas and Carless (2013:97) support this view, by saying that autoethnographers do not claim their work to be the truth merely because they are able to link their personal experiences to social and cultural aspects -- their work is plausible, however, in the context where it was created.

Wall (2008:39) reports that an autoethnography always starts with a story. The story's characters and their part in the story, together with the story itself, is linked to the real context, and can improve understanding of a certain social aspect or context (Ochs

and Taylor 1999:302). Ochs and Taylor (1999:302) elaborate that telling stories enriches the mental processes of perception, reasoning and judgement. These mental processes, linked to aspects described in words, give characters in the story the chance to unveil their opinions and to make decisions that are based on the details of the story being told. These opinions and decisions can even assist the characters to make sense of their actions or feelings (Ochs and Taylor 1999:302). Douglas and Carless (2013:98) agree, by saying that autoethnography often involves telling stories about sensitive matters; matters that are silenced by other researchers. Frank (2000:354) reports that autoethnography is used to tell stories that focus on personal links to a certain aspect, rather than on investigation into the aspect.

Sparkes (2000:21) and Spry (2001:710) explain autoethnography as narratives of self - this description links with all the opinions of researchers mentioned in the previous paragraphs. Autoethnography does the opposite of what used to be expected of authors. In the past, authors were urged to keep their opinions out of the documents they wrote (Charmaz and Mitchell 1996:285). Sparkes (2000:22) opposes being a silent author, by stating that authors or researchers use their own experiences to understand certain social aspects. Sparkes (2000:22) comments, furthermore, that autoethnography authors challenge silent author views; they do this by making themselves the main characters in the stories they tell. Sparkes' comment is supported by Wall (2006:4), who reports that autoethnography confronts traditional ways of writing, in which the author's voice is not always heard. According to Hamilton et al. (2008:22), autoethnography reports on personal experiences and thoughts, and links them to culture. Ellingson and Ellis (2008:448) support this statement, by saying that autoethnography connects personal experiences and opinions to culture. Flotman (2018:2) elaborates further, by saying that autoethnography is an extremely personalised point of view, because the researcher is part of the research.

## 3.5.4.2 The origin of autoethnography

In the 1970s and 1980s, researchers started questioning traditional research ways. Their need often related to linking research to stories and personal feelings (Ellis *et al.* 2011:1). This different method of inquiry lead to the start of using autoethnography as research approach.

Autoethnography finds its roots in postmodernism, which introduced new ways of doing social science inquiry (Ellis *et al.* 2011:1). Wall (2006:2; 2008:39) also states that autoethnography emerged from postmodernism. According to Wall (2006:3), postmodernism acknowledges different ways of finding answers to questions asked about a phenomenon; without one method being more important than another method. Starr (2010:4) agrees by saying that autoethnography is embedded in postmodernism, and that postmodernism emphasises the researcher's important place in the culture being researched. In this case, the researcher-as-part-of-the-culture replaces the researcher-with-a-silent-voice of the more traditional methods.

### 3.5.4.3 Personal narratives or stories

Autoethnography is closely linked to stories. The autoethnographer tells his/her story and also the stories of the participants in relation to the social and cultural aspects being researched. Frank (2000:354-355) mentions that a story consists of many different relationships; stories are full of emotions, thoughts, history and beliefs – stories are not merely data used by the researcher for analysis.

Laslett (1999:392) defines personal narratives as stories told by a narrator giving details of the lives and other experiences of the characters in the story, and stories give background of individuals' lives. Personal narratives tell the stories of individuals' places in the society they exist in. The relationships between individuals' histories, the places they live and the societies they form part of, are part of the story in a personal narrative. Personal narratives can give insight into individual beliefs, thoughts and opinions, as well as a community's beliefs and opinions. With this insight, narratives can show possible relationships between individuals and the society (Laslett 1999:392). To understand stories about aspects or people's lives well, it is of the utmost importance to understand social contexts and cultural development (Laslett 1999:392). Personal narratives, as an analysis technique, give entry into feeling, creativity and originality in a way that is absent from other sources of data analysis (Laslett 1999:392).

### 3.5.5 Narratology

An aspect worth including in the research design, is narratology. This study relies on stories and data collected in the form of words. Amerian and Jofi (2015:182) define

narratology as the investigation and interpretation of narratives. This definition supports that of Bal (2004:264), who explains narratology as the "theory of narrative text". Prince (1990:325) states that narratology assists in identifying the structure underlying the narrative. Another explanation of narratology is given by Fludernik (2009:8), who is of the opinion that narratology is an investigation into the way the different parts of the narrative connect to the bigger framework. Park (2016:474) supports this meaning, by saying that reality is formed by connecting parts of our experiences of a social aspect to the rest of the community's experiences.

In Section 2.2.1.3, personal narratives are explained to be an important part of autoethnography and of every individual's daily life. Prince (1982:179) explains that people from different cultures often use the same signs or representations as stories, and often tell the same kind of stories. Different people tell the same story in different ways; they summarise the same story differently and have different viewpoints on the same story (Prince 1982:180). Despite the differences between stories, there will always be a number of similarities too. People understand and interpret stories differently, depending on their backgrounds, abilities and interests (Park 2016:474; Prince 1982:181); however, in spite of these different understandings, there is always a state of harmony regarding certain aspects. This shows that we all have, in a way, the same instincts or feelings about certain matters. Holley and Colyar (2009:680) and Prince (1990:324) support this explanation, by saying that researchers can interpret the similarities in narratives, regardless of the languages spoken by the narrators.

Narratology investigates different narratives, to identify all the similarities and all the differences in the information given through the narratives (Amerian and Jofi, 2015:182; Prince 1982:182). Narratology can be used as a tool to describe other narratives, and serve as a basis for many interpretations or discernments (Prince 1982:183). Prince (1982:186) states that the meaning of a narrative is represented by interpretation, even though the meaning given by narratology is not the only meaning: the interpretation merely gives the interpretation of the person using the theory. People may interpret the same narrative in different ways. Narrative analysis can be used to report on the viewpoints and interpretations of similarities and differences in narratives (Mitchell and Egudo 2003:5). The method used to gather, interpret and report on data

is referred to, by Etherington (2017:3), as narrative inquiry. The data gathered by this method are individuals' stories, told by the individuals themselves.

Narratives aim to make voices heard – voices that are ignored in dominant structures and processes (Squire 2008:8). Narratives use the social medium of language and are created by social beings, which make narratives naturally social in nature. However, narratives continue to exist as an exhibition of personal, subjective experiences (Squire 2008:37). Narratives are a basic method used to communicate meaning, while incorporating cultural values and unfolding understanding (Mitchell and Egudo 2003:39).

Narratologists focus on the similar aspects occurring in narratives (Barry 2002:215), and tend to place a great deal of emphasis on the storyteller and the story. Exposure to narratives places the researcher in the position of storyteller, which is a role of the researcher that is of the utmost importance to academic society (Holley and Colyar 2009:680). According to Nash (2004:2), the reason for the existence of academic society is the exchange of stories between researchers. These stories range from academic paragraphs to narratives giving information about lived experiences. Researchers who use narratives are all intrigued by the way people experience the world, and the stories resulting from these experiences (Holley and Colyar 2009:680).

### 3.6 RESEARCH METHOD

In this section, the research methods used in this study will be discussed in detail. Aspects, such as the methods used for data collection in order to answer each research question, the population and selection of a sample for this study, as well as autoethnography as research method, will be discussed, as will methods of data analysis.

### 3.6.1 Literature review

After I had identified the topic and formulated the research questions of the study, I started the search for relevant literature. An in-depth literature review not only shared the results of other studies related to this study, but also provided a framework for indicating the importance of this study (Creswell 2009:32). The perceptive study of

relevant literature positioned my study in a field of investigation and in relation to related research (Marshall and Rossman 2011:77).

I used the related studies to learn from other researchers who also had an interest in the topic (Mouton 2001:87). The way these researchers theorised and conceptualised, and the methods they used, assisted me to shape the research design and theoretical framework. The work of other scholars gave me good background regarding what had already been done in my field of study. Knowing what had already been researcher should avoid repeating research that has been done by another researcher, unless the researcher wants to do an exact study to validate or confirm research results (Mouton 2001:77). Spending time studying the relevant literature assisted me to identify the gap in research in this field (Maree and Van der Westhuizen 2007:26). This realisation reassured me that the topic I had chosen was something new in this field of study.

I studied literature from journals, books, blogs, magazines and theses of other researchers in my field of study. The librarians at the UFS Library assisted me by doing searches for relevant literature using databases. I used the internet (Google and Google Scholar) as well as the library's electronic journals to access articles and books. I borrowed books from the library to add to the information I searched for. I included national and international literature in my literature review.

By reading available, relevant literature, I identified specialists in the field as well as specialists in other topics relevant to my study, such as qualitative research and autoethnography. The literature referred to in Chapter 2 includes recent and less recent sources. The reason for using older sources is to track the history or origin of certain aspects and the development thereof through the years of research by various researchers. Studying the development of, for example, paradigms and theories, assisted me to think critically about the literature. Researchers do not always agree on topics – scholars sometimes contradict others' opinions, and identify weaknesses in methods or theories.

Integrating different sources and obtaining an overview of current trends and directing perspectives gave me a deeper understanding of the field of study I had chosen (Ferreira 2012:33). It also served to introduce the topic in detail to the readers of my

research report. Above all, it also answered my first secondary research question, How does literature describe mathematics teaching environments? (See Section 2.7.)

### 3.6.2 Personal experiences

To answer the research question, How did 17 years' exposure to all aspects of teaching, on personal and professional levels, direct the researcher's perspectives of teaching and facilitation?, I added Chapter 4 to this research report. In Chapter 4, I describe my years at school, my years as a teacher, my years as a mentor, as well as the educational needs of my own children. Exposure to all these described situations shaped my perspectives on and framework of teaching. Because I placed myself in the study and relied on my own experiences and perceptions to gain an understanding of the perceptions and environments of the participants, I needed to tell my story as part of this study. Chapter 4 fits into the theoretical framework, with autoethnography and narratology as two of the theories (see Sections 2.2.1 and 2.2.3).

During my years as a mentor, I observed teachers in their natural teaching environments. Observations enable a researcher to do qualitative analysis of a social environment by being in the environment (Nieuwenhuis 2007b:85). It is important for an observer to be part of the environment without changing it (Strydom 2005:275). I observed teachers in their classrooms, while they taught and interacted with learners and the mathematical content. I made field notes of my observations. These field notes assisted me to identify certain problematic aspects in the teaching environments of Thaba Nchu teachers. It also gave me the opportunity to get to know the teachers in their work environments. Observing their interactions with the learners, content and the environment, gave me insight into aspects of their personalities as it related to the environment and the situation they were being observed in.

## 3.6.3 Population of this study

This study involved mathematics teachers of three schools in Thaba Nchu, a district of Motheo. Thaba Nchu is a small town approximately 80 km from Bloemfontein, in the Free State. All three schools offered the General Education and Teaching phase (GET phase, i.e., Grade 8 and Grade 9) as well as the Further Education and Training phase (FET phase, i.e. Grades 10, 11 and 12), thus, had learners in Grade 8 to Grade 12 in the schools. The GET phase includes, in principle, Grade 7 to Grade 9 learners; however, in South Africa, the traditional secondary school accommodates Grade 8 to Grade 12 learners, while Grade 7 learners attend primary schools.

I chose this population because these schools were part of the SPP of the UFS. This project aimed to improve teaching in township schools by mentoring teachers of mathematics, physical science, accounting and English. I mentored the mathematics teachers, which meant that I had contact with the teachers every week. I visited each school once per week, and spent time with each of the mathematics teachers, for at least two periods per teacher per week. The teachers I mentored taught mainly learners in the FET phase. Even though the teachers taught mathematics, my study did not focus on mathematics content, but on the experiences of the teachers in their teaching environments. It was due to the good, positive trust relationship I had with the mathematics teachers, that I chose to study their environments, not because of the subject.

### **3.6.4** Selecting the sample

The process used to select a part of the population for a study, is referred to as sampling (Nieuwenhuis 2007b:79; Van der Merwe 2011:153). Non-probability and purposive sampling is generally used in qualitative research (Nieuwenhuis 2007b:79; Strydom and Delport 2005:327), and it was the sampling technique I used for this research study. Purposive sampling involves selecting participants from a population on the basis of specific features or characteristics of the participants (Nieuwenhuis 2007b:79; Strydom and Delport 2005:327). In qualitative research, it is often appropriate for a researcher to select participants by using his/her own discernment and according to the purpose of the study (Babbie and Mouton 2001:167). In qualitative research, sample size is not linked to specific rules. The sample size of a qualitative study will depend on what the researcher aims to discover, what will be trustworthy, and the purpose of the investigation (Strydom and Delport 2005:328).

As a mentor of the SPP, I mentored mathematics teachers of five schools in Thaba Nchu. To choose three schools, I considered the overall performance of the five schools. During the five years I had mentored at the five schools in Thaba Nchu, we had studied the mathematics results and the general performance of learners in all the

subjects of each grade. Based on these results and performance, I chose a wellperforming school, a school with average performance, and a poorly performing school. The school with the highest results and overall performance was chosen as the well-performing school. The school with the lowest results and overall performance was chosen as the poorly performing school. The school more or less between wellperforming and poorly performing schools was chosen as the school with average performance. Performance was not an aspect I investigated in this study; however, I used it for sample selection, to ensure that schools from different levels of performance, not only good performance or not only poor performance, but the whole performance spectrum, were represented in the study. Therefore, performance does not feature in my research report again. To adhere to ethical standards and to protect the participants, I used the letters A, B and C to refer to the three schools. The letters were assigned to the schools based on the alphabetical order of the schools' names and not based on the level of their academic performance.

Teachers were selected as participants, again using a non-probability and purposive sampling method. At School A, two teachers taught mathematics in the FET phase, as was the case at School B, while, at School C, only one teacher taught mathematics in the FET phase. This meant that five teachers could participate in this study. To maintain high ethical standards and to protect the participants' rights to anonymity, I use A.1, A.2, B.1, B.2 and C.1 to refer to the participants. A, B, and C refer to the schools and the numbers 1 and 2 refer to the teachers at a school. The teachers at the same school were given numbers based on the position of their surnames in the alphabet. The numbers allocated to the teachers do not show favouritism relating to the researcher, the age of the teacher or any other characteristic.

The biographical details of each participant are given in Chapter 5 (see Sections 5.2.1.1 (A.1); 5.2.2.1 (A.2); 5.2.3.1 (B.1); 5.2.4.1 (B.2) and 5.2.5.1 (C.1)). The participants varied in age, gender, race and post level at the schools. Not one of these aspects were used as criteria for selecting the sample.

#### 3.6.5 Interviews

The aim of qualitative research is to view the phenomenon being studied through the eyes of the participant (Nieuwenhuis 2007b:87). One of the methods commonly used

by qualitative studies is interviews with participants. Nieuwenhuis (2007b:87) defines an interview as a two-way conversation that gives the researcher the opportunity to ask the participant questions. The answers to these questions will give the researcher insight into the participant's opinions, perspectives and beliefs regarding the topic of research. Giving participants the opportunity to tell their stories, often gives the researcher access to information which he/she would not be able to find using other methods.

The participants were asked to give me a suitable time for the interview. It was important that the interview did not disturb the participants' duties and responsibilities at the schools. I asked for an hour of their time, to make sure we had enough time to talk through the questions I wanted to ask. The participants were supportive in many ways; they even made sure we had a quiet environment, with few or no disturbances, to do the interview in.

In this study, I used semi-structured interviews. After the aim of the interview had been explained and the participants, again, informed that they were not obliged to answer a question if they felt uncomfortable, the interview started. The interview schedule, that is, the set of predetermined questions I wanted to ask, was used as a guide, but did not control the interview (Greeff 2005:296). The interview schedule was visible to the participant throughout the interview. The participants' answers also served to guide the interview. If answers that were given did not make sense to me at first, I used probing questions to get a clear understanding of the meaning intended by the participant. The questions in the interview schedule, as well as the probing questions, were open-ended questions. Open-ended questions give participants space to tell their stories, by giving their opinions, perspectives and explanations of experiences. The interview schedule is attached to this research report as Appendix A.

I recorded the interviews with the participants' consent, using my mobile device. Recording the interviews gave me the opportunity to focus on the participant and the answers given by him/her. A recording is a more reliable way of capturing all that is said than trying to write everything down. The recordings were downloaded to a USB (universal serial bus) device and an external hard drive, and stored safely. I transcribed all the interviews shortly after they were done. This assisted me to

remember the emotions and the atmosphere present during the interviews. It also ensured a true reproduction of the participants' contribution to this study.

# 3.6.6 Questionnaires

After coding and analysing each of the five interviews, I developed five individual questionnaires based on the data collected during the interviews. I developed five different questionnaires, because the experiences and opinions of each participant differed, and I wanted to ensure I gathered rich, descriptive data. All the questions I asked were open-ended questions, which gave participants the opportunity and freedom to give their honest opinions, thoughts and suggestions. I arranged a suitable time with participants to deliver the questionnaires to them for completion. After I had collected the completed questionnaires, I typed all the answers. Both the typed and handwritten documents were stored safely.

# 3.6.7 Autoethnography as research method

In Section 3.5.4, I discussed autoethnography as part of the research design of this study. As I mentioned in that section, many researchers consider autoethnography to be a valid research method.

A large part of this study was based on my own experiences and opinions, linked to that of the participants in the study. By using autoethnography as a method, I described and analysed my own experiences. This analysis was done in such a way that I could understand and relate to the mathematics teachers' cultural experiences and perspectives at the three schools (Ellis *et al.* 2011:1). Autoethnography gives the researcher a place in the research design, thereby admitting that using the experiences and thoughts of the researcher can improve understanding of teaching and teacher education (Hamilton *et al.* 2008:17).

# 3.6.8 Data analysis

Analysing the collected data is the pulse of research (Henning *et al.* 2004:103). The process of analysis clearly shows the skills, quality of thinking and interpretation of the researcher. Through the analysis of the data, the researcher aims to gain a better

understanding of the participants' perspectives, views and experiences, in such a way that it can contribute to answering the study's research questions.

In qualitative research, the processes of data collecting, processing, analysing, interpreting and reporting are intertwined (Nieuwenhuis 2007b:99). This means that the processes are not separate steps that follow on each other; instead, it means that the researcher needs to move forward and back between the different processes. It may even be necessary for the researcher to return to the participants to clarify certain information, or to get additional information.

In this study, I used the literature to identify certain themes I wanted the participants to share their experiences and perspectives on. I used these themes as guidelines when I started coding the transcribed interviews. I transcribed the interviews verbatim. As I went through each transcription, I searched for all the possible themes, which included physical challenges, socioeconomic challenges, teacher-faced challenges, management challenges and affective aspects experienced by the teachers. After coding each transcription, I drew a mind map for each participant, so as to group different aspects under the themes identified by the literature, but also under new themes that emerged.

Unlike the interviews, the questionnaires the participants had completed were coded with open coding only. Open coding codes are created while the researcher works through the data (Henning *et al.* 2004:105). After coding the data, central themes were identified from all the questionnaires. These central themes were used to answer the fourth secondary research question (see Section 6.3), as well as to construct the framework for answering the main research question.

## 3.7 QUALITY OF QUALITATIVE RESEARCH

All research is concerned with the production of valid and trustworthy knowledge, gained while applying high-standard ethical practices (Mertens 1998:198). Richards (2005:139) links words, such as credibility, transferability, dependability and confirmability, to validity and reliability. Triangulation concerns the observation of certain aspects from more than one viewpoint (Denscombe 2007:134), and aims to give the researcher a better understanding of the issue being researched. All the concepts mentioned are discussed in this section.
#### 3.7.1 Credibility

The aim of credibility is to show that the research was done in such a way to ensure that the problem or issue being researched, is identified and described in a reliable and precise manner. By giving an in-depth description of the parameters of or boundaries around the study, the credibility of the study is guaranteed (De Vos *et al.* 2005:346). Neuman (2000:474) states that it is important to supply readers with enough information and evidence, so that they will accept the interpretations as trustworthy and credible. In my study, I clearly discussed the population (see Section 3.6.3) as well as the sample (see Section 3.6.4). I discussed the methods used (see Sections 3.6.5 – 3.6.7) in detail and attached all the data collected as appendices (see Appendices G – K, O, Q, S, U, W) to this research report.

#### 3.7.2 Transferability

The ability to transfer the study's findings to another context establishes the transferability of the study (De Vos *et al.* 2005:346; Denscombe 2007:299). In this study, in Chapter 2, I provided readers with information about rural schools in general. The schools I identified as my sample can be compared with the rural schools discussed in the literature review, and are representative of rural schools in South Africa. This being so, this research could be repeated in any other township in South Africa, using the same instruments to make the results transferable. All the instruments I used to collect data are attached as appendices (see Appendices A, N, P, R, T, V) to this research report. Triangulation (see Section 3.7.5), also referred to as the crystallisation of multiple data sources, can increase the transferability of the study (De Vos *et al.* 2005:346; Maree and Van der Westhuizen 2007:40).

#### 3.7.3 Dependability

In qualitative research, changes to the context of the study is expected, because the main contributors are people in real-life environments. Thus, dependability is established by the thoroughness by which the variation is explained and the extent to which the variation can be tracked (Ary *et al.* 2006:502). De Vos *et al.* (2005:346) state that the researcher must make an effort to keep the reader and other researchers informed about all changes in the situation of the research study. Changes in the

research design that result from a deeper understanding of the phenomenon being studied, gained as the study progresses, also need to be explained.

As a way to enhance dependability, the researcher must provide a detailed description of methods used, analysis done and the path taken by the researcher to interpret and make decisions (Denscombe 2007:298). One way of showing the researcher's route of thinking and making decisions, is to keep an audit trail (Ary *et al.* 2006:502; Denscombe 2007:298). An audit trail entails field notes, recordings of interviews and, most importantly, keeping all the notes, recordings and transcriptions safe. An audit trail also allows the reader to follow the path and understand how decisions were made by the researcher, and gives a description of the distinctiveness of the phenomenon being researched (Ary *et al.* 2006:503; Denscombe 2007:298).

During my years as a mentor, I wrote down, in notebooks, observations of aspects of teaching environments, teaching practices, teachers' and learners' content knowledge, teachers' classroom management, the teacher-learner relationship, pedagogical skills and learner behaviour. I made detailed notes during all the mentoring class visits, to use as background to observations. I kept all the notebooks safely in storage. I recorded the interviews digitally using my mobile device. I kept the recordings safely on more than one electronic storage device, to ensure the availability of the recordings. Transcriptions of the interviews are attached as appendices (see Appendices G – K) to this research report. The instruments for analysing these transcriptions were completed and have been kept for control purposes. The questionnaires used (see Sections 6.2.1.2; 6.2.2.2; 6.2.3.2; 6.2.4.2 and 6.2.5.2) were completed by the participants. Transcriptions of the answered questionnaires are attached as appendices (see Appendices O, Q, S, U, W). The completed instruments, as well as the analysed questionnaires, have been kept for control purposes.

#### 3.7.4 Confirmability

Confirmability in qualitative research is compared to objectivity in quantitative research (Ary *et al.* 2006:504; Denscombe 2007:300; De Vos *et al.* 2005:347). Qualitative research is always a product of interpretation. To deal with the lack of objectivity in qualitative research, the researcher needs to explain his/her identity, beliefs and values, and how his/her own experiences and background shaped the study. The audit

trail, as discussed in Section 3.7.3, is the main strategy for establishing confirmability. Following the audit trail gives the reader the information needed to confirm the conclusions of the researcher (Ary *et al.* 2006:504). I will provide a detailed explanation of my background, experiences, beliefs and values in Chapter 4. This explanation, together with the autoethnographic approach I used, explain how my research was shaped, and it is supported by the audit trail available for the whole research report.

### 3.7.5 Triangulation

Triangulation is the process whereby the same phenomenon is viewed from different viewpoints (Denscombe 2007:134; Neuman 2014:166). By viewing a situation from different angles, the researcher obtains a better understanding of the situation. A qualitative study's reliability is improved, or even guaranteed, by using multiple data collection sources, or even using different data collection tools and, thus, achieving triangulation (Gray 2009:193). My study made use of different sources of data – which refers to the different participants. Each participant's interview and questionnaire were analysed and used to construct logical and consistent validation of themes (Creswell 2009:177). Adding to triangulation were the multiple methods used to collect data. Triangulation, thus, added to the validity of this study.

### 3.8 OBTAINING PERMISSION FOR THIS STUDY

Before the actual process of data collection could begin, I had to obtain permission from the Free State Department of Education (FSDoE) to conduct the research study. The official responsible for research applications at the FSDoE supplied me with the application form, as well as the list of documents which I had to attach to my application. However, I had to wait for the UFS to approve my ethical clearance application, first, before I could apply at the FSDoE. The letter of ethical clearance from the UFS is attached to this research report as Appendix B.

After being granted ethical clearance, I submitted the lengthy application form to the official of the FSDoE. Accompanying my application was all the required documents, including the letter confirming the ethical clearance from the UFS, examples of the type of questions I would use in the interviews, as well as an explanation of the process of my research. The reason for the last-mentioned letter was that I could not supply

the questionnaire at the time I applied for permission to do research. I had to conduct the interviews first and, from the interview findings, develop the questionnaires. I did, however, supply examples of possible questions, so that the committee had an idea of what could be expected. Letters that would be used to obtain permission from principals to conduct research at their schools, as well as letters asking consent from the participants to take part in the research study, were included in my application. The application was approved and I was granted one year to collect data at the schools identified. Unfortunately, the year was not enough time to complete data collection, and I had to request an extension of the period. It was approved and another year was granted to complete the research. Both letters of permission from the FSDoE are attached to this research report, as Appendices C and D.

After permission for the research study had been granted by the FSDoE, I approached the principals and mathematics teachers at the identified schools. The research study was explained to each individual and I requested them to sign the consent form if they agreed to take part in the study. All the principals and mathematics teachers of the identified schools were supportive and in favour of the study. Examples of the letters given to the principals (Appendix E) and the mathematics teachers (Appendix F) are attached to this research report.

### 3.9 ETHICAL ISSUES

Conducting qualitative research involves studying human beings in different contexts, including the natural environment of their daily lives (Mouton 2001:243). The researcher has a responsibility to adhere to high ethical standards, especially when studying people and their feelings, thoughts and perspectives (Leedy and Ormrod 2010:101). Creswell (2008:23) is of the opinion that a researcher's ethical responsibilities include the comprehensive principles of academic integrity and honesty and respect for other people. Other people include the research participants as well as the readers of the research report. Mack *et al.* (2005:8) report that protection of the research participants must be the qualitative researcher's prime concern throughout the research study.

The most important factor linked to ethicality in any form of research, is "informed consent" (Creswell 2013:175; Leedy and Ormrod 2010:101; Mack *et al.* 2005:9). As

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explained in Section 3.8, I had to apply for ethical clearance from the UFS as well as for permission to conduct research from the FSDoE. After obtaining ethical clearance and permission from FSDoE, I personally visited the principals of the identified schools. I explained the research study and the involvement of the school and the identified mathematics teachers to the principals. All the principals signed letters giving me permission to conduct research at their schools. The next step was getting consent from the identified mathematics teachers. I personally communicated with the teachers, explaining the details of what would be expected of them, as well as the purpose of the research and how it would be conducted. It was explicitly explained that participation was voluntary and that they could withdraw at any stage of the research. All five teachers signed the consent form without reluctance, based on the information I gave them.

Appointments were made to do the interviews with the participants at a time that suited them. Great care was taken to ensure that the participants were not inconvenienced in any way and that the interviews did not disturb their teaching responsibilities and work schedules. Participants were ensured that all the information gathered would be handled with confidentiality and that the data would only be used for the academic purposes of this research study.

The anonymity of the participants was given high importance. To protect the participants' identities, and that of their schools, they were assigned pseudonyms, such as A.1, A.2 and B.1 (see Section 3.6.4). All personal and identifiable information provided by the participants was protected, even after completion of the study. The process of doing research should not put the participants at risk of harm. Informed consent must be given by the participants' daily lives (Mouton 2001:245). The participants in this research study were not harmed in any way: not physically, psychologically or emotionally.

#### 3.10 CHAPTER SUMMARY

In this chapter, the methodology used to answer all the research questions of my study (see Section 3.3) was discussed. The paradigm, social constructivism, had been chosen as the study's paradigm, with relativism as my ontology and subjectivism as my epistemology. A qualitative research design was used, combined with a case study. Methods used to search for relevant literature were explained in Section 3.6.1. My personal experiences form part of this study (see Chapter 4), in order to answer the second secondary research question and to give background to the reader, to understand my interpretation of the data collected. Details of the interviews with the participants to collect data to answer the third secondary research question were explained in Section 3.6.5. The questionnaires needed to answer the fourth secondary research question and were addressed in Section 3.6.6. The methods used to analyse all the data collected from the interviews and questionnaires were explained in Section 3.6.8. The qualitative research done in this study received attention in Section 3.7. I took great care to ensure that the research done in this study was of high quality and would contribute to the research done in this field of study. Permission to conduct this study was obtained from the FSDoE, and consent was given by the principals and the teachers who participated in the study. Ethical issues were handled with great care and importance throughout the study.

In Chapter 4, I tell "My Story", by giving details of my background, experiences and exposure to all aspects of teaching, on personal as well as professional levels. The aim of this narrative is to answer the second secondary research question, namely, How did 17 years' exposure to all aspects of teaching, on personal and professional levels, direct the researcher's perspectives of teaching and facilitation?

# **CHAPTER 4: MY STORY**

#### 4.1 INTRODUCTION

Chapter 4 is a narrative chapter, and has the purpose of giving the reader insight into my background, and linking my perceptions and experiences to my research study. The chapter answers the second secondary research question: How did 17 years' exposure to all aspects of teaching, on personal and professional levels, direct the researcher's perspectives of teaching and facilitation? The reader might not realise why this chapter is necessary in my thesis. My research was aimed at understanding teachers' perceptions and experiences of their mathematics teaching environment. To understand the teachers and their perceptions, I chose autoethnography as the theoretical framework and one of the research methods. By using this method, I used my own background and experiences in a way that made it possible for me to understand, make sense of and relate to the teachers' cultural experiences in their mathematics teaching environments.

I wanted to enable the reader to experience mathematics teaching environments in rural schools from the teachers' perspectives. For me, the best way to understand the teachers' perspectives, was to link my perceptions and experiences to those I found in my search for data.

#### 4.2 PERSONAL BACKGROUND

The second secondary research question will be answered by means of this chapter, by application of my exposure and experiences of teaching, so that it serves as guidelines to direct my understanding of teaching environments and the aspects of the teaching environment that were familiar to me. I wanted participants to view me as a colleague, rather than just a researcher. It made me feel more comfortable about sharing their perspectives, feelings and thoughts, because they knew I understood the aspects they related to me. Therefore, it is necessary to provide some biographical details that explain my interest in teachers' perspectives and the way I understand certain aspects of teaching.

#### 4.2.1 Childhood years

I grew up in a home with a loving, but strict, mother and father. We lived a simple, humble life, guided by Christian principles and strong moral values. My father worked at a newspaper company and often had to work night shifts. My mother had the privilege of being a housewife, which meant that most of the responsibilities of raising a child were on her shoulders. All of the mentioned factors gave me the opportunity to grow up in a safe and child-friendly area.

#### 4.2.2 Schooling

My parents understood the value and need of good education. They did everything they could to keep me in a school with high standards and values, and a high level of education. I attended a primary and secondary school adjacent to each other, again, in a safe environment. I spent 12 years in a school environment with good teachers and enough opportunities to excel.

#### 4.2.3 University education

After completing Grade 12, I enrolled at a local university. I could study from home, and did not need to stay in a hostel. I enrolled for B.Sc. (Biological Sciences), being especially interested in mathematics and chemistry. I completed a PGCE, but only after I had started teaching. A PGCE qualification consists of education modules; students are taught basic pedagogical skills and receive a background in philosophy and education law. Students also select two content modules, for subjects they intend teaching at a school – my content modules were mathematics and physical science.

#### 4.2.4 Becoming a teacher

I did not become a teacher by following the usual route. I never thought my professional path would take me to a classroom. I was busy with a degree in research when I assisted a private school with mathematics and physical sciences classes for Grade 10 to Grade 12 learners. The school offered classes for Grade R to Grade 12. The school's only income was the school fees paid by parents. About 25% of the parents often struggled to pay the school fees every month. The school did not have many classrooms – there was only one class per grade. The staff consisted of a small

number of teachers, which meant that there was only one teacher per subject in the FET phase – Grades 10 to 12. That teacher had to teach the subject to learners in Grades 10 to 12, act as the head of department (HOD), and manage the subject administration. Facilities, such as sports grounds and computer labs, were limited or not available. There were a soccer field and a small playground for the Grade R and foundation phase learners. In the absence of computer labs, computer-related subjects were not offered. Few subjects were offered: English, Afrikaans, life orientation, mathematics, physical sciences, accounting and business studies were the only subjects offered by the school. Learners did not have a choice regarding subjects. The abilities of learners in a specific subject varied, which presented teaching challenges related to accommodating various intellectual levels in one class. Teaching at the private school was supposed to have been a temporary situation, however, I loved the learners and teaching them the subjects I was interested in, so, I gave up my plans to conduct research and joined the teaching profession.

I completed my PGCE qualification and started teaching at a government school. For the first few years I taught at this secondary school, it was a purely technical school for boys only. The last seven years I taught at the school, an academic course was implemented, and girls were admitted. The learners had a choice regarding their subjects in the FET phase. The school had three computer labs, and could, therefore, offer computer-related subjects. The technical workshops were well equipped and well-functioning, which opened another career direction for the learners. For 13 years I taught mainly mathematics to learners from Grade 8 to Grade 12. Other subjects I taught were functional mathematics, commercial mathematics and life sciences.

This school functioned on a different level than the private school I had started teaching at. Parents paid school fees, but this was not the school's only income; it also received an allowance from the government. Due to its better financial situation, and because it was a government school, the school had more staff members. We were five teachers teaching mathematics from Grade 8 to Grade 12; we also had an HOD who kept the administration up to date. The school had excellent sports facilities, which included a gymnasium, and rugby, soccer, athletics and netball were some of the sports on offer. Cultural extramural activities, such as choir and drama classes, were

also available. It was much easier to have a holistic development approach at this school.

### 4.2.5 Personal life

While I was working as a teacher, my husband and I were blessed with two children. The eldest is a girl. She did not have developmental challenges, and went through school with ease. She is a high achiever and worked hard.

Our youngest child, a boy, faced challenges that made it more difficult for him to experience normal development. He has hearing loss in both ears, which was only diagnosed when he was already four years old. By the time he was fitted with hearing aids, he had a developmental gap in areas such as speech and language. This meant that we had to take him for several different types of therapy, including speech therapy. He also has low muscle tone, which meant he needed occupational therapy. We spent many hours waiting at therapy practices, or learning new techniques to assist him. Another challenge he faces is attention deficit disorder (ADD), which required him to develop certain coping skills.

### 4.2.6 Becoming a mentor

In 2013, I decided to take the passion I have for teaching a step further, by becoming part of the SPP of the UFS. The purpose of the programme was to visit underperforming schools in Thaba Nchu and mentor the mathematics, physical science, accounting and English teachers, to assist them with becoming the best teachers they could be, which, in turn, could lead to the improvement of learners' achievement. For four years I worked closely with approximately 30 mathematics teachers. Not only did the SPP members assist the teachers by improving knowledge of subject content, but we also developed pedagogy and affective areas, such as motivation and self-belief. We used methods such as observation, one-on-one discussions, model teaching, co-teaching and content training to achieve the programme goals.

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#### 4.2.7 Lecturing education students

During the time I was a mathematics mentor, I started lecturing students at a South African higher education institution. The students ranged from second-year to final-year education students, or PGCE students. The content I lectured included mathematics subject content (according to the school syllabus) and the pedagogy of mathematics. What made my work even more interesting is that few PGCE students had an education background other than their perspectives of their own school careers. It was my aim to equip the students with tools and knowledge they could use when they started to teach.

### 4.3 OBSERVATIONS DURING SCHOOL CLASS VISITS

One of the methods we used in the mentoring programme was doing observations of teachers' classes. During observations, I focused not only on the teacher, but also on the learners. It was important to get the whole picture of the involvement of the teacher and the learner in a lesson. To be in the classrooms and on school grounds gave me hands-on experience and a deeper understanding of the teaching environments of the teachers I mentored. I had to experience the challenges, positive aspects and physical environment myself in order to understand the participants' perceptions better. Attending classes and observing gave me an opportunity to really see what was happening in the classes with the teachers and the learners, without my presence having an impact on the lesson.

In the following sections, I discuss the aspects I frequently observed in the schools I worked in. My observations relate to mathematics classes and mathematics teachers.

#### 4.3.1 Physical aspects

In this discussion of my observations, I first address the physical aspects that I encountered at the township and rural schools where I acted as a mentor.

#### 4.3.1.1 Resources

In some schools, textbooks sometimes presented problems. It happened that books were ordered late, which delayed delivery; at times the books were ordered in time, but due to high demand, the books were delivered late. Another scenario was an

increase in the number of learners in a specific grade, which caused a shortage of textbooks, which had either not been ordered due to financial constraints, or had been ordered late in the first term. The teachers tried to make copies of the books for the learners who did not have books, but sometimes this was not possible: schools did not always have enough paper for the photocopier, or the photocopier was not working; schools without electricity found it impossible to make copies. If the grant from the Department of Education was not paid in time, a school would be behind on their electricity bills; this meant teachers had to write instructions on the board for the learners to copy. Waiting for all the learners to copy down information from the board slowed down the teaching process tremendously; waiting for slow learners affected discipline and encouraged learners to talk among themselves.

#### 4.3.1.2 Physical state of classrooms

In some schools, the physical state of classrooms was upsetting. Basic requirements were not met, as there were insufficient tables and chairs in classrooms to accommodate all the learners, ceilings were broken or absent, blackboards were not mounted properly on the wall, and there were no board dusters. The learners sometimes shared two chairs between three learners; often, chairs were broken and unusable. Windows without glass were a huge problem, especially during winter. I learnt to carry chalk, a duster or lots of tissues, and whiteboard markers in my bag whenever I visited the schools.

#### 4.3.2 Socio-economic aspects

The socio-economic backgrounds of learners influence their learning experiences to a large extent, as explained in the following sections. If the learners experience obstacles in their learning environments, it means that teachers may experience obstacles in teaching the learners.

#### 4.3.2.1 Feeding schemes

Most of the learners at the schools we worked in, came from low-income households. The schools all had feeding schemes, which gave the learners a meal per day. In many cases, this was the only meal for learners for that day. The fact that some learners arrived at school hungry, influenced the teaching and learning that took place.

### 4.3.2.2 Stationery

Another challenge that is linked to poor communities is that learners lack basic stationery. I saw learners sharing a pen, which even lacked its plastic casing. Sometimes learners shared a short, blunt pencil. Trying to do geometry and having the learners draw circles with only a handful of mathematical sets was often close to a nightmare for teachers. Learners did not get enough practise in class in using calculators; they often did not have calculators, or they did not bring it to school in fear of it being stolen.

### 4.3.2.3 School uniforms

During winter, some learners did not have warm enough school uniforms to wear, and sometimes wore another shirt under the school shirt. This led to the appearance of the learners being less than neat. It also meant that some learners struggled to focus because of feeling cold.

School uniforms during summer was also problematic. Boys' trousers were too short, or they did not have socks to wear. In some cases, girls' dresses were too short. They tried to cope, in a dignified way, with the short dresses by wearing pantyhose. Wearing pantyhose in the middle of summer was uncomfortable, because of the hot summer weather in Thaba Nchu.

#### 4.3.2.4 School bags

It is really difficult for learners from low-income households or poor communities to look after textbooks, scripts, and exercise books, because some of these learners do not have proper school bags, and use plastic bags to carry their books to school. Textbooks are often damaged and even lost.

### 4.3.3 Challenges confronting teachers

The following is a discussion of eight challenges that many of the teachers experienced at the schools where I did my observations during my mentoring years.

### 4.3.3.1 Maintaining discipline

The majority of the learners behaved well during most of the mathematics classes; however, sometimes learners tested the boundaries and the patience of the teachers.

In large classes, in particular, learners sometimes talked when they had to copy work from the board or do classwork activities. Failing to pay attention meant learning was not taking place effectively.

#### 4.3.3.2 Class size

Large numbers of learners in classes were common in Grades 8 to 10; classes with between 40 and 70 learners were a familiar sight in four out of the five schools where I mentored. Large classes were predominantly part of the GET phase. Large classes presented teachers with challenges, not only in relation to maintaining discipline, but also regarding providing individual assistance to learners. With large numbers of learners in a class, the class was crowded, and the teacher did not have enough space to move around to answer individual questions. When working on topics like construction and measurement, teachers had to enlist a great deal of good planning, preparation and organisational skills to ensure effective teaching and learning.

Smaller groups of learners in Grade 11 and 12 classes often meant that teachers were faced with progressed learners. Progressed learners are learners who had not passed the previous grade, but who had been moved to the next grade due to various reasons, including age. Progressed learners not only struggle with prior knowledge, but also have poor self-image and lack self-esteem.

#### 4.3.3.3 Administrative responsibilities

None of the schools we mentored had a set timetable for a whole year. The timetable changed frequently throughout the year. Teachers often discovered that the timetable they had followed the previous day had been replaced by a new one. Sometimes, teachers did not see certain classes for a few days, due to changes in the timetable. Uncertainty about what to expect every day, in terms of the timetable, influenced the learners' learning.

Official mark sheets presented administrative obstacles at half the schools. Administrative clerks were in charge of capturing information on a school's administration system. Once the system had been updated, mark sheets could be generated. This process of capturing information often took weeks. Sometimes teachers only received mark sheets for a new academic year way into the first term. Receiving mark sheets late in the term meant that, by that time, teachers had instituted another system, which they used to record marks until they received the official mark sheets. The risk with a system like this is that the substitute pages on which the marks are written could be lost, leaving no record of learners' marks.

### 4.3.3.4 Learners' attitudes, abilities and commitment

Teachers were regularly faced with learners in the mathematics class who lacked the necessary prior knowledge. It seemed that parents and guardians considered taking mathematical literacy to be shameful, and they forced learners to take mathematics. Learners tend to lose interest if they believe mathematics is above their potential. Sometimes, learners would either lack the motivation to even try to do homework, or they would copy from a friend's book. Motivating someone who believes they lack the ability to do it, is a huge challenge. A lack of commitment meant learners did not do homework. They believed the teacher had to pass them – they failed to realise that they also had to contribute to their marks.

Negative attitudes were common amongst the learners. Learners' intrinsic motivation was very low. They gave up easily, especially when the problem seemed difficult. Teachers had to constantly motivate learners to believe in their capability to master through perseverance. Teachers found motivating learners to keep on trying emotionally draining.

### 4.3.3.5 Copying during assessments

Copying during assessments was a negative trend displayed by learners in the schools that I visited. Copying happened during tests and examinations and when learners had to do assignments or investigations. Consequently, assignments and investigations were no longer sent home to be completed, but were done in class. As a result, the number of teaching periods decreased.

### 4.3.3.6 Grade 12 preparation and invigilation

The management of a school includes the principal and the senior management team (SMT). The SMT consists of the principal, the deputy principal(s), the HODs and other teachers in management positions, e.g., grade guardians and subject heads.

Decisions made by the principal or the SMT sometimes required teachers to adjust their daily planning for various reasons, for instance, marathon sessions with the Grade 12 learners, or Grade 12 camps away from school, usually in the third term. Grade 12 teachers had to focus exclusively on Grade 12 learners – the rest of the school had to cope without these teachers. However, most Grade 12 teachers also taught other grades. Abandoning learners of other grades for a while to prepare Grade 12 learners for their final exams placed a great deal of pressure on teachers in the last term to get the other grades ready for their end-of-year exams.

Few schools could afford invigilators from the community. This meant that Grade 12 teachers had to invigilate Grade 12 exams, which, once again, extracted Grade 12 teachers from the normal school programme. We often asked the principal to plan the invigilation differently, to give Grade 12 teachers the opportunity to work with all the grades they taught. The invigilation process was only changed at two of the five schools we mentored.

#### 4.3.3.7 Retaining teachers, and absenteeism of teachers

More than once, we experienced mathematics departments having to replan teachers' work distribution and load due to a teacher leaving or joining the school and the mathematics department. Teachers were sometimes moved from mathematics to other subjects. Moving teachers from one subject to another was not always a decision that benefitted learners. In a few cases, teachers were moved from mathematics because they had failed to master mathematics teaching. These teachers were moved to subjects of which they did not always have the necessary background or prior knowledge to teach learners. Mathematics teachers often found themselves having to start teaching a new class in the middle of the year, due to teachers moving to other subjects, or teachers leaving the school. Learners sometimes resisted this change, and it usually took the teacher a while to gain their trust. Time, they did not have, because the syllabus had to be completed.

Not all members of staff were always loyal and reliable. When teachers were absent and their classes were left unattended, it often disturbed the teacher and the class next door.

#### 4.3.3.8 Other challenges

Teachers were regularly called, on short notice, to attend meetings or training. Certain administrative tasks were also sent to schools, for immediate attention. Sometimes,

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teachers' unions arranged meetings during school hours and expected their members to attend. Teachers tried to adhere to requests for and demands on their time, as well as keep control of their classes.

### 4.3.4 Management aspects

Two aspects with regard to management are discussed next.

### 4.3.4.1 Mathematics teachers as part of top management

Principals, deputy principals and HODs were part of the group of mathematics teachers I mentored. They taught fewer classes than other teachers, but still had between two and four classes each, meaning between 14 and 28 periods per week. Other teachers taught between 35 and 40 periods per week. The principals, deputy principals and HODs were dedicated and determined to teach each class; however, sometimes, they failed, as they had to attend meetings, meet parents or attend to administrative tasks. Where necessary, they made arrangements with other teachers to take their classes, or they arranged to meet learners after school. They tried their best, and doing so set an example to the rest of the staff.

### 4.3.4.2 Support and motivation by management

The managers of the schools we mentored made an effort to assist, support and motivate the staff. Sometimes principals expected a great deal from the teachers at short notice, which, in my opinion, could, perhaps, have been avoided by better planning. In general, the teachers knew they could count on the support of the principal and the management team.

### 4.3.5 Affective aspects

Affective aspects play an important role in teaching. I observed a number of matters concerning affective aspects.

### 4.3.5.1 Dedication of teachers

Teachers were generally positive about teaching and their subjects. They were patient with the learners if the learners showed interest and were willing to work. It did not matter to teachers what the learners' intellectual abilities were.

### 4.3.5.2 Reliability of teachers

Teachers were serious about their job as teachers. Only illness (their own, or that of their children or immediate, close family), meetings or training prevented them from reporting for teaching.

### 4.3.5.3 Demotivation of teachers

Sometimes, teachers were demotivated, especially at the end of the term, when they had to mark exam scripts, or at the start of a term, after all the marks had been calculated. The results of the learners did not always reflect the effort teachers put into classes, extra classes, many informal tests and additional exercises.

### 4.3.6 Other observations

The majority of the teachers I mentored had sufficient pedagogical knowledge, but they did not always apply it effectively. Sufficient pedagogical knowledge relates to proper skills and methods to teach mathematics concepts to learners; these methods are also linked to effective classroom practices and classroom management.

All the challenges listed in Section 4.3 had an influence on the application of the pedagogy, which led to teachers not using their knowledge of pedagogical methods in ways that ensured that effective learning took place. Teachers generally struggled to keep up with the schedule proposed for each term. The learners did not attend extra classes and were often absent, which made it difficult to complete the term's work in time.

# 4.4 MY PERCEPTIONS OF TEACHERS AND TEACHING

To answer the second secondary research question by means of the data captured in this chapter, it is necessary to provide the reader with insight into my own experiences with teachers and teaching. These personal experiences directed my perspectives of teaching and facilitation.

### 4.4.1 During my own school years

In my experience, many people not directly involved in the school system, and even learners, believe that teachers have a comfortable job, with four holidays every year and every afternoon free to attend to their own concerns – I also believed this when I attended school. I had good to excellent teachers. Obviously, there will be one or two in any learner's school career that the learner does not get along with. My teachers, especially mathematics teachers in the FET phase, were first-class teachers. Not only did their love for mathematics spill over to the learners, but they also taught us life lessons. They encouraged the development of problem-solving skills and critical thinking. They made sure that we never stopped trying, no matter how difficult the problems were. They had outstanding pedagogical skills and they used it to motivate us to do our best. The content knowledge of the teachers was of a high standard. My mathematics homework was always done. Perseverance was synonymous with mathematics. Good metacognitive strategies, such as modelling, generating questions and setting and pursuing goals, were incorporated into my mathematics teachers' lessons. I experienced, in full, the positive enthusiasm of a teacher as a leader, and the positive willingness of learners who tried their utmost in the mathematics class.

#### 4.4.2 During my years as a teacher

I entered the teaching profession with this image of a teacher as described in Section 4.4.1, in my mind. I wanted to be as good to learners as my mathematics teachers had been to me. I was confronted by the reality of being a teacher quite early in my teaching career. Not only did I have to work in the afternoons to set or mark assessments, I also came into contact with the socioeconomic situations of learners, learners with variable mathematics abilities, skills and prior knowledge and other emotional challenges that make it difficult for learners to excel in the subject. I had to be a mathematics teacher, a psychologist and a caregiver, all in one. Even though I had to learn really fast to handle different situations, I realised that I was privileged to be in a position where I could have a positive influence and impact on learners' lives. Only then did I understand the importance of having good teachers. Teachers see learners for a large part of the day. Often, we are the only people listening to or seeing the potential in those children.

The learners I taught came from average-income homes. They had reasonable resources to assist them in mastering their schoolwork. The schools at which I taught did not have feeding schemes. The small number of learners who had social problems were taken care of, though in an inconspicuous way. Not having a warm school

uniform was the exception, not the norm. Sensitive situations were handled with great care. Over the years, from time to time, I had learners in my classes with serious social problems. Being expected to act as an ear to listen and a shoulder to cry on took my teaching experience to a higher level. Where possible, teachers assisted in different ways, including arranging therapy, if necessary. My greatest challenge was assisting poorly performing learners to believe in themselves again, to encourage them to try, and not give up. It broke my heart to see children with potential suffering from low selfesteem that was caused by the absence of someone to provide support, believe in them and motivate them to do their best. Building relationships and gaining the learners' trust were as important to me as teaching mathematics.

#### 4.4.3 My own children

As I mentioned in Section 4.2.5, our daughter coped very well throughout her school career. We assisted her by providing extra classes, not to merely pass, but to excel.

The situation with our son was different, and still is. From Grade R, he needed therapy and extra classes. It required a great deal of patience to assist him with ordinary tasks and homework. I had to adapt my pedagogical methods in such a way that I could assist him to understand and master his subjects. Having hearing loss created other challenges, such as difficulties writing the correct information in his workbooks when teachers only presented information verbally. It sometimes took more than one attempt to make sense of his workbook entries. I am thankful for the experience of being a teacher, without which I would not have been able to assist our son. I did a great deal of reading on ways to work with and explain to learners with disabilities. Inclusive education became a reality in our home. Another benefit was that I developed a sensitivity regarding learners who struggle, and who are not high achievers. Working with learners with disabilities or with those who face challenges, is one of the highlights of my teaching career. As long as they are willing to try and give their best, I could help them.

#### 4.4.4 The years as a mentor

My perception of being a teacher changed again when I started working with the schools in Thaba Nchu. I met teachers with wonderful, patient spirits, and hearts for

the learners. They coped with all the challenges they faced. It was an amazing experience, and the attitudes of the teachers were a lesson for me too. They adapted and made the best of their day. Their focus was not the physical state of the classroom, or the challenges they had to cope with, but the learners and teaching them the subject.

More than once a teacher taught me new methods to explain certain topics to learners – methods that made more sense to me and the learners and were easier to follow. I wish I had known these methods while I was still teaching, as it would have promoted teaching and learning in my own class. The teachers I worked with were willing to try new approaches. They were looking for fresh ideas to make their classes interesting and stimulating.

Every term, when the marks were calculated and the teachers felt despondent, my heart went out to them. They had invested many hours in preparation, lessons, extra lessons and assessments, to get the best out of each learner, but their efforts did not always reflect in the learners' results. This may have been the most frequently discussed situation in all the years I mentored, and was one of the main drivers of my research. Teachers' perspectives are often overlooked, and the focus is on the learners only. More and more is asked of teachers, and they have to make everything work; yet, their personal stories of teaching, such as those of the teachers whom I mentored, are seldom told. I wanted to hear the teachers' stories and to see teaching through their eyes.

#### 4.4.5 Lecturing education students

The university students I lectured added another dimension to my teaching experience. In the case of the PGCE students, they possessed the necessary subject knowledge, but knowing how to teach content to the learners was giving them nightmares. It is amazing to see how they developed teaching skills throughout the year, while we worked through the methodology. I realised that this was an opportunity to guide the students, from being unsure and afraid to face the teaching profession, to gaining confidence and having the necessary tools when they start teaching. Every year, I learnt more about the uncertainties the students might have. I am so glad I had the chance to walk this road with them, and to prepare them for their first year of

teaching. If one is not ready to face the challenges of teaching, it can be a shocking experience – it may even cause some novice teachers to leave the teaching profession.

I also lectured a generic mathematics module that was compulsory for all B.Ed. Intermediate Phase students. Most of the students entered the first lecture with a negative attitude; they were unwilling participants in the class, because they believed they could not do mathematics. Teaching them basic numeric skills was the main aim of the module. The second aim was to help them to make a mind-shift, so that they could see that mathematics is actually wonderful, and that they could do it. It is always heart-warming to receive emails from students at the end of the year, saying they never thought they would feel so positive towards mathematics. I hope that they take more than just mathematics with them into their classrooms.

#### 4.5 CHAPTER SUMMARY

To summarise my story and underline the answer to the second secondary research question, namely; How did 17 years' of exposure to all aspects of teaching, on personal and professional levels, direct the researcher's perspectives of teaching and facilitation?, the following main ideas can be highlighted: as a learner, I attended a good school, where I received effective teaching. My school years laid a solid foundation for my perspectives of teaching. After my school years and my years of studies, I started teaching at a private school with limited resources and support. I learnt a great deal about teaching learners with different intellectual ability levels in a single class. When I started working at a government school, I experienced another part of being a teacher, which involved a different approach than that which I encountered at the private school. I learnt how to work as part of a team in a subject department. The responsibilities were greater, and the learners differed in various aspects, such as ability, socioeconomic status and interests in sports and culture, and subject preferences. Keeping a good standard of discipline was more challenging, because of the greater number of leaners in the school, as well as the different backgrounds they came from.

Having my own children and supporting them with their skills and challenges, gave me new insight into certain teaching aspects. I had to learn new pedagogical skills to use

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to assist both my children, more especially, our son, with his hearing disability. Thinking back on all my years of teaching, I realise it was a privilege to teach in so many different scenarios. I could grow in my teaching abilities and the understanding of different aspects of different learners.

Mentoring teachers in Thaba Nchu schools gave me insight into another part of teaching. Seeing teachers facing and coping with challenges and remaining positive, every day, made me change my perspectives once again. After mentoring for a few months, I tried to make plans with the teachers, to get the most out of each opportunity to work with the learners, despite the challenges the teachers might have at that stage.

Through the years of my teaching and mentoring careers, I had been confronted by different aspects of teaching, which all assisted me in adapting and understanding the part of teaching I experienced at that stage. Due to the ability to adapt, I could find ways to let effective teaching and learning be my first priority. Therefore, I could make meaning of many aspects of the teaching environments of my participants. They could share their stories with me without fear, because they knew that, in a way, I could relate to their stories.

### 4.6 CHAPTER CONCLUSION

According to Kelchtermans (2005:996), the emotions of teachers are the result of their involvement in their teaching environment. Teachers use these emotions to understand their situations and determine what they can gain from it. That is why it is so important to give teachers a voice through which to report on their perspectives. They can make valuable inputs to the school system on a variety of levels.

Chapter 5 is the first data analysis chapter. In this chapter, I analyse the interviews I had with the participants. In the interviews, I focused on the participants' stories, so it is appropriate that this analysis follows the current one. Both Chapters 4 and 5 are chapters that tell stories, though from different perspectives.

# CHAPTER 5: THABA NCHU TEACHERS' TEACHING EXPERIENCES

## 5.1 INTRODUCTION

Chapter 3 describes how I chose autoethnography and qualitative research approaches to investigate the experiences of Thaba Nchu teachers regarding their teaching environment. I generated qualitative data through interviews with the participants. In this chapter, I present the data in Section 5.2, and follow it up by analysing, interpreting and discussing the data in Section 5.3. The biographical details of each participant are given to provide the reader with some background of each teacher.

# 5.2 CONSOLIDATION OF ASPECTS DISCUSSED DURING INTERVIEWS WITH PARTICIPANTS

The information below represents a summary of the important and relevant data provided by individual interviews with each participant. I want the reader to meet each participant and to get an idea of each participant's opinions and thoughts about his/her teaching environment.

After an in-depth study of the relevant literature, I identified five main groups of challenges faced by teachers in township schools. Some of the challenges that the participants discussed individually, were not experienced negatively. The reader will be able to conclude from the discussions that these aspects have a positive influence on each participant's teaching environment. Each participant experienced different positive and negative aspects, which lead to the information being grouped under the heading 'Challenges'.

The five groups are physical challenges, socioeconomic challenges, teacher-faced challenges, management challenges and affective aspects. The participants did not identify exactly the same aspects in each group. This observation supports the reason for presenting a separate discussion of the interview with each individual participant before combining the information, as presented in Section 5.3.

# 5.2.1 Interview with participant A.1

Biographical details, as well as a summary of the aspects discussed in the interview, are given in the paragraphs that follow.

## 5.2.1.1 Biographical details of participant A.1

Participant A.1 is a 29-year-old female teacher who had been teaching at a township school for five years (School A). When she started teaching, she taught life sciences and natural sciences, and she had been teaching mathematics for the last three years. At the time of the interview, she was teaching mainly learners in the FET phase, Grades 10, 11 and 12. She also taught one Grade 8 class.

After completing Grade 12, she lacked the funds needed to attend university to obtain a qualification. However, she needed a qualification and a career to support herself. She was fortunate to receive a Funza Lushaka bursary to study education, and in this way, she entered the teaching profession.

### 5.2.1.2 Summary of aspects discussed during the interview

The transcription of this interview is given in Appendix G. Table 5.1 provides a summary of the aspects discussed during the interview. The details of each aspect are explained after the table.

Fable 5.1: Summary	of aspects	discussed durin	g the interview wit	h participant A.1
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Physical challenges	Socioeconomic challenges	Teacher-faced challenges	Management challenges	Affective aspects
Resources	Learner support by the school	Teacher support	Teacher support	Teaching in a township school
Textbooks	Learner attendance	Learners' attitudes	Mathematics department	Positive aspects of teaching
Class size	Parental involvement	Discipline		Negative aspects of teaching
	Learners' attitudes and behaviour towards their parents	Crime/ violence		Teacher development
	Parental support			

#### 5.2.1.3 Physical challenges experienced by participant A.1

A discussion of the three physical challenges experienced by participant A.1 is presented in the sections that follow.

#### 5.2.1.3.1 Resources

School A had many resources available. One of these was a MathsLab, which is the result of an initiative by a sponsor, who built classrooms specifically for mathematics teaching at most schools in Thaba Nchu. The interior of the classroom was decorated in a way to encourage creative thinking and stimulate learners' interest in mathematics. A mathematics environment had been created by arranging tables or groups of tables in different shapes, such as squares and pentagons. The MathsLab was equipped with a data projector, a whiteboard and a chalkboard. A laptop was also allocated for use in the MathsLab.

### 5.2.1.3.2 Textbooks

All the learners had textbooks for mathematics, though the participant was not satisfied with the textbook in use – she considered the standard of the textbook to be suboptimal. She used another textbook for preparing lessons and to provide additional

information to learners. She found that the extra textbook explained concepts in an easier, more understandable way; furthermore, it provided a better distribution of cognitive levels in explanations and activities.

#### 5.2.1.3.3 Class size

There was enough space in the classrooms to accommodate the learners. The class sizes were acceptable, even though some classes had large numbers of learners.

### 5.2.1.4 Socioeconomic challenges experienced by participant A.1

A discussion of the five socioeconomic challenges experienced by participant A.1 is presented in the sections that follow.

### 5.2.1.4.1 Learner support by the school

Some learners at the school lived in child-headed families. The school and even some of the teachers supported these learners by giving them food and toiletries. Staff of the UFS also assisted the Grade 12 learners to complete their application forms for tertiary studies.

#### 5.2.1.4.2 Learner attendance

School attendance by learners was generally good. SA-SAMS, a South African School Administration and Management System, has a feature that keeps track of the number of days a learner is absent. SA-SAMS is a computer program that assists with schools' daily administration, management and governance (SA-SAMS Forum 2016:online). As soon as learners have been absent for 20 days, SA-SAMS can deregister them. Learners were informed about the way SA-SAMS works by their class teachers.

### 5.2.1.4.3 Parental involvement

Parents seemed to be available to assist learners, and were willing to visit the school for meetings. If parents failed to attend meetings, learners were sent home to fetch their parents. When teachers complained about learners to their parents, it seemed to worsen the burden on parents, as the parents did not always know how to handle their children.

#### 5.2.1.4.4 Learners' attitudes and behaviour towards their parents

Learners were disrespectful towards their parents, and mislead their parents regarding school matters. When parents were called to the school and informed of their childrens' behaviour, the learners reacted as if the teachers had wronged them. After such meetings with parents, learners' behaviour improved temporarily; however, learners fell back into their old ways of behaving after a few days.

#### 5.2.1.4.5 Parental support

Parents did not support their children academically at home, because many parents had low levels of education and lacked the knowledge to assist with schoolwork.

### 5.2.1.5 Teacher-faced challenges experienced by participant A.1

A discussion of the four teacher-faced challenges experienced by participant A.1 is presented in the sections that follow.

#### 5.2.1.5.1 Teacher support

If they wished, teachers could stay at school after school hours to prepare for the next day's lessons. Participant A.1 had access to extra resources, such as HeyMath!, to assist her with preparing lessons. HeyMath! (2017:online) is an interactive mathematics computer program that explains concepts and suggests activities that learners can do.

#### 5.2.1.5.2 Attitudes of the learners

Learners considered mathematics to be difficult; they had negative attitudes towards mathematics and believed they could not do it. Learners in the commercial stream of the school were enrolled for subjects such as business studies, accounting and economics. They passed all the subjects, except mathematics, and were, nevertheless, being promoted to the next grade. Learners, in general, did not care about mathematics.

#### 5.2.1.5.3 Discipline

Bad behaviour by some learners influenced other learners' learning, and made it difficult for the teacher to teach. Some learners were rowdy while the teacher was explaining, and prevented learners who wanted to listen, from hearing what she had

to say. The participant found that only a few learners approached her for extra help. The participant's Grade 10 class was her biggest challenge. Learners had negative attitudes and were guilty of bad behaviour in class. They continued talking while the teacher explained; even when she addressed this behaviour, they continued talking.

### 5.2.1.5.4 Crime/violence

There was no visible crime or violence at the school. There was, however, a great deal of crime and violence in the community and area surrounding the school. Crime and violence also influenced the participant. She was too scared to take a laptop home to do preparation, fearing that someone would steal the laptop, which was not her property.

# 5.2.1.6 Management challenges experienced by participant A.1

A discussion of the two management challenges experienced by participant A.1 is presented in the sections that follow.

### 5.2.1.6.1 Teacher support

Teachers received good support from the school's principal. However, teachers in different departments of the school did not support each other -- each department seemed to function as an isolated section. The participant did not experience coherence with teachers of different departments.

# 5.2.1.6.2 Mathematics department

Teamwork between teachers in the mathematics department was good, and they supported each other. At the time of the interview, one of the mathematics teachers was on maternity leave. Consequently, the principal divided the classes among the remaining mathematics teachers, which meant that three teachers had to do the work of four teachers. This arrangement had a visible influence on their workload regarding the number of learners taught by each mathematics teacher, as well as the number of assessments they had to mark.

# 5.2.1.7 Affective aspects experienced by participant A.1

A discussion of the four affective aspects experienced by participant A.1 is presented in the sections that follow.

### 5.2.1.7.1 Teaching in a township school

Teaching in the township environment was frustrating and hard. The participant had to work seven days a week. The learners' results did not reflect the effort and time invested by the teacher. The poor results were even more frustrating because the teacher was held accountable for the results. When she was asked to explain the poor results, she often did not know how to answer. The participant indicated that she would leave the teaching profession if she had the opportunity to do so.

### 5.2.1.7.2 Positive aspects of teaching

The participant mostly enjoyed teaching. The feeling of accomplishment from achieving good discipline in most classes, staying on schedule with the content she needed to teach, assessing learners according to the schedule as expected by the departmental subject advisors, and getting good cooperation from learners, motivated her positively. Other aspects that motivated the participant included learners who were enthusiastic about and show an interest in the subject, and positive attitudes from learners. Learners who work hard and have the goal to pass contributed to her positive attitude attitude.

### 5.2.1.7.3 Negative aspects of teaching

Learners with bad attitudes towards the subject and towards the participant were two of the most prominent negative aspects. Another aspect of her everyday work that influenced her attitude towards teaching negatively was learners who are not interested in the subject.

#### 5.2.1.7.4 Teacher development

The participant identified a mathematics teacher at another school as her mentor, and she met with him on a regular basis. She considered him to be an excellent mathematics teacher, and she aimed to reach his level of teaching. They also did team teaching.

### 5.2.2 Interview with participant A.2

The biographical details, as well as a summary of the aspects discussed in the interview, are given in the paragraphs that follow.

## 5.2.2.1 Biographical details of participant A.2

Participant A.2 is a female teacher, 50 years old at the time of the interview. She had been teaching for 15 years, of which she had spent five years in ABET (Adult Basic Education and Training), and the remaining 10 years teaching at a township school (School A). She had been teaching mathematics, mathematical literacy and natural sciences for the past 10 years. At the time, she was teaching mainly learners in the GET phase, Grades 8 and 9. She taught mathematics and natural sciences to Grades 8 and 9 learners and assisted with mathematical literacy for Grade 12. She chose the teaching profession as her career from the start. She loved working with children, loved the subjects she was teaching and had no regrets about becoming a teacher.

### 5.2.2.2 A summary of the aspects discussed in the interview

The reader can find the transcription of this interview in Appendix H. Table 5.2 provides a summary of the aspects discussed during the interview. The details of each aspect follow the table.

Table 5.2: Summary of the aspects discussed during the interview with participant A.2

Physical challenges	Socioeconomic challenges	Teacher-faced challenges	Management challenges	Affective aspects
Resources	Learner support by the school	Teacher-faced challenges mentioned by the literature	Teacher support	Positive aspects of teaching
Technology usage in class and Internet Broadcast Project	Stationery	Motivation of learners	Mathematics department	Negative aspects of teaching
Broken windows	Parental involvement	Discipline	Head of department	
	Parental support	Teaching practice		
		Crime/violence		
		Relationships with colleagues and other staff		

### 5.2.2.3 Physical challenges experienced by participant A.2

A discussion of the three physical challenges experienced by participant A.2 is presented in the sections that follow.

#### 5.2.2.3.1 Resources

The participant highlighted her preference for using various textbooks, instead of the internet, as a resource. She was, however, not against internet use.

#### 5.2.2.3.2 Technology usage in the classroom and IBP

The participant was not fond of using Internet Broadcast Project (IBP) lessons in class. She had found that learners were uninterested, and even fell asleep. IBP lessons are an initiative of the UFS to assist with the teaching of mathematics. Subject specialists had been recorded in a studio while explaining a topic; these recordings are distributed to schools via a device provided by the UFS. The participant had tried using technology in class to assist with the teaching of mathematics, but had found it time-consuming, and she preferred the traditional blackboard and chalk. However, she admitted that she needed support with using the internet; her confidence in this area was low.

### 5.2.2.3.3 Broken windows

Another big challenge for the teacher was the broken windows in some classes, especially during winter. The broken windows meant the classes were very cold. The learners struggled to pay attention and focus during lessons. When learners were not paying attention, the participant found it difficult to teach.

### 5.2.2.4 Socioeconomic challenges experienced by participant A.2

A discussion of the four socioeconomic challenges experienced by participant A.2 is presented in the sections that follow.

### 5.2.2.4.1 Learner support by the school

The economic status of the learners' families was low. A major contributing factor to this low status was that many leaners did not have parents, but were taken care of by their grandparents or other guardians. Many households survived on social grants received from government. School A, a no-fee school, had a feeding scheme that provided the learners with a daily meal.

#### 5.2.2.4.2 Stationery

Learners did not have the necessary stationery, which made teaching and learning a challenge. The learners borrowed stationery from each other during lessons -- this practice of borrowing stationery was accepted by the learners as the norm. Learners without pens or calculators in class could not complete classwork in their workbooks, which meant the books were incomplete and of no use when the learners had to study. Learners used pens, instead of pencils, to draw graphs, and being unable to erase made it impossible for them to correct mistakes.

Another problem caused by borrowing stationery was that it was difficult for the participant to complete lessons. Borrowing and/or sharing stationery is time-consuming, and the practice creates a stressful situation during assessments in class time, or when tests or exams must be written, because of time restrictions linked to assessments/tests/exams. The school had implemented a rule that learners had to ensure they had stationery before they entered the class or exam venue. Not having

stationery at school meant there was no stationery at home either, leading to homework not being done. Failing to do homework negatively influences teaching and learning.

### 5.2.2.4.3 Parental involvement and support

Some caregivers and guardians showed interest, but others did not attend parent meetings. Learners received an average amount of support from grandparents and other guardians. Some grandparents and guardians supported learners and showed interest in learners' schoolwork when the learners were at home. This support was, however, not always enough to keep the learners motivated to do their daily homework.

### 5.2.2.5 Teacher-faced challenges experienced by participant A.2

A discussion of the six teacher-faced challenges experienced by participant A.2 is presented in the sections that follow.

As part of the questions I asked the participant during the interview, I mentioned teacher-faced challenges, such as absenteeism of teachers, under-qualified teachers, teacher shortages, shortcomings in teachers' subject knowledge, and knowledge of the language of teaching. The participant answered that she did not experience the absenteeism of teachers, underqualified teachers, teacher shortages, poor subject knowledge of colleagues or the language of teaching as challenges.

#### 5.2.2.5.1 Class size

Overcrowded classes had been a problem until two years before, when it had been addressed and the class sizes adjusted to around 40 learners per class.

#### 5.2.2.5.2 Motivation of learners

Most of the learners were motivated by the teachers -- only learners who were mature were self-motivated. Learners did accept the guidance of the teachers. A group of the participant's learners had started their own afternoon classes. They took control of their learning by showing the participant the attendance list and describing everything they did in the classes.

### 5.2.2.5.3 Discipline

The participant experienced the learners of the school as being very disciplined.

### 5.2.2.5.4 Teaching practice

The participant made sure that she prepared well for every lesson. She compiled the memorandum of all the activities and exercises before class. The learners she taught wrote weekly informal tests. The participant marked all the informal tests herself, to know the abilities of the learners in her classes. She preferred to teach the same group of learners from Grade 10 to Grade 12; by doing this she had the opportunity to build a strong relationship with the learners. She often had to take in Grade 12 mathematical literacy learners at the beginning of their Grade 12 year. The participant found it frustrating to not be able to start teaching a group of learners in Grade 10.

### 5.2.2.5.5 Crime/violence

The participant was not aware of crime or violence in the school, neither was she aware of any gangsters in the school.

### 5.2.2.5.6 Relationship with colleagues and other staff

It was important for the participant to have good relationships with her colleagues and other staff. She had had a bad relationship with one of the other mathematics teachers and it had a negative influence on her teaching. The other teacher left the school, leaving the participant with peace in her heart.

### 5.2.2.6 Management challenges experienced by participant A.2

A discussion of the three management challenges experienced by participant A.2 is presented in the sections that follow.

### 5.2.2.6.1 Teacher support

The participant received good support from all levels of management: the principal, the management team and other teachers on the SMT. The SMT of a school typically consists of the principal, the deputy-principal(s), the heads of department (HOD) and subject heads (if the school identifies teachers as subject heads). The SMT manages many aspects of a school and also mediates between the Department of Education and the teachers.

### 5.2.2.6.2 Mathematics department

There were sound, positive relationships between the mathematics teachers, who worked well as a team. They assisted each other with all aspects of teaching, including planning. At the time, one of their colleagues was on maternity leave, and the rest of the mathematics teachers had taken over her classes. The increase in the number of classes each mathematics teacher had to teach, led to an increase in their workload.

### 5.2.2.6.3 Head of department

The teacher heading the mathematics department also headed the physical sciences and life sciences departments. The HOD focused more on physical sciences and life sciences, which left the mathematics teachers to rely on themselves and each other.

### 5.2.2.7 Affective aspects experienced by participant A.2

A discussion of the two affective aspects experienced by participant A.2 is presented in the sections that follow.

### 5.2.2.7.1 Positive aspects of teaching

The participant enjoyed going to work. She had a positive attitude towards her working environment and was happy at school. She also had positive relationships with her colleagues and the principal.

#### 5.2.2.7.2 Negative aspects of teaching

The only negative aspect of teaching that the participant could identify, was the bad relationship she had with a former colleague. This relationship had influenced her teaching negatively and had compromised her peace of mind at work.

### 5.2.3 Interview with participant B.1

The biographical details and a summary of the aspects discussed in the interview are given in the paragraphs that follow.

### 5.2.3.1 Biographical details of participant B.1

Participant B.1 is a male teacher; he was 58 years old at the time of the interview, and had been teaching at a township school for 32 years. Of the 32 years, only five years had been spent teaching at another school, the rest was at School B. He had started
as an HOD at School B and, at the time of the interview, was one of the deputy principals at School B. He was teaching mathematics to all the Grade 10 learners who took mathematics as a subject.

After completing Grade 12, participant B.1 was unsure what he wanted to do. He enrolled to study engineering, and worked at a big company for five years after completing his studies, but never felt happy and comfortable. Upon leaving his job, he reported for compulsory military service. During this time, he was assigned to work as a teacher at a township school, where he taught for about a year. He enjoyed the teaching and decided that this was what he wanted to do with his life. He completed a postgraduate diploma in education, and started teaching. After 32 years, he is still teaching, and still enjoying it.

## 5.2.3.2 Summary of aspects discussed in the interview

The reader can find the transcription of this interview in Appendix I. Table 5.3 provides a summary of aspects discussed during the interview. A discussion of the details of each aspect follows the table.

Table 5.3: Summary of aspects discussed during the interview with participant B.1

Physical challenges	Socioeconomic challenges	Teacher-faced challenges	Management challenges	Affective aspects
Resources	Learner support from the school	Teacher class attendance	Communication	Positive aspects of teaching
Water	Parental support	Teacher subject knowledge	The principal	Negative aspects of teaching
Classrooms	Poverty in the community	Discipline	School governing body	
Transport	Attendance by learners	Crime/violence	Extra classes	
Hostels				

Class size

Technology

### 5.2.3.3 Physical challenges experienced by participant B.1

A discussion of the seven physical challenges experienced by participant B.1 is presented in the sections that follow.

### 5.2.3.3.1 Resources

The participant did not have complaints about the resources available at the school. According to him, 99% of the learners had textbooks; however, he would have liked to have a smartboard in his class.

### 5.2.3.3.2 Water

Water was sometimes a problem, as there was not always water in the taps. The school had decided to sink a borehole to solve this problem – at the time of the study they were in the process of completing the pipeline system to start using the borehole.

### 5.2.3.3.3 Classrooms

The classrooms were in poor condition. Some classrooms had no electricity. Furthermore, the classrooms were boring, with nothing interesting on the walls. The learners had to share tables, which influenced their behaviour and encouraged talking during lessons. The participant said he would like to have his own classroom. At this school, teachers, not the learners, moved from one class to another between periods. They had tried to change the system, by letting the learners move from one class to the next, but it did not work. There were not enough classrooms for all the teachers.

# 5.2.3.3.4 Transport

Many learners arrived for school late. Transport was possibly one of the factors that played a role in the learners' tardiness. Some learners had to use public transport, because they lived too far away to permit walking to school.

## 5.2.3.3.5 Hostels

The learners could not board in the school's hostels, which were reserved for learners from farm schools that had closed down. The participant mentioned that certain problems could be reduced if learners could stay in the hostels.

## 5.2.3.3.6 Class size

The number of learners in a class had increased over the preceding two years. The increase in numbers meant that teachers had to mark more scripts. The greater number of learners also influenced discipline at the school. Nevertheless, all the learners had desks to sit at, even if they had to share the desks, and there was enough space in the classrooms to accommodate all the learners.

## 5.2.3.3.7 Technology

The participant did not use technology for teaching. He reported that it was timeconsuming to set up the equipment in every class, and then move all the equipment to the next class for the next lesson.

# 5.2.3.4 Socioeconomic challenges experienced by participant B.1

A discussion of the four socioeconomic challenges experienced by participant B.1 is presented in the sections that follow.

## 5.2.3.4.1 Learner support from school

The school's feeding scheme provided learners with one meal per day. Utilising the feeding scheme meals were optional, though most learners did.

A certain staff member was responsible for identifying and supporting learners facing barriers and social problems. The school assisted some learners financially and provided food, where necessary, for the learners to take home. The participant was also involved with certain learners, whom he assisted in various ways. The school was a no-fee school, which was operated by funding from the Department of Education.

### 5.2.3.4.2 Parental support

Parents were often uninvolved in learners' schoolwork. Learners often failed to do homework, and no one at home checked whether they did homework. The participant explained that parents can influence learners through encouragement and checking their homework. Mathematics needs practise, and parents can ensure that learners practise by doing their homework.

## 5.2.3.4.3 Poverty in the community

Many of the people in the community were poor. The school sometimes held a "civvies day" for fundraising. On this day, learners do not have to wear school uniform. However, learners from low-income households can't buy brand-name clothes, and they feel inferior and skip school on this day, causing them to miss a whole day's work.

### 5.2.3.4.4 Attendance of learners

Tardiness was a problem, though it was under control. It was usually the same learners who were late for school, and they missed the first one or two lessons of the day. At least the learners who arrived late tried to enter the classrooms quietly, to avoid interrupting the teaching taking place.

### 5.2.3.5 Teacher-faced challenges experienced by participant B.1

A discussion of the four teacher-faced challenges experienced by participant B.1 is presented in the sections that follow.

### 5.2.3.5.1 Teacher class attendance

Some of the teachers did not turn up to teach their lessons, as they were required to do. Sometimes teachers were absent from lessons for some of the time, and then learners became rowdy, and affected other teachers' teaching. The participant reported often needing to stop teaching, go to the class from where the noise was

coming, and send a learner to call the teacher. Doing so wasted his teaching time. The participant reported trying to be on time for each class and not leaving before the end of the period.

### 5.2.3.5.2 Teacher subject knowledge

The school had appointed a substitute teacher in the mathematics department, and the participant and his colleagues had discovered that the substitute teacher did not teach all the topics the policy document requires him to teach. The substitute teacher had admitted that he lacked the confidence to teach certain topics. The participant and the HOD had then decided to teach those topics on the substitute teacher's behalf.

### 5.2.3.5.3 Discipline

Overall, the discipline was not bad, and was better than it had been in the past. Discipline depends a lot on the teacher. The participant reported that some teachers, especially young teachers, struggled with discipline in class. Poor discipline in a class often leads to a class disturbing lessons being presented in adjacent classrooms. In some cases, teachers struggled to maintain discipline because corporal punishment is no longer allowed.

### 5.2.3.5.4 Crime/violence

Crime and violence was seldom present in the school. The participant was not aware of gangs in the school. A small group of learners smoked marijuana/dagga, though the school had a system in place to handle the situation. Learners caught smoking dagga were suspended for a certain time.

## 5.2.3.6 Management challenges experienced by participant B.1

A discussion of the four management challenges experienced by participant B.1 is presented in the sections that follow.

### 5.2.3.6.1 Communication

Communication between the principal and the SMT was not adequate. Sometimes, the principal made decisions without consulting the SMT, in situations where the SMT was supposed to be part of the decision-making. When the SMT became aware of the

decisions that had been made, it caused conflict between the principal and the rest of the SMT.

# 5.2.3.6.2 The principal

The participant found the principal to be unorganised. The participant said it created the impression that the principal did not always have the smooth running of the school as a first priority.

## 5.2.3.6.3 School governing body

The SGB of a school consists of parents, the principal, deputy principals and some staff members. The principal is not the chairperson of the SGB. The function of the SGB is to ensure that the school functions optimally.

School B had recently elected a new SGB, and a meeting was planned for the SGB to meet the staff. At the time of the interview, the SGB did not yet feature strongly in school activities.

## 5.2.3.6.4 Extra lessons

Extra lessons were often arranged for different subjects. The participant believes that, if everyone was present in their classrooms and taught like they are supposed to, extra lessons would not be necessary.

## 5.2.3.7 Affective aspects experienced by participant B.1

A discussion of the two affective aspects experienced by participant B.1 is presented in the sections that follow.

## 5.2.3.7.1 Positive aspects of teaching

The participant reported being happy at the school. After all these years of teaching, he still had a passion for teaching. Receiving appreciation from learners for his effort, encouraged the participant. He experienced the learners as being eager to learn. There were learners who were enthusiastic about mathematics and who regularly asked the participant for assistance.

## 5.2.3.7.2 Negative aspects of teaching

The participant could not identify any negative aspects about teaching. However, he was frustrated with all the meetings he had to attend, the interference of the Department of Education, and workshops and training being arranged during school hours. All he wanted to do was be in the classroom and teach mathematics.

# 5.2.4 Interview with participant B.2

The biographical details and a summary of the aspects that had been discussed in the interview, are given in the paragraphs that follow.

## 5.2.4.1 Biographical details of participant B.2

Participant B.2 is a male teacher, 29 years old at the time of the interview. He had been teaching since 2012, for the last five years at School B. He taught mathematics and mathematical literacy to learners in the FET phase. He used to teach life orientation; however, the subject advisor of life orientation had told the principal that the participant should rather teach mathematics.

The participant had loved mathematics and physical sciences since his school years. During those years, he assisted fellow learners with problems in the two subjects in Grade 12. He knew then that teaching was the way he had to go. When he started teaching, he knew that this was where he belonged. The participant did not study teaching only because he had to choose a career -- he was passionate about teaching and he wanted to stay in the teaching profession.

## 5.2.4.2 Summary of aspects discussed in the interview

The reader can find the transcription of this interview in Appendix J. Table 5.4 provides a summary of aspects discussed during the interview, and the details of each aspect are discussed after the table.

Physical challenges	Socioeconomic challenges	Teacher-faced challenges	Management challenges	Affective aspects
Resources	Learner support	Teacher support from the school	Teacher support	Positive aspects of teaching
Textbooks	Uniform	Teacher qualifications	Management of resources	Negative aspects of teaching
Sports grounds	Parental involvement	Discipline	School management team	
	Discipline	Attitudes of learners	School governing body	
	Late-coming	Support from Department of Education		
		Teacher attendance		
		Mathematics department		
		Class size		
		Crime/violence		
		Learner motivation		
		Language of teaching		

Table 5.4: Summary of aspects discussed during the interview with participant B.2

### 5.2.4.3 Physical challenges experienced by participant B.2

A discussion of the three physical challenges experienced by participant B.2 is presented in the sections that follow.

### 5.2.4.3.1 Resources

The school had no problems with water, electricity or the internet. The participant found everything regarding resources to be adequate. The fact that the resources are always available, had a positive influence on teaching.

The school had a rule that prohibited the use of cell phones. Learners were not permitted to bring their cell phones to school; if a learner was caught with a cell phone, the phone was confiscated and placed in the safe in the office for a time. However, if a teacher required learners to use the internet during a lesson, the teacher arranged with staff beforehand, so that learners could bring their cell phones to school.

## 5.2.4.3.2 Textbooks

Even though the principal had ordered the textbooks in time, some of the textbooks had arrived late. While they waited for the textbooks to be delivered, the learners had to share textbooks in class. Sharing textbooks had created a challenge when the teachers wanted to give homework. It was then decided that the teachers had to make copies of the activities they wanted to give as homework. The participant used the textbooks in class for classwork and, for homework, he copied problems from previous question papers.

## 5.2.4.3.3 Sports grounds

The school had soccer pitches, which were used by learners. There were also tennis courts on the school grounds, though they were dysfunctional.

# 5.2.4.4 Socioeconomic challenges experienced by participant B.2

A discussion of the five socioeconomic challenges experienced by participant B.2 is presented in the sections that follow.

## 5.2.4.4.1 Learner support

School B was a no-fee school, which means that the parents did not pay school fees. A fee, payable by the parents, was charged for optional computer classes. A teacher had been given the task to identify learners with emotional problems and/or social problems. She was doing a good job of providing support and assistance to learners with social problems. The school had a feeding scheme, which provided learners with a meal per day. The learners could choose if they wanted to eat with the scheme, or not. The people who prepared the food had a set menu, so learners could see what was on the menu every day. The menu often influenced whether learners decided to eat at school or not.

### 5.2.4.4.2 Uniform

All the learners wore the correct uniform, even during winter.

### 5.2.4.4.3 Parental involvement

Parental involvement was very poor. Even attendance of parent meetings was low, with only a small number of parents attending the meetings.

### 5.2.4.4.4 Discipline

Behaviour of the learners was good. Not even a social challenge, like a single-parent household, influenced the learners' behaviour in a negative way.

### 5.2.4.4.5 Late-coming

Many learners arrived for school late, especially on Mondays. A decision had been made to close the school gate at a specific time, locking out late-comers, with the idea that this would encourage learners to arrive at school on time. However, closing the school gate had the opposite effect on learners. They seemed to enjoy standing outside the school grounds. The Department of Education makes it difficult to discipline late-comers. The Department's stance is that all learners have a right to learn, and locking them outside the school grounds prevents them from learning.

## 5.2.4.5 Teacher-faced challenges experienced by participant B.2

A discussion of the 11 teacher-faced challenges experienced by participant B.2 is presented in the sections that follow.

### 5.2.4.5.1 Teacher support

The teacher who supported learners with social and emotional problems, also supported the teachers by looking after teachers' well-being. The principal supported teachers by calling meetings with parents of learners who had misbehaved.

### 5.2.4.5.2 Teacher qualifications

Teachers at School B were qualified. Some were busy with postgraduate degrees or upgrading their certificates.

### 5.2.4.5.3 Discipline

Learners obeyed the rule prohibiting cell phones at school. This rule was one of the results of the prohibition of corporal punishment. Learners had used their phones to make videos of teachers using sticks to discipline learners. The participant did not report experiencing discipline problems in any of his classes.

### 5.2.4.5.4 Attitudes of learners

Alcohol and smoking was more important to a minority of learners than their education. This attitude created problems for teachers. Extra lessons were arranged for learners who struggled with a subject, however, these learners were usually the ones who did not attend extra lessons. The participant reported that it seemed that learners did not want to take the teachers' motivation to heart.

## 5.2.4.5.5 Support from the Department of Education

Sometimes, it seemed to the participant as if the Department of Education sided with the learner in situations where the Department should be on the school's side. The school makes rules, for example, regarding hairstyles. If a learner is reprimanded for a hairstyle not being according to the rule, and the parents do not agree, the parents turn to the circuit manager, who may take the side of the parent and inform the school that the learner did not break the rule.

In the Free State, the circuit manager is called the SMGD (School Management Governance and Development). The circuit manager is a government official and can overrule a school's decisions.

### 5.2.4.5.6 Teacher attendance

Teacher attendance was good, overall. The principal appointed temporary staff if there was a need, or if a staff member would be absent for a long time. There were enough teachers at the school.

### 5.2.4.5.7 Mathematics department

The mathematics teachers worked together well, and there was good communication between them. The mathematics teachers held meetings to ensure they did the same work and to support and assist each other. If one of the mathematics teachers was absent, his/her colleagues made the effort to teach the absent teacher's class.

### 5.2.4.5.8 Class size

The classes had acceptable numbers of learners, that is, between 22 and 42 in the FET phase. In Grades 8 and 9, classes were overcrowded, with more learners in each class, between 45 and 55.

### 5.2.4.5.9 Crime/violence

Drugs, especially marijuana and cigarettes, on the school grounds were a problem. Learners brought the drugs to school and gave it to hostel learners to hide; at break they collected it from the hostel learners again. What complicated the situation even more, was that learners who used drugs looked out for each other. They warned each other when a teacher approached, which made it difficult to catch them. Drug use influenced the discipline and behaviour of learners in class. Learners using drugs were noisy and often disrupted teaching. Their performance tended to decline too.

## 5.2.4.5.10 Learner motivation

The participant experienced the learners as unmotivated and, furthermore, that the school failed to motivate learners. The school did not hand out certificates to encourage learners. Learners are not self-driven to perform. The participant believed that learners who try their utmost, even if their marks are not that high, had to be motivated. The lack of motivation in learners lead to learners failing to do homework. Instead, they copied the answers from a friend's book, then, when asked in class to explain an answer, they were unable to do so, because they did not understand. The participant reported trying to motivate the learners in his class by linking subject matter to real life. He also gave learners information about careers related to mathematics.

## 5.2.4.5.11 Language of teaching

The language of teaching in School B was English, which posed a challenge for mathematics and mathematical literacy. It is difficult to do mathematical literacy if the learners cannot understand English. Most of the problems in mathematical literacy are situated in real life, and require a great deal of reading and understanding. Often, the learners were able to answer questions in their own home languages; however, as

soon as they had to answer in English, they struggled. In other situations, learners were hesitant to answer in English. When they tried to speak in English and made mistakes, some of the other learners laughed at them.

### 5.2.4.6 Management challenges experienced by participant B.2

A discussion of the four management challenges experienced by participant B.2 is presented in the sections that follow.

### 5.2.4.6.1 Teacher support

Mathematics and mathematical literacy each had its own HOD. The HOD for mathematics was also the HOD for physical sciences, and the HOD for mathematical literacy was also the HOD for life sciences. The participant worked together well with both HODs.

### 5.2.4.6.2 Management of resources

Resources were managed properly by one of the deputy principals. Due to this good management, resources, such as paper for the photocopier, was always available.

### 5.2.4.6.3 School management team

The participant experienced no challenges regarding the SMT, which supported the teachers.

## 5.2.4.6.4 School governing body

The participant was positive about the new SGB, which was trying to make a difference. The SGB started out by having a meeting with the staff to introduce the members, to explain their aims and to give the staff an opportunity to share their feelings, concerns and problems.

## 5.2.4.7 Affective aspects experienced by participant B.2

A discussion of the two affective aspects experienced by participant B.2 is presented in the sections that follow.

### 5.2.4.7.1 Positive aspects of teaching

Teachers at School B worked as a team. Grade 12 teachers planned together to develop action plans to support learners optimally. The participant experienced good

communication between the principal and the staff. The teachers in the mathematics department formed a good team, and found ways to address problems, such as poor results. The participant was happy at the school and was considering starting a business giving extra lessons for learners.

# 5.2.4.7.2 Negative aspects of teaching

The only negative aspect of teaching at the time of the interview, was the participant's own late-coming problem. He had to drop his own children at school in the mornings; his children were still very young and their school started later than School B. This meant he was late every morning, and missed the daily staff meeting. However, he was always in time for the first lesson. The participant was working hard to find a solution for this problem.

# 5.2.5 Interview with participant C.1

The biographical details and a summary of the aspects discussed in the interview are given in the paragraphs that follow.

# 5.2.5.1 Biographical details of participant C.1

Participant C.1 is a male teacher, who was 33 years old at the time of the interview. He had been born and had studied in Ghana. He had been teaching mathematics for seven years, of which six had been at a township school. At the time, he had been teaching learners in Grades 8 to 12. The participant chose teaching as his profession because of his passion for teaching mathematics. He reported being a born teacher who did not want to do anything else.

School C is situated approximately 30 minutes' drive from Thaba Nchu. The road to School C was a gravel road in a poor condition, especially after rain.

# 5.2.5.2 Summary of aspects discussed in the interview

The reader can find the transcription of this interview in Appendix K. Table 5.5 provides a summary of aspects discussed during the interview. The discussion of the details of each aspect follows after the table.

Table 5.5: Summary of aspects discussed during the interview with participant C.1

Physical challenges	Socioeconomic challenges	Teacher-faced challenges	Management challenges	Affective aspects
Facilities	Learner support	Teachers' work ethic	Principal	Positive aspects of teaching
Classrooms	Parental involvement	Language of teaching		
Transport	Poverty	Teachers' attitudes		
Technology	Learner attendance			

### 5.2.5.3 Physical challenges experienced by participant C.1

A discussion of the four physical challenges experienced by participant C.1 is presented in the sections that follow.

### 5.2.5.3.1 Facilities

The school had no sports grounds or extramural activities to offer the learners. Extramural activities are important and assist learners with their schoolwork.

### 5.2.5.3.2 Classrooms

Some of the classrooms were in a poor condition. In some classrooms, the windows were broken and the ceilings were either absent or broken. There were insufficient classrooms for optimal teaching.

### 5.2.5.3.3 Transport

Transport to School C presented a big challenge. Due to the poor condition of the road, everyone relied on public transport, even teachers. Specially arranged buses took the learners and teachers to school in the mornings and back to the township in the afternoon. There were no other way to get to and from the school, which meant extra lessons after school were not possible. If teachers took more time than allocated to explain certain topics, there was no extra time to catch up, making it difficult to complete the term's work.

## 5.2.5.3.4 Technology

Technology was not generally available at the school. Electricity was often a problem. The electronic resources available at the school were for exclusive use by the school. Equipment could not be taken home by teachers to use for preparation; this included the HeyMath! laptop.

# 5.2.5.4 Socioeconomic challenges experienced by participant C.1

A discussion of the four socioeconomic challenges experienced by participant C.1 is presented in the sections that follow.

5.2.5.4.1 Learner support

The school had a feeding scheme that provided all the learners with a meal every day.

5.2.5.4.2 Parental involvement

Parents were not involved in their children's academic work.

### 5.2.5.4.3 Poverty

The majority of learners came from low-income households. Many of the learners did not have food at home, and depended on the feeding scheme. Another challenge created by poverty was that learners lacked the necessary stationery and uniform to wear.

5.2.5.4.4 Learner attendance

Poor learner attendance was experienced, due to the reliance on public transport. Parents did not take the trouble to ensure that learners attended school. Repeated absenteeism resulted in learners missing a lot of work. Teachers were expected to repeat work, which lead to teachers taking longer than expected to complete the term's work.

## 5.2.5.5 Teacher-faced challenges experienced by participant C.1

A discussion of the three teacher-faced challenges experienced by participant C.1 is presented in the sections that follow.

### 5.2.5.5.1 Teachers' work ethic

The participant expressed that teachers were not committed to their work or to the learners. Teachers were often absent. Repeated absenteeism resulted in teachers failing to complete the syllabus, because they ran out of time. Another aspect that frustrated the participant was that the teachers used local languages to teach the learners, instead of English. This practice caused learners to struggle even more to answer questions in English. The participant found it strange that teachers did not try to motivate learners. He believed that motivating learners had to be high on teachers' priority lists.

### 5.2.5.5.2 Language of teaching

The participant could not understand or speak the local languages, because he had grown up elsewhere. The participant explained that the learners often failed to understand his explanations, which were given in English, because learners were used to hearing explanations in local languages. The learners often failed to understand lessons taught in English. The language barrier often influenced the learners' performance.

### 5.2.5.5.3 Teachers' attitudes

Some teachers could not commit to the school or the surroundings, and did not stay very long before they applied for posts at other schools. Teachers at School C also failed to support each other, and teamwork was not a priority. The teachers set an example of lack of commitment, which spilled over to the learners, who lacked commitment in their work.

### 5.2.5.6 Management challenges experienced by participant C.1

A discussion of the one management challenge experienced by participant C.1 is presented in the next section.

#### 5.2.5.6.1 Principal

The example set by the principal motivated the participant to keep trying, and not to give up. The principal was hard-working and had good work habits.

## 5.2.5.7 Affective aspects experienced by participant C.1

A discussion of the one affective aspect experienced by participant C.1 is presented in the next section.

### 5.2.5.7.1 Positive aspects of teaching

The principal was hard-working and supportive, especially when teachers wanted to address learners' needs to improve results. The participant learned different ways of teaching due to the different learners in his classes. He believed that he had to continue teaching, in order to influence learners in a good, positive way.

# 5.3 INTERPRETATION AND DISCUSSION OF ASPECTS IDENTIFIED BY THE PARTICIPANTS, SUPPORTED BY QUOTES

In this section, I consolidate and discuss the information I provided in Section 5.2. By discussing and interpreting the participants' meanings and experiences of their teaching environment, I move towards answering the third secondary research question: How do practicing mathematics teachers in Thaba Nchu schools experience their teaching environments? In order to interpret and discuss the information, I combined the different participants' meanings regarding specific aspects, and present it in Tables 5.6 to 5.15.

#### 5.3.1 Physical challenges

The participants did not all identify the same aspects as physical challenges. Table 5.6 summarises the information on physical challenges, as described in Section 5.2. The headings of the rows combine the physical challenges identified by the participants. Under each of the headings, I include a short explanation of the physical challenge in the context of this study, as well as quotes by each participant who identified the aspect as a physical challenge. All the quotes were taken from the transcribed interviews, which can be found in Appendix G to Appendix K.

Using a table to combine, summarise and interpret the physical challenges that had been identified, provided me with a partial answer to the third secondary research question, which I answered in this chapter. Further parts of the answer are given by the interpretation of the rest of the tables in this chapter.

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In Table 5.6, the reference at the end of a quote, e.g., (A.1; 2:31), refers to the position of the quote in the transcription found in Appendix G to Appendix K.

- A.1 participant
- 2 page number of the transcription
- 31 line number on the page

In the case of participant B.1, some of the quotes were translated from Afrikaans to English. The translation was done by a registered language practitioner. The letter of declaration by the practitioner is attached to this research report as Appendix L. The English version is used in the table.

The reference next to a translated quote of participant B.1 will appear as follows:

"..." (E: B.1; 1:12) [in the original transcription: (B.1; 2:31)]

The first bracket, (E: B.1; 1:12), refers to the position of the quote in the translated document in Appendix M.

- E indicates the language of the quote, namely English
- B.1 participant
- 1 page number of the transcription
- 12 line number on the page

The second bracket, [in the original transcription: (B.1; 2:31)], refers to the position of the quote in the original transcription in Appendix I.

Table 5.6: Identification of physical challenges experienced by participants, supported by appropriate quotes

#### **Physical Challenges**

#### Resources

Resources refer to anything a teacher or learner uses to improve teaching and learning of mathematics.

- A.1: Every learner has a textbook, has a pen, has a book. We always have a chalk and then copy machine is always available... (A.1; 2:19)
- A.1: ...we have MathLab (A.1; 2:27)
- A.1: ...we do have the projector, the laptop, Heymath!, everything (A.1; 2:29)
- A.2: I prefer different textbooks...yes, I do have (A.2; 3:18,22)
- B.1: Resources, it's not too bad.... (E: B.1; 1:3) [in the original transcription: (B.1; 3:33)]
- B.1: Let's say 99% (E: B.1; 1:4) [in the original transcription: (B.1; 4:27)]
- B.2: ...everything is perfect (B.2; 4:8)
- B.2: Water, electricity, internet, resources we have a lot of resources here (B.2; 4:9)

#### Textbooks

The availability of textbooks for learners, as well as the standard of the textbook.

- A.1: ...we have the textbook... (A.1; 3:3)
- A.1: ...the textbook we are using they're not well... (A.1; 3:4)
- A.1: I'm using the Mind Series as the teacher which the learners don't have (A.1; 3:7)
- B.2: ...principal ordered the books, but they will come late... (B.2; 4:11)
- B.2: ...they share textbooks... (B.2; 4:18)
- B.2: ... I have to make copies for them (B.2; 4:19)

#### **Class size**

Class size refers to the number of learners in a class.

- B.1: ...this year I got in Grade 10, two classes that are 45, which is quite a lot (B.1; 4:19)
- B.1: It is rather tough to mark (E: B.1; 1:5) [in the original transcription: (B.1; 4:21)]
- B.1: ...they all have a desk and they can all sit and have enough space (B.1; 4:23)

### Technology usage in the classroom and IBP

Any electronic device, e.g., laptop or data projector, teachers can use as part of their lessons.

- A.1: ...I tried...using technology when I teach maths it's...I really just can't (A.2; 3:1)
- A.1: ...it's time-consuming or I want to do it myself (A.2; 3:7)
- A.2: ...I tried uh using IBP...but I saw learners are not interested... (A.2; 3:10)
- B.1: ...I cannot make use of technology in my class because I would have to take everything from one class to the other (E: B.1; 1:6) [in the original transcription: (B.1; 4:2)]
- B.1: It takes time to set up (E: B.1; 1:8) [in the original transcription: (B.1; 4:7)]
- C.1: Technology is not available in class and for preparation (C.1; 1:28)
- C.1: The use of technology in classes are very poor because of lack of resources... (C.1; 2:4)
- C.1: ...are not allowed to be taken home by teachers for lesson preparations (C.1; 2:5)

### Physical state of the classrooms

The building structure, including windows, ceilings and doors, as well as the interior of the classroom.

- A.1: ...even the space in the classroom, we don't have many learners like we used to (A.1; 2:21)
- A.2: ...broken windows in our classroom...hard when it's winter (A.2; 2:26)
- B.1: ...classrooms are in a bad condition...some are even without electricity (B.1; 3:11)
- B.1: ...it's so boring...nothing on the walls (B.1; 3:15)

C.1: ...not enough classrooms (C.1; 1:27)

#### Water

Water challenges at the school.

- B.1: water is also a problem from time to time...got a borehole (B.1; 3:18)
- B.1: the water issue will be, will be better now (B.1; 3:19)

#### Transport

Transport refers to the method learners use to get to school.

- B.1: ...many children come to school late...transport probably plays a role to some extent (E: B.1; 1:9) [in the original transcription: (B.1; 4:31)]
- B.1: ...you have to walk far to the zones...come with a bus, or you know, these taxis (E: B.1; 1:10) [in the original transcription: (B.1; 5:3)]
- C.1: Transport is a major problem (C.1; 1:29)
- C.1: ...whole school depends on public transport...the roads are very bad... (C.1; 2:7)

### Hostels

#### Hostels which form part of the school.

- B.1: Only children from closed-down farm schools stay in the hostels (E: B.1; 1:11) [in the original transcription: (B.1; 5:11)]
- B.1: It will reduce such problems (E: B.1; 1:12) [in the original transcription: (B.1; 5:16)]

### Sports grounds

Availability and functionality of sports grounds at the schools.

- B.2: ...we do have a soccer ground (B.2; 3:30)
- B.2: And the tennis court, but it's not functional (B.2; 3:32)
- C.1: ...no sport grounds... (C.1; 1:27)

C.1: ...doesn't have sport grounds for extramural activities...exercises is a major tool to help learners to be active in school (C.1; 2:1)

Some of the challenges, such as resources and textbooks, were identified by more than one participant. An interesting observation is that no single aspect was identified as a physical challenge by all the participants. Participants experienced some of the aspects positively and some of the aspects negatively. A summary of the positive and negative experiences of physical challenges is given in the Table 5.7.

Table 5.7 shows the combination of the participants' perceptions, ideas or feelings on different groups of challenges.

- indicates positive comments, feelings, experiences or perceptions regarding a specific aspect.
- X indicates negative comments, feelings, experiences or perceptions regarding a specific aspect.
- X / X indicates a mixture of positive and negative comments, feelings, experiences or perceptions regarding a specific aspect, as given by a single participant. It is counted as a single response, because it was given in one answer to a question asked during the interview. This type of response is referred to as a mixed response in the discussion after Table 5.7.

	A.1	A.2	B.1	B.2	C.1
Physical Challenges					
Resources	Х	Х	Х	Х	-
Textbooks	<mark>X / X</mark>	-	-	Х	-
Class size	-	-	Х	-	-
Technology usage in classroom and IBP	-	Х	Х	-	Х
Physical state of classrooms	Х	Х	Х	-	Х
Water	-	-	<mark>X / X</mark>	-	-
Transport	-	-	Х	-	Х
Hostels	-	-	Х	-	-
Sports grounds	-	-	-	<mark>X / X</mark>	Х

**Table 5.7:** Summary of physical challenges identified by the five participants

From the 20 responses relating to physical challenges given by the participants, only five were positive. Three of the responses were mixed responses. The mixed responses were not considered in the calculations of the percentages, which I used to get an idea of the overall opinions of the participants about this group of challenges; therefore, I only took the positive and negative responses into consideration for calculating percentages. The other 12 responses were negative, which means that 70,5% of the responses were negative and only 29,5% positive. From this information, it is clear that physical aspects of teaching, in general, definitely created challenges for the teachers. These challenges influence the teaching and learning that take place in the classes.

A physical challenge, such as transport, causes learners to miss lessons, which results in them failing to gain knowledge on a specific topic. Some learners do take the trouble to get the work from either a class friend or the teacher, but not all of them care enough about their schoolwork to do this. When the learners write tests, they score low marks, and they cannot understand why.

Another clearly identified physical challenge is the physical state of classrooms. If the tables and chairs are broken, or if there are not enough, learners need to share the tables and chairs that are available. Sometimes three to four learners use one double table, or three learners sit on two chairs. Such a situation does not contribute to successful teaching or learning. Learners are distracted easily, because they sit too close to each other. They talk among themselves while the teacher explains, forcing the teacher to stop the lesson to get the learners focused again. If a teacher has to do this a number of times during one lesson, he/she will lose time, making it difficult to complete the term's work on time, before the test or exam.

Having a large number of learners in one class can create the same situation, requiring learners to share tables and chairs. If learners must share furniture, maintaining discipline can become a problem. Teachers might need to address unwanted behaviour, such as learners talking and not paying attention, more often. Valuable time is wasted every time a teacher needs to handle a disciplinary situation in class. Not only is the effectiveness of teaching influenced negatively, but learners are also deprived of opportunities to learn. A large number of learners in a class also brings a bigger workload for the teacher. The more learners a teacher has in a class, the more

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assessments must be marked by the teacher. It is sometimes impossible to give individual attention to learners in a class with a large number of learners. Often, there is not enough time available during a period to assist learners with individual problems. Teachers arrange extra lessons after the end of the school day to help learners with individual attention.

Lack of resources, such as textbooks and photocopiers, can present physical challenges for teachers when they need the resources. If there are not enough textbooks for a class, learners need to share textbooks, which may be possible, in class, while the teacher is teaching. A problem arises when the teacher wants to give homework. If there is only one textbook between two or three learners, it could happen that two of the learners do not do their homework, with the excuse that they don't have a textbook. Teachers can solve this kind of problem by making copies of exercises for learners without textbooks. If a photocopier is not available or not functioning, or if the school has electricity supply problems, lack of resources will remain a problem. Computers and the internet are valuable resources for teachers. Both resources can be used to prepare for lessons, to develop activities for classwork, and set assessments.

Electronic devices, such as laptops and data projectors, and other technological resources, such as YouTube and mathematics software, can be worthwhile for teachers to use as part of their teaching strategy. Learners are interested in technology and their attention is easily attracted by using technology in a classroom. However, if the teacher must move from one class to another, it can be time-consuming and challenging to move around with the technological equipment.

Currently, water, as a resource, is a sensitive topic in South Africa. For the last five years, the country has been experiencing a shortage of water, due to drought, low rainfall and poor infrastructure. People must adopt ways of storing and using water. Not having running water in a household presents challenges, and it is an even bigger challenge when the school does not have running water either. Making a plan to sink a borehole shows that the school wanted to eliminate its water access problems as far as possible.

Of the three schools involved in this study, only School A had a hostel. School C wanted to build a hostel, but were waiting for approval from the necessary

stakeholders. A hostel on the school grounds could address certain challenges, among which transport. Learners who have to walk long distances to school, or have to use public transport, could apply to stay in the planned hostel. Learners staying in the hostel will not be late for school in the morning. Not only will teachers appreciate fewer learners coming late, but learners will not miss school. Attending school regularly will assist learners to keep up with the content explained in all the lessons, and may even have a positive influence on results.

A part of teachers' responsibility towards learners is the holistic development of learners. Holistic development includes physical and social development – not only cognitive development. One way in which the physical development of learners can take place at school, is through playing sports, such as soccer or tennis. Effective sports coaching requires sports grounds and coaches. Few schools in Thaba Nchu have sports grounds. Encouraging learners to do physical exercises can also contribute to physical development. However, for learners to do effective physical exercises, the school needs space where this can be done.

To summarise the experiences of the teachers regarding physical challenges: Some physical challenges, such as resources, were not experienced as challenges in a negative way by participants, but rather as positive aspects that needed to be nurtured. The other eight physical challenges identified by the participants, namely, textbooks, class size, technology usage in classrooms, the physical state of classrooms, water, transport, hostels and sports grounds, were experienced as challenges. These challenges needed to be addressed, so that the teaching environments of the participants, as well as that of other teachers in similar schools or teaching environments, can be improved.

#### 5.3.2 Socioeconomic challenges

All the participants identified the support learners get from school to be a positive aspect in their teaching environments. Learner attendance, parental involvement and parental support were the aspects that were mentioned by most participants.

Table 5.8 gives a summary of the information on socioeconomic challenges as described in Section 5.2. The headings of the rows show the combined socioeconomic challenges identified by the participants. Under each of the headings, I include a short

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explanation of the socioeconomic challenge in the context of this study, as well as quotes by each participant who identified the aspect as a socioeconomic challenge. All the quotes were taken from the transcribed interviews, which can be found in Appendix G to Appendix K.

Using Table 5.8 to combine, summarise and interpret the identified socioeconomic challenges, provided me with part of the answer to the third secondary research question that I answered with this chapter. The interpretation of the rest of the tables in this chapter will contribute to the rest of the answer to the research question.

In Table 5.8, the reference at the end of a quote, e.g., (A.1; 2:31), refers to the position of the quote in the transcription found in Appendix G to Appendix K.

- A.1 participant
- 2 page number of the transcription
- 31 line number on the page

Recall that in the case of participant B.1, some of the quotes were translated from Afrikaans to English. The translation was done by a registered language practitioner. The letter of declaration by the practitioner is attached to this research report as Appendix L. The English version is used in the table.

The reference next to a translated quote of participant B.1 will appear as follows:

"..." (E: B.1; 1:12) [in the original transcription: (B.1; 2:31)]

The first bracket, (E: B.1; 1:12), refers to the position of the quote in the translated document in Appendix M.

- E indicates the language of the quote, namely English
- B.1 participant
- 1 page number of the transcription
- 12 line number on the page

The second bracket, [in the original transcription: (B.1; 2:31)], refers to the position of the quote in the original transcription in Appendix I.

#### Table 5.8: Identification of socioeconomic challenges experienced by participants, supported by appropriate quotes

#### **Socioeconomic Challenges**

#### Learner support by school

Learner support by school refers to anything a teacher or the school does to support a learner with socioeconomic needs (e.g., food, clothes, stationery).

A.1: Do you have many child-headed families where they don't have parents? (A.1; 6:9)

#### A.1: We have... (A.1; 6:11)

- A.1: The teachers...they giving him food, toiletry... (A.1; 6:19)
- A.1: ...people from UFS, they did come here and helped him with the application and everything (A.1; 6:26)
- A.2: I know you still have a feeding scheme... yes (A.2; 4:23)
- A.2: ...they don't pay school fees (A.2; 4:28)
- B.1: ...feeding scheme...they at least get one meal per day at school (B.1; 5:30)
- B.1: All the learners that want to...but I think most of them taking it anyway (B.1; 5:33)
- B.1: No school fees (B.1; 6:14)
- B.1: ....she is mos in charge of this learners, with barriers and problems and whatever (B.1; 6:7)
- B.2: ...we do have a feeding scheme (B.2; 6:20)
- B.2: If they want to. Some, they don't go for feeding scheme (B.2; 6:22)
- B.2: The person who is working with them... (B.2; 9:4)
- B.2: ...they don't pay school fees (B.2; 9:18)
- C.1: ...the ladies prepare food for the learners every day (C.1; 3:4)
- C.1: Do all the learners eat with the scheme? Yes (C.1; 3:5)

#### Learner attendance

Learner attendance refers to the level of attendance by learners and the influence of school attendance.

- A.1: They do attend...Most of them (A.1; 5:21)
- A.1: ....SAMS-thing, it says after 20 days you will be out of the school, so they are scared of that (A.1; 5:26)
- B.1: It is a problem, but I would not say that it is out of control (E: B.1; 1:14) [in the original transcription: (B.1; 6:30)]
- B.1: But many come late, and mainly the same children... (E: B.1; 1:15) [in the original transcription: (B.1; 7:2)]
- B.1: ...many times he would come in the middle of the period; others will not even come in, so he misses the whole period (E: B.1; 1:16) [in the original transcription: (B.1; 7:5)]
- C.1: Attendance of learners is very poor because of transport problems (C.1; 2:29)
- C.1: Poor attendance of learners delays me to complete the pacesetter within the planned time (C.1; 3:12)
- C.1: Continuous absenteeism makes the learners don't perform well in their tests and exams because they were not present when most of the of the topics were taught (C.1; 3:17)

#### **Parental involvement**

Parental involvement refers to the involvement of parents in their children's schoolwork and the school.

- A.1: most of the parents here are not working, so they are available. (A.1; 4:24)
- A.1: Do they come to parents' evenings or meetings?...they do. (A.1; 4:25)
- A.1: And then if the parents are here, the learners will be like uh humble (A.1; 5:2)
- A.2: Others they show some interest. Others didn't even come to parents' meetings (A.2; 7:11)
- B.2: Parental involvement here are very poor (B.2; 11:24)
- B.2: ...the turn-up of parents, you'll find that it's 40 parents, 30, 50. Very low (B.2; 11:29)
- C.1: Parents do not really follow up on the children to check how they are performing in school (C.1; 2:25)

#### Learners' attitudes and behaviour towards their parents

This aspect refers to learners' behaviour towards their parents.

- A.1: Even if the parents want to support them, they they couldn't because the learners are so clever, they can think of anything ... (A.1; 4:19)
- A.1: ...the learners are disrespectful to their parents... (A.1; 5:12)
- A.1: ...they will always say "he's like that even at home, I don't know what to do" (A.1; 5:14)
- A.1: ...you are putting a burden on their parents because they already have their problems at home with this learner and then when you are coming with another ones at school so and then this learners, they don't listen (A.1; 5:17)

#### **Parental support**

Parental support refers to the availability and the ability of parents to assist learners with the content of the schoolwork.

- A.1: ...because some of the parents, they don't attend the classroom, the classworks of the learners at home to see a leaner, does he have a homework or whatsoever (A.1; 4:7)
- A.1: ...most of the parents they are not educated, so they cannot help their learners with factorisation (A.1; 4:11)
- A.2: ...I think it's 50/50 (A.2; 7:9)
- B.1: The parents are not always a 100% involved... (B.1; 5:22)
- B.1: ...they haven't done their homework. So, nobody have asked them or checked "have you done your homework or haven't you done the homework"...I think parents can play a big role to improve the learners' marks by just encouraging them and checking on them whether they are doing their homework (B.1; 5:23)

#### Stationery

Stationery points refers to the stationery owned by the learners.

- A.2: ...my serious problem is the stationery...learners do not have any stationery...and disturbs the class (A.2; 4:31)
- A.2: ...when we are writing a test now, they have to go all around the school now looking for calculator and looking for pens... (A.2; 6:1)
- A.2: At the end of the period you must be done (A.2; 6:7)

- A.2: ...they write equal to, then equal to what, because there is no answer there, waiting for the calculator (A.2; 6:13)
- A.2: ...then you need pencils maybe he's drawing a graph and then the graph is wrong using the pen. Now, it's difficult now to reverse that (A.2; 6:18)
- A.2: They are sharing the ruler, the smaller ruler, maybe five of them. That is disturbing, time consuming, so I can't finish my lesson (A.2; 6:27)
- A.2: And then if you give homework, now he's alone at home without anything to work, come back tomorrow, no homework (A.2; 7:2)

#### Poverty

Poverty refers to the socioeconomic status of the households and surrounding communities and its influence.

- B.1: ...poverty in the community. Is it a problem? It is rather bad. I think it is a problem (E: B.1; 1:18) [in the original transcription: (B.1; 6:15)]
- B.1: ...but to raise funds, they are fond of saying "this is going to be a civvies day". You will be surprised as to how many children do not even pitch...they feel that they will be valued less amid others with their labels (E: B.1; 1:19) [in the original transcription: (B.1; 6:22)]
- B.1: Miss a day... (E: B.1; 1:22) [in the original transcription: (B.1; 6:25)]
- C.1: Some of the learners don't have food to eat from their homes and they only depend on the feeders (C.1; 2:27)
- C.1: Some of the learners suffer from poverty and that affects in minor cases as having pen, pencils and school uniform and so on (C.1; 2:30)

#### Uniform

Uniform means the prescribed clothes the learners must wear to school.

- B.2: ...they do have a, most of our learners here, they do have full school uniform (B.2; 9:11)
- B.2: ...But some, those who don't have jerseys will wear the, maybe the black ones... (B.2; 9:13)

#### Discipline

Discipline includes everything that can have an influence on teaching and learning.

B.2: Or maybe his father, he was trying to put him on the line. So, after his father passed on, maybe he just saw an opportunity to do whatever he want (B.2; 10:16)

### Late-coming

Late-coming means arriving at school after the starting time of the school day.

- B.2: ...the problem that we are facing is late-coming...especially on Mondays (B.2; 7:10)
- B.2: ...they do close the gate...It seems like they are enjoying it (B.2; 7:14)
- B.2: ...our department is making our job very difficult...they will tell that the learner have a right to learn (B.2; 8:11)

Participants experienced some of the aspects positively and some of the aspects negatively. A summary of the positive and negative experiences of socioeconomic challenges is given in Table 5.9.

Table 5.9 shows the combination of the participants' perceptions, ideas or feelings on different aspects of socioeconomic challenges.

- indicates positive comments, feelings, experiences or perceptions regarding a specific aspect.
- X indicates negative comments, feelings, experiences or perceptions regarding a specific aspect.
- X / X indicates a mixture of positive and negative comments, feelings, experiences or perceptions regarding a specific aspect, as given by a single participant. It is counted as a single response, because it was given in one answer to a question asked during the interview. This type of response is referred to as a mixed response in the discussion after Table 5.9.

Table 5.9: Summary of	f socioeconomic chal	llenges identified by t	he five participants

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	A.1	A.2	B.1	B.2	C.1
Socioeconomic Challenges					
Learner support by school	Х	Х	Х	Х	Х
Learner attendance	Х	-	Х	-	Х
Parental involvement	Х	<b>X / X</b>	-	Х	Х
Learners' attitudes and behaviour towards their parents	Х	-	-	-	-
Parental support	Х	Х	Х	-	-
Stationery	-	Х	-	-	-
Poverty	-	-	Х	-	Х
Uniform	-	-	-	Х	-
Discipline	-	-	-	Х	-
Late-coming	-	-	-	Х	-

In this category, the participants provided 22 responses, of which nine were positive, 12 were negative and one was a mixed response. The mixed response was not considered in the calculations of the percentages. As with the responses relating to physical challenges, I used the percentages to get an idea of the overall feeling of the participants towards this group of challenges, therefore, I only took the positive and negative responses into consideration when I calculated the percentages. Negative responses in the socioeconomic challenges category comprised 57,1% of responses, compared to the 70,5% of the physical challenges category, were given regarding socioeconomic challenges.

The challenges, learner support received by school, stationery and uniform, can all be linked directly to the poverty aspect identified by the participants. All three schools had a feeding scheme that supplied learners with one meal every day. For the majority of the learners who ate with the scheme, that meal was their only meal for the day. The poverty level of the communities surrounding the three schools was high. Most of the learners came from low-income households, where food was not always available. For this reason, all three schools supported the learners with food during the day. In extreme cases, the school gave the learners food to take home. Participant A.2 commented extensively about stationery being a socioeconomic challenge, and elaborated on the influence that learners without stationery had on teaching and learning. If learners come from low-income households where they do not have food to eat every day, it is unlikely that those learners would have the necessary stationery.

Learners adapted to this situation by sharing stationery, such as pens and calculators, in class. Sharing stationery leads to learners often asking for their turn to use it, thereby disturbing the lesson, for the teacher as well as for the other learners. Regular interruption of the teacher while he/she is explaining, can cause the teaching and learning to be less effective. Even though learners who do not have the needed stationery try to keep up with the lesson, they often have incomplete workbooks. One of the causes of incomplete workbooks is that corrections are not done, because the learner does not have a pen or pencil to do corrections with. Another contribution to incomplete workbooks is failure to draw, for example, graphs, because the learner did not get the chance to borrow a pencil to draw the graph.

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All the participants indicated that their learners have uniforms. However, they did not mention that the clothes were sometimes not the correct size, or not always in a good condition, as I know from personal observation. Not having a warm enough uniform to wear during winter, in a classroom with broken or no windows, means that learners cannot concentrate during lessons. It is difficult to concentrate and pay attention if one is cold and hungry. This situation leads to learners failing to understand the lesson's content, failing to make notes in their workbooks and, thus, not getting good results in assessments.

Participant B.2 shared a great deal about late-coming being a socioeconomic challenge. Late-coming and poor attendance by learners have similar consequences. Whether learners arrive late for a lesson, or do not come to school at all for a day, they miss the content covered in lessons. If they do not make an effort to catch up the work they missed, they have gaps in their knowledge. The schools had plans in place to address late-coming problems, some of which were very effective, and some less effective. Effective plans lead to decreasing and even eliminating late-coming, whereas less effective plans do not make a difference to the number of learners who arrive for school late.

Parental involvement and parental support work together. If parents or guardians support their children at home, by checking up on homework done or assisting when a child has a problem with the content, it is likely that those parents will also attend parent meetings and be involved at their children's school. A good relationship between teachers and the parents/guardians of learners, means that solutions to problems will be found quickly, due to open communication channels. Learners, particularly those who cause discipline problems, tend to disrespect teachers and parents/guardians. Behaviour such as disrespect is often a sign of learners experiencing other, underlying problems or challenges. The necessary parental support can help to spot and address these problems. Learners, regardless of age, do not always have the necessary skills to address emotional and development challenges – they need adults to assist and support them.

The participants' strong reactions to these challenges lead me to believe that they really experienced the negative impact these challenges had on their teaching.

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# 5.3.3 Teacher-faced challenges

Of all the categories discussed during the interviews, the teacher-faced challenges elicited the highest number of responses from participants. Table 5.10 gives a summary of the information on teacher-faced challenges as described in Section 5.2. The headings of the rows show the combined teacher-faced challenges identified by the participants. Under each of the headings, I included a short explanation of the teacher-faced challenge in the context of this study, as well as supporting quotes from each participant who identified the aspect as a teacher-faced challenge. All the quotes come from the transcribed interviews, which can be found in Appendix G to Appendix K.

One of the aims of this chapter is to answer the third secondary research question: How do practicing mathematics teachers in Thaba Nchu secondary schools experience their teaching environments? Using a table to combine, summarise and interpret the identified physical challenges, contributed to answering the research question.

In Table 5.10, the reference at the end of a quote, e.g., (A.1; 2:31), refers to the position of the quote in the transcription found in Appendix G to Appendix K.

- A.1 participant
- 2 page number of the transcription
- 31 line number on the page

All the quotes of participant B.1 in this section are in English in the original transcription.

Table 5.10: Identification of teacher-faced challenges experienced by participants, supported by appropriate quotes

## **Teacher-faced Challenges**

Teach	her support
Any fo	orm of support given to the teachers by the school.
A.1: A.1: A.1: B.2: B.2: B.2:	But you can work here as well ne?mmm (A.1; 8:29) I do get support from the principal (A.1; 9:10) and your colleagues?No, nobody (A.1; 9:12) Even we as educators, she help us a lot (B.2; 11:7) It's not only focusing on the learners (B.2; 11:8) He called a parents' meeting for that class only (B.2; 16:16)
Attitud This a	des of learners aspect refers to how learners react to schoolwork, teachers and themselves.
A.1:	They think that mathematics is a difficult subject and they have told themselves they will never pass mathematicsthey don't even care (A.1; 3:18)

- B.2: Alcohol, vapes, etc. etc. Those things, they don't put their education first, so they are making our, our job very difficult (B.2; 2:28)
- B.2: ...even if you want to organize some extra classes to help them, those who will come to school are those that you, you don't actually want them to come. (B.2; 3:1)
- B.2: ... even if you try to motivate them, ah-ah, they just listen at that time and they continue with what they are doing (B.2; 3:5)

#### Discipline

Discipline includes everything which can have an influence on teaching and learning.

- A.1: ...especially in Grade 10...bad attitude...they keep quiet for a second, then they start talking (A.1; 7:9)
- A.1: I explain them and they are going to a picnics and they are going to fail them because they didn't hear me explaining to them because they were busy talking (A.1; 7:14)
- A.1: They are just quiet there and then this learners who are around them, they will be making noise and this one they don't even hear what I'm saying (A.1; 7:22)
- A.2: they are disciplined. Our learners are very disciplined (A.2; 8:13)
- B.1: ...it was better, but it's not that bad really (B.2; 8:21)
- B.1: ...it depends on the teacher...the young teachers, I'm not so sure that they can... (B.2; 8:23)
- B.1: ...I walk into a, storm actually into a class, and then only to find that the teacher is also there. I thought there were nobody with all the noise from, coming from the class... (B.1; 8:23)
- B.1: ...no corporal punishment, it's even more difficult with some of them... (B.1; 8:31)
- B.2: ...they do listen (B.2; 5:22)
- B.2: ...it's a new rule, because we know that corporal punishment is abolished... (B.2; 5:29)
- B.2: if you see a learner having a cell phone, you take it. We don't compromise on that one (B.2; 6:6)
- B.2: ...But behaviour in my class, it's good (B.2; 10:25)
- B.2: ...but you said now earlier the discipline in your classes are fine...yeh, it's fine (B.2; 16:8)

#### **Crime/violence**

Any crime/violence that is part of the school and/or the community.

- A.1: No, in this school it doesn't happen (A.1; 8:13)
- A.1: ...Do you have lots of violence crime here around the school? Yes (A.1; 8:19)
- A.1: ...I'm scared that they might come and take this one and this laptop (A.1; 8:25)
- A.2: No, in our school (A.2; 8:7)
- A.2: Gangsters? No, in our school everything is fine (A.2; 8:10)
- B.1: ...violence...at school...not really, seldom actually (B.1; 8:12)
- B.1: ...gangs and things like that...not really, no (B.1; 8:13)
- B.1: ...some learners that smoking dagga...minority...we are also suspending them for a, for a certain period of time (B.1; 8:16)
- B.2: ...drugs (B.2; 14:22)
- B.2: Marijuana and cigarette... (B.2; 14:24)
- B.2: Some learners will bring their stuff here at school and give to some of the hostel learners to keep for them (B.2; 14:28)
- B.2: The other one will be standing at the corner to look for anyone coming...To inform their friend if there's anything (B.2; 15:2)
- B.2: ...he was using marijuana and he was mentally disturbed...he was disrupting the class (B.2; 15:10)
- B.2: ... even the results or, ay, something is not right with this boy (B.2; 15:22)

## Motivation of learners

Motivation of learners refers to the extent to which learners are self-motivated or motivated by teachers.

- A.2: If you motivate them, then they pick up. Yes, they are motivated (A.2; 8:16)
- A.2: Only those that's uhm matured, then they are self-motivated (A.2; 8:20)
- A.2: But others if you talk to them, oh-ah, they listen and they do that (A.2; 8:22)
- A.2: They decided to do their classes, afternoons...On their own...they show me attendance and everything they are doing (A.2; 8:27)

- B.2: I see all of them are like that. (B.2; 17:1)
- B.2: Motivation nowadays, ey, it's not in good condition now...we are used to being motivated by certificates... (B.2; 17:4)
- B.2: ...you don't have to motivate a person if he only did good, but you can motivate a person if he tried to do it (B.2; 18:3)
- B.2: ...come to school without homework asking his friend to borrow a book and he just copy everything just like that...if you ask her or him "how did you get this answer?", no reply (B.2; 18:15)
- B.2: I become aware that on math literacy everything that is there it's on real life situation (B.2; 18:23)
- B.2: ...a information sheet about the careers that you can choose if you are doing maths lit (B.2; 19:19)

## **Teaching practice**

This aspect refers to the participant's way of preparing him/herself for lessons or teaching in class.

- A.2: ...you are still doing all your preparation in your book...Always (A.2; 12:16)
- A.2: And the exercises, working out the memos...Always, before I go to class, always. Mark informal tests....Every week (A.2; 12:18)

### **Relationships with colleagues**

This aspect refers to how teachers get along with their colleagues and the influence of these relationships on the teachers' teaching.

- A.2: ...but the environment must be relationships (A.2; 11:6)
- A.2: That one...really last two, two years back, oh it was a disaster for me...because if you are not in good terms with another teacher, ugh, that brings disturbances (A.2; 11:7)

## **Teacher class attendance**

This aspect refers to the level of class attendance by teachers and its influence on teaching.

- B.1: Teachers are not, I feel they are not attending in their classes like they should (B.1; 7:20)
- B.1: ...arriving late, leaving early...some are even dodging the whole period... (B.1; 7:21)
- B.1: ...it's frustrating when I'm in class and next door there are learners making noise (B.1; 9:5)

- B.1: ...I will go next door and say "which teacher is supposed to be here", then I take the RCL [Representative Council of Learners (South Africa)]and say "go and fetch that teacher" (B.1; 9:5)
- B.1: ...it's taking away some of my time... (B.1; 9:9)
- B.1: ... I try to be there on time and leave on time (B.1; 9:10)

## Teacher subject knowledge

The level of subject content knowledge of teachers.

- B.1: ...they've got this guy who is sort of to help out...the learner mentioned that they are going to write test now on trigonometry and they haven't done trigonometry (B.1; 7:26)
- B.1: ...I found it seems as if he is not comfortable with teaching trigonometry (B.1; 8:1)
- B.1: ... I've taken it on myself that I will go three days in a week, when my periods are not clashing with theirs to try and help them with trigonometry... the HOD will also do a portion of trigonometry (B.1; 8:5)

### **Teacher qualifications**

The teaching qualifications of teachers.

- B.2: ...they are qualified to be here (B.2; 9:27)
- B.2: ....some are busy with their honours and others are upgrading their certificates... (B.2; 10:1)

#### Support from Department of Education

Support and involvement of any kind by the Department of Education.

B.2: One parent came with a child, telling us that he don't see any problem with the child. We told her that we want short hair...He went straight form our SMT to our SMGD. So our SMGD called, telling him that he don't see anything wrong with that boy (B.2, 8:19)

#### **Teacher attendance**

The frequency of teachers attending school on a daily basis.

- B.2: ...our attendancy here...it's in good condition (B.2; 12:25)
- B.2: principal have organised someone to continue...where there is a gap, we are trying to close it (B.2; 12:26)

#### Mathematics department

The mathematics department of a school is the group of mathematics teachers and the relationship between them.

- B.2: ...working very good with them...even our communication, it's very good (B.2; 13:16)
- B.2: ...we normally meet sometimes and communicate to "how far are you", "I have this type of questions, you can maybe make use of them for your learners" (B.2; 13:19)
- B.2: If he's absent, I normally take their learners or if I'm absent, they take my learners (B.2; 13:21)

### **Class size**

Class size means the number of learners in one class of a grade.

- B.2: ...they are 39 and 42, but in Grade 12, it's 22 and 36 (B.2; 14:9)
- B.2: ...overcrowded are the Grade eights and nines (B.2; 14:12)

## Language of teaching

The language used in the school for teaching the learners.

- B.2: ....somehow it's a bit challenge, because our learners, when it comes to English... (B.2; 20:9)
- B.2: ...you cannot do maths literacy if you don't understand English... (B.2; 20:12)
- B.2: ...a learner will be able to answer it with his or her language, Tswana language or Sotho language, but when it comes to English... (B.2; 20:15)
- B.2: ...one will try to speak English, but the constructive is not correct and others will start laughing (B.2; 20:24)

- C.1: Most of the teachers also use the local languages to teach...difficult to answer and understand questions when it is in English (C.1; 3:29)
- C.1: I don't speak and understand any of the local languages...find it difficult to explain some concepts when teaching because the learners are used to be taught in their local languages (C.1; 4:6)
- C.1: Learners fail to understand most of the lesson being taught...that affects their performance... (C.1; 4:10)

#### Teachers' work ethic

It refers to teachers' attitudes towards their profession and the methods they apply to attend to responsibilities.

- C.1: ...teachers are not really committed to their jobs...don't come to school regularly...leave gaps in pacesetter (C.1; 3:26)
- C.1: ...teachers don't motivate these learner (C.1; 3:31)

## **Teachers' attitudes**

The way a teacher acts in relation to aspects of their profession.

- C.1: Most of the teachers are not committed to their work...don't support... (C.1; 4:22)
- C.1: The learners also tend to not put in more effort to perform well in class... (C.1; 4:25)

As seen with the previous two groups of challenges, participants experienced some of the aspects positively and some of the aspects negatively. A summary of the positive and negative experiences of teacher-faced challenges is given in Table 5.11.

Table 5.11 shows the combination of the participants' perceptions, ideas or feelings regarding different aspects of teacher-faced challenges.

- indicates positive comments, feelings, experiences or perceptions regarding a specific aspect.
- X indicates negative comments, feelings, experiences or perceptions regarding a specific aspect.
- X / X indicates a mixture of positive and negative comments, feelings, experiences or perceptions regarding a specific aspect, as given by a single participant. It is counted as a single response, because it was given in one answer to a question asked during the interview. This type of response is referred to as a mixed response in the discussion after Table 5.11.

	A.1	A.2	B.1	B.2	C.1
Teacher-faced Challenges					
Teacher support	Х	-	-	Х	-
Attitudes of learners	Х	-	-	Х	-
Discipline	Х	Х	<mark>X / X</mark>	Х	-
Crime/violence	<b>X / X</b>	Х	Х	Х	-
Motivation of learners	-	<b>X / X</b>	-	Х	-
Teaching practice	-	Х	-	-	-
Relationship with colleagues	-	<mark>X / X</mark>	-	-	-
Teacher class attendance	-	-	Х	-	-
Teacher subject knowledge	-	-	Х	-	-
Teacher qualifications	-	-	-	Х	-
Support by Department of Education	-	-	-	Х	-

Table 5.11: Summary of teacher-faced challenges identified by the five participants

Teacher attendance	-	-	-	Х	-
Mathematics department	-	-	-	Х	-
Class size	-	-	-	<b>X / X</b>	-
Language of teaching	-	-	-	Х	Х
Teachers' work ethic	-	-	-	-	Х
Teachers' attitudes	-	-	-	-	Х

Participants provided the most responses in this category. Of the 27 responses received, 12 were negative (54,6%), 10 were positive (45,4%) and 5 were mixed responses. The mixed responses were not considered in the calculation of the percentages. As with the physical and socioeconomic challenges sections, I used the percentages to get an idea of the overall feeling of the participants towards this group of challenges, therefore, I only took the positive and negative responses into consideration when I calculated the percentages. There were, again, fewer negative responses than the 57,1% negative responses in the socioeconomic challenges category, though there were still more negative than positive responses. A variety of aspects were identified as teacher-faced challenges, which indicated to me that this category is the biggest problem area for the participants.

The most problematic aspect seemed to be the attitudes of learners. Both responses received were negative. The participants reacted strongly to this aspect, indicating how serious the influence of the negative, unconcerned attitudes of learners were on their teaching and what happened in the classroom. Another rather alarming aspect is the reportedly low motivation level of learners. It is a challenging combination if learners have a negative attitude as well as low to no motivation, especially if the learners have the perception that mathematics is difficult and that they cannot do it.

Two other aspects mentioned by most of the participants are discipline and crime/violence. Learners' discipline seems to be on a good level, overall. It seems that only a few learners, and only isolated cases or classes, needed to be disciplined. The rest of the learners seemed to behave according to what is expected of them. Crime/violence was not a problem in the schools, though it definitely was present in the community. Crime and/or violence did not seem to have an impact on any one of the participants' teaching.

From the responses, it is clear that the participants were satisfied with the level of emotional and motivational support they get from their schools. The support is given by the principal and some of their colleagues. Teacher support will be discussed further in Section 5.3.4.

The cooperation by and relationships in the mathematics departments of the schools were positive and supportive, overall. The participants felt a sense of belonging in the mathematics departments they were part of. A mathematics department needs to function as a team. Mathematics is a challenging subject to the majority of learners. It is, therefore, of the utmost importance that mathematics teachers plan together and find ways to assist and support each other. Refer to Section 5.3.4 for a discussion of the mathematics department as a management challenge.

Participant A.2 mentioned the importance of good preparation for and planning of lessons. If teachers do not prepare properly, learners can lose confidence in the teacher, especially if a teacher is disorganised and makes many mistakes during lessons. If a teacher has not prepared for a lesson, it could also have a negative impact on the teacher's confidence to teach the lesson.

A school that wants to function optimally, needs to have unity among staff. Bad or strained relationships between staff members can have a negative effect on staff members' attitudes and may even influence their teaching in a negative way.

Teachers must set an example for learners, by attending school every day and being in class, on time, for every period. Teachers who are absent from school must be substituted by another teacher or a temporary teacher. Learners who sit in class but who are not constructively busy, tend to lose interest and start behaving in ways that can cause discipline problems. Teachers who take their time to get to class, not only create a foundation for learners to talk while they wait, but also lose valuable teaching time. Considering the pace at which the teachers must work to complete the term's content, teachers cannot afford to lose time.

Teacher subject knowledge and teacher qualifications often complement each other. Teachers with applicable qualifications to teach a subject will have sufficient subject knowledge. Teachers should stay up to date with changes in content and, if necessary, improve their qualifications. Teachers can assist each other to understand the content of topics, if some of them are not completely comfortable with the topic.

The Department of Education is another possible source of support for teachers. Teachers and the Department are role players in the development of the learners. A relationship of trust and cooperation is needed between these two role players.

Class size was discussed in Section 5.3.2. The number of learners in a class can increase the number of assessments teachers must mark, and could affect maintenance of discipline in a class.

The language of teaching in most South African schools is English. English is, in the majority of cases, the second or even third language of a learner. If the medium of instruction is not the home language of a learner, it can create difficulties for comprehension and the ability to express him/herself. Learners need to understand a question in order to answer the question. Teachers need to assist learners by teaching them only in English; by doing so, learners learn the terminology of the subject, and improve their English language skills generally.

To teach implies an opportunity to make a difference in a child's life. What teachers tend to forget, is that learners see teachers as their role models, and follow the example set by the teacher. If teachers have negative attitudes towards teaching or a subject, it is likely that these negative attitudes will spill over to the learners. Teaching is a noble profession; teachers not only teach content, but also provide care and life lessons, which contribute to the holistic development of learners.

## 5.3.4 Management challenges

Management includes the principal, SGB, SMT and HOD. Aspects related to management by the SMT and communication between the SMT and the staff, will be addressed in this section.

Table 5.12 provides a summary of the information on management challenges as described in Section 5.2. The headings of the rows show the combined management challenges identified by the participants. Under each of the headings, I include a short explanation of the management challenge in the context of this study, as well as quotes by participants who identified the aspect as a management challenge. All the

quotes come from the transcribed interviews, which can be seen in Appendix G to Appendix K.

Table 5.12 combines, summarises and interprets the management challenges that were identified. Using the information in this table provided me with a partial answer to the third secondary research question, which I answered with this chapter. Further parts of the answer are given by the interpretation of the other tables in this chapter.

In Table 5.12, the reference at the end of a quote, e.g., (A.1; 2:31), refers to the position of the quote in the transcription found in Appendix G to Appendix K.

- A.1 participant
- 2 page number of the transcription
- 31 line number on the page

As mentioned before, some of participant B.1's quotes were translated from Afrikaans to English. The translation was done by a registered language practitioner. The letter of declaration by the practitioner is attached to this research report as Appendix L. The English version is used in the table.

The reference next to a translated quote of participant B.1 will appear as follows:

"..." (E: B.1; 1:12) [in the original transcription: (B.1; 2:31)]

The first bracket, (E: B.1; 1:12), refers to the position of the quote in the translated document in Appendix M.

- E indicates the language of the quote, namely English
- B.1 participant
- 1 page number of the transcription
- 12 line number on the page

The second bracket, [in the original transcription: (B.1; 2:31)], refers to the position of the quote in the original transcription in Appendix I.

Table 5.12: Identification of management challenges experienced by participants, supported by appropriate quotes

#### **Management Challenges**

#### **Teacher support**

Any support in any form given to the teacher by the HOD, SGB, SMT or the principal.

- A.1: ... I do get support from the principal (A.1; 9:10)
- A.1: ...and your colleagues?...No, nobody... (A.1; 9:12)
- A.2: ... Everything that I need, really I always get somebody (A.2; 9:27)
- A.2: Even in my colleagues, with my colleagues, maths teachers, ai, everything is fine (A.2; 9:29)

#### **Mathematics department**

Mathematics departments of schools refer to the groups of mathematics teachers and the relationships between them.

- A.1: Are you working well with your colleagues? Yeah, we are (A.1; 9:13)
- A.1: ...I hear G is now on maternity leave...we have to split them between the three of us (A.1; 10:4)
- A.2: We work together (A.2; 10:2)
- A.2: I'm going to have lots of classes now, because of that teacher, G, we have to share those classes, all of us now (A.2; 12:25)

#### Communication

This aspect refers to communication between the principal, the SMT and the rest of the staff.

- A.2: ...my HOD...maths and mathematics, no. It's life sciences and physical sciences. So, we are on our own (A.2; 15:15)
- A.2: ...we have just one another, maths teachers (A.2; 15:20)
- B.1: ...problem with communication. Between the principal and the rest of the SMT (B.1; 9:23)
- B.1: ...he is taking decisions that I think the SMT should also have been involved in, but he is doing it on his own...cause a bit of friction (B.1; 9:26)

### Principal

Principal refers to the way the head of the school handles situations, and principals' attitudes towards their profession.

- B.1: ...he is very disorganised... (B.1; 9:32)
- B.1: ...he is going beyond the meeting into the first period. And it's also taking away teaching time (B.1; 10:13)
- C.1: The principal's hard-working habit pushes me to not to give up on learners whenever I feel demotivated sometimes by the challenges. (C.1; 5:2)

## School governing body

The level of involvement of the SGB in the school.

- B.1: ...I've only seen the chairperson of the SGB, the new SGB once (B.1; 10:23)
- B.1: ...there is going to be a meeting between the SGB and the staff so that they can be introduced (B.1; 10:27)
- B.2: ...I can see and I can feel with the current SGB now, it's going to, it's going to work (B.2; 22:5)
- B.2: ...are trying to bring the change...talk with the staff...we can know them...what their intentions about the school...we also gave them our feelings about the school... (B.2; 22:15)

## **Extra lessons**

Extra lessons refer to classes arranged outside normal academic school hours.

- B.1: ...extra classes and whatsoever programmes... (E: B.1; 1:24) [in the original transcription: (B.1; 10:16)]
- B.1: ...if only people would attend their classes; it would not be necessary... (E: B.1; 1:25) [in the original transcription: (B.1; 10:17)]

## Management of resources

This aspect refers to conserving and controlling resources.

B.2: ...it's a good management... (B.2; 4:28)

## School management team

The SMT refers to the management group of the school, consisting of the principal, deputy principal(s) and HODs, and their influence in the teaching environment.

- B.2: ...I don't have any challenges of SMT (B.2; 22:26)
- B.2: ...they do give us support (B.2; 22:28)

The participants experienced some of the aspects positively and some of the aspects negatively. To summarise the different experiences of the participants regarding management challenges, I constructed Table 5.13.

Table 5.13 shows the combination of the participants' perceptions, ideas or feelings on different aspects of management challenges.

- indicates positive comments, feelings, experiences or perceptions regarding a specific aspect.
- X indicates negative comments, feelings, experiences or perceptions regarding a specific aspect.
- X / X indicates a mixture of positive and negative comments, feelings, experiences or perceptions regarding a specific aspect, as given by a single participant. It is counted as a single response, because it was given in one answer to a question asked during the interview. This type of response is referred to as a mixed response in the discussion after Table 5.13.

	A.1	A.2	B.1	B.2	<b>C</b> .1
Management Challenges					
Teacher support	Х	Х	-	Х	-
Mathematics department	Х	Х	-	-	-
HOD	-	Х	-	-	-
Communication	-	-	Х	-	-
Principal	-	-	Х	-	Х
SGB	-	-	Х	Х	-
Extra classes	-	-	Х	-	-
Management of resources	-	-	-	Х	-
SMT	-	-	-	Х	-

Table 5.13: Summary of management challenges identified by the five participants

The division of positive and negative responses is quite different for management challenges. The total number of responses received is 13, with eight positive (61,5%), five negative (38,5%), and no mixed responses. The participants were either positive or negative about the management aspect. The general feeling in relation to support by principals is very positive. From the responses, I gained the impression that management (principal, SMT, HOD and SGB) at the schools was supportive and structured in a way that made the participants feel they have a backup support system. Knowing there is a support system at their schools influenced the participants' teaching environment in a positive way. However, participant B.1 experienced challenges with the principal and the communication between the principal and the rest of the SMT. Considering that participant B.1 is a deputy principal and, thus, part of the SMT, he experienced management from a different perspective than the other participants, who were all post level 1 teachers.

The management of the mathematics departments was perceived as positive by the participants. The HODs of the respective schools' mathematics departments did not always feature prominently in leadership of the departments. However, the participants were not discouraged by HODs who failed to focus fully on mathematics. The participants focus on teamwork and good relationships.

Management of resources at the schools was mentioned by only one participant. As reported in Section 5.3.1, four of the participants said that resources were available at their schools. For resources to be available without difficulty, good management of these resources has to be in place.

Participant B.1 mentioned extra lessons as a negative aspect of management. He explained that, if the teachers were in their classrooms, as they were expected to be, extra lessons would be unnecessary. He mentioned, furthermore, that it is important that the management of a school pays attention to aspects of teaching, such as teachers' attendance in lessons. If teachers are in every lesson according to their timetable, challenges, such as not having enough time to complete the term's subject content, and discipline problems, will not be common obstacles. Then, extra lessons can be arranged to assist learners with individual content problems, and not to complete the terms' subject content.

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## 5.3.5 Affective aspects

Each one of the participants identified at least one positive aspect of teaching at their schools. They struggled to identify negative aspects of their teaching experience.

Table 5.14 provides a summary of the information on affective aspects reported by participants, as described in Section 5.2. The headings of the rows show a combination of the affective aspects identified by the participants. Under each of the headings I give a short explanation of the affective aspect in the context of this study, as well as quotes by participants who identified the aspect as affective. All the quotes come from the transcribed interviews, which can be seen in Appendix G to Appendix K.

Using a table to combine, summarise and interpret the identified affective aspects, not only gave me a glimpse into the hearts of the teachers, but also provided a partial answer to the third secondary research question, which I answered with this chapter. Further parts of the answer are given by the interpretation of the other tables in this chapter.

In Table 5.14 the reference at the end of a quote, e.g., (A.1; 2:31), refers to the position of the quote in the transcription found in Appendix G to Appendix K.

- A.1 participant
- 2 page number of the transcription
- 31 line number on the page

Once again, in the case of participant B.1, some of the quotes were translated from Afrikaans to English. The translation was done by a registered language practitioner. The letter of declaration by the practitioner is attached to this research report as Appendix L. The English version is used in the table.

The reference next to a translated quote of participant B.1 will appear as follows:

"..." (E: B.1; 1:12) [in the original transcription: (B.1; 2:31)]

The first bracket, (E: B.1; 1:12), refers to the position of the quote in the translated document in Appendix M.

E - indicates the language of the quote, namely English

- B.1 participant
- 1 page number of the transcription
- 12 line number on the page

The second bracket, [in the original transcription: (B.1; 2:31)], refers to the position of the quote in the original transcription in Appendix I.

Table 5.14: Identification of affective aspects experienced by participants, supported by appropriate quotes

#### Affective aspects

#### Teaching in a township school

This aspect refers to the feelings and emotions of teachers regarding teaching in a township school.

- A.1: ...is very hard and frustrating (A.1; 12:4)
- A.1: Because you need to be here every day and in that every day, the results are not there (A.1; 12:7)
- A.1: ...if I could get the opportunity, I will leave (A.1; 12:10)
- A.1: We are on work, seven days of our lives (A.1; 12:16)
- A.1: At home you are stressing whether the learners are going to pass or not. If they don't pass, I'm going to account why mine did not pass (A.1; 12:18)

#### Positive aspects of teaching

Aspects that contribute to a good teaching and learning environment.

- A.1: ...the only class that which gives me that energy and showing the interest of maths and giving me that ah...when I'm alone at home I can even laugh, thinking of them how interesting they are (A.1; 10:25)
- A.1: The attitude of them of the learners towards mathematics...it shows that they interest or they're not interested I mathematics (A.1; 10:30)
- A.1: And they want to pass maths (A.1; 11:4)
- A.1: I say "come and write on the chalk board", they all want to come (A.1; 11:17)
- A.1: Come and explain, they all want to explain (A.1; 11:21)
- A.2: Every day that you come to, there is that thing that "I want to go to work, I want to go to school B, yes I'm happy there" (A.2; 10:16)
- A.2: I'm happy here, every day (A.2; 10:19)
- A.2: Teachers, my colleagues, the principal, just yes, ah, I'm happy, really (A.2; 10:24)

- A.2: ...I like mathematics, maybe it's one of the things (A.2; 11:27)
- A.2: ...if you are teaching something that you like, everything is simple (A.2; 12:6)
- B.1: ...learners are still very eager to learn (B.1; 11:12)
- B.1: ...very encouraging if there's even just one learner who are appreciating what you are doing (B.1; 11:12)
- B.1: ...at least there are some of them who are still enthusiastic about the subject (B.1; 11:24)
- B.1: I still love it; I still enjoy it here, the teaching itself (E: B.1; 1:27) [in the original transcription: (B.1; 12:11)]
- B.1: ...I am still very happy here (E: B.1; 1:28) [in the original transcription: (B.1; 12:20)]
- B.1: It is still there, even though it is almost at the end of my teaching career (E: B.1; 2:1) [in the original transcription: (B.1; 12:26)]
- B.2: ...do things together here. If you need a support, you'll get it (B.2; 23:10)
- B.2: ...we normally sit together...come with suggestions... (B.2; 23:16)
- B.2: ...the principal, he normally talks with us (B.2; 23:21)
- B.2: ...our teamwork is very, very strong (B.2; 23:28)
- B.2: ...we tried to come up with strategies how we can help them (B.2; 23:31)
- C.1: The principal is very hard-working and supports... (C.1; 4:29)
- C.1: ...learning different ways of teaching and changing strategies when I face challenges (C.1; 5:8)
- C.1: ...I have to continue giving my best for them to become responsible adults in future and that keeps me going (C.1; 5:10)

## Negative aspects of teaching

Aspects of teaching that make it difficult for teachers to teach.

- A.1: They aren't going to listen anyway, but I have to go to class (A.1; 11:11)
- A.2: ...but the environment must be relationships. That one...really last two, two years back, oh it was a disaster for me. It was a disaster for me, because if you are not in good terms with another teacher, ugh, that brings disturbances. (A.2; 11:6)
- A.2: ...Hey that one disturbed me a lot (A.2; 11:17)
- A.2: That was the only thing. Now that he's not here, I'm okay (A.2; 11:20)

- B.1: ...is really not something that bothers me (E: B.1; 2:2) [in the original transcription: (B.1; 11:29)]
- B.1: ...there were other principals who made it easier (E: B.1; 2:3) [in the original transcription: (B.1: 12:22)]
- B.1: ...many meetings...interference from the department...a workshop or a...training or a whatever, during school hours (E: B.1; 2:4) [in the original transcription: (B.1; 12:1)]
- B.2: Late-coming...I take my kids to school...their school start at, the small one eight o' clock and this one half past seven...at seven fifteen I must be here at school (B.2: 24:4)
- B.2: ...some of my colleagues, they even suggested that how about I get a transport for, for my kids...I'm not in a good position to do that (B.2; 24:13)
- B.2: ... I'm late for briefings... (B.2; 24:26)

## **Teacher development**

Anything mentioned by the participants that can enrich the teacher.

- A.1: ...I think I want to teach mathematics until I be, I become an expert like Ntate H (A.1; 12:25)
- A.1: He always comes here and we always do team teaching together (A.1; 12:28)

Affective aspects varied for different participants. All the participants, however, identified positive aspects of teaching, which indicated their love for teaching and the realisation that they are where they wanted to be. A summary of the positively and negatively experienced affective aspects is given in Table 5.15.

Table 5.15 lists the combination of the participants' perceptions, ideas or feelings on different affective aspects.

- indicates positive comments, feelings, experiences or perceptions regarding a specific aspect.
- X indicates negative comments, feelings, experiences or perceptions regarding a specific aspect.
- X / X indicates a mixture of positive and negative comments, feelings, experiences or perceptions regarding a specific aspect, as given by a single participant. It is counted as a single response, because it was given in one answer to a question asked during the interview. This type of response is referred to as a mixed response in the discussion after Table 5.15.

	A.1	A.2	B.1	B.2	C.1
Affective aspects					
Teaching in a township school	Х	-	-	-	-
Positive aspects of teaching	Х	Х	Х	Х	Х
Negative aspects of teaching	Х	Х	<mark>X / X</mark>	Х	-
Self-development	Х	-	-	-	-

In this category, the responses cannot be linked to positive and negative percentages. Affective aspects focus on the emotional experiences of the participants, and these emotional experiences are too personal to be combined with other participants' personal feelings. Affective aspects are based on a framework of personality characteristics, personal beliefs and values. All five participants identified many positive aspects in their teaching and teaching environment. What stood out clearly is the positive impact good attitudes of learners, and their willingness to work, have on the participants. Another generally positive aspect of teaching is the good relationships between the mathematics teachers. All the participants were happy and still had a passion for what they were doing.

Participants wanted to enrich themselves and develop their skills and abilities. One way of addressing this need is to do team teaching. Not only do the teachers learn from each other's teaching strategies when they do team teaching, they also form professional relationships with teachers from other schools. These relationships can provide support for the teachers and they can assist each other to address certain shortcomings, for instance, a lack of knowledge on certain content topics.

It is not as easy to name negative aspects as it is to identify positive aspects. Different aspects were identified by each participant, ranging from late-coming to relationships with colleagues. What was heart-warming to me, was the attitudes of the participants. Even though they mentioned the negative emotions they experienced in their teaching environments, they did not send out messages of discouragement or desperation. They acknowledged the challenges as obstacles, but, at the same time, showed a spirit that was willing to overcome these challenges.

Teaching at a township school can involve frustration and difficulties, which require a great deal of patience, perseverance and dedication from the participants. Participants did experience moments of despair, especially when results did not reflect their efforts and inputs. To experience this kind of emotion is an absolutely normal reaction to the circumstances or situations the participants work in. The participants' lives are so entwined with their profession, that they even stress about the learners in their free time, when they are not at school or busy with academic responsibilities.

## 5.3.6 Comparing each participant's responses

Adding the total number of responses and dividing responses into those that are positive and those that are negative, reveals the following:

 Participant A.1: Gave a total of 18 responses, 10 positive, 6 negative and 2 mixed responses. She is positive (55,5%) overall. Her biggest challenge was the learners, and their lack of serious attitude and commitment to their schoolwork.

- Participant A.2: Gave 17 responses, 8 positive, 6 negative and 3 mixed responses. She came across as slightly less positive than participant A.1 (47%). The physical state of classrooms and the low-income environment of learners, which, for example, lead to them not having stationery, elicited her strongest responses.
- Participant B.1: Of the 21 responses he gave, only four were positive (19%); of the other 17 responses 14 were negative and 3 were mixed responses. These results could suggest he was negative about his teaching environment. His biggest challenge was teachers being absent from their classrooms when they were supposed to be there, which lead to discipline problems in their classes and disturbed the people around them. The participant often had to leave his class to handle these situations, because of his position as deputy principal of the school each deputy principal had certain aspects of the school to manage, and participant B.1's responsibilities included discipline and resources.
- Participant B.2: He had a great deal to share. He responded 24 times, 13 positive (54,2%), 9 negative and 2 mixed responses. Learners with low motivation and a lack of serious commitment to their work were his biggest complaints -- almost the same problems as experienced by participant A.1. Participant B.2 had a positive attitude and wanted his learners to have the same type of attitude.
- Participant C.1: By giving three positive responses (21,4%) and 11 negative responses in a total of 14 responses, this participant presented himself as rather negative about the learners and his surroundings. The fact that his school is quite far from Thaba Nchu and that all the learners and teachers have to make use of public transport, might be some of the main reasons for the negative image this interview presented. In direct contrast to this image, he made a positive remark, saying he knows he has a lot to offer, and that he must keep on teaching.

# 5.4 CHAPTER CONCLUSION

The interviews with the participants not only clarified their experiences of teaching in their immediate environment, but also gave me a look into their hearts. They had the learners' best interests at heart and they were passionate about the subject, the learners and the profession. Sometimes, they experienced challenges that caused obstacles in their way, but they were still happy and wanted to change the learners' lives.

In this chapter, I presented the data collected from conducting interviews with the participants. I analysed, interpreted and discussed the results in a way that I, and the reader, could gain a deeper understanding of how the participants experienced their teaching environments at Thaba Nchu schools, thereby answering the third secondary research question: How do practicing mathematics teachers in Thaba Nchu schools experience their teaching environments?

Individual participants identified different aspects in each group as challenges and as positive aspects. Due to these individual differences, I developed five individual questionnaires. By giving each participant his/her own, unique questionnaire, I ensured that a participant made valuable recommendations to the constitution of a framework. In Chapter 6, I discuss the questionnaires that the participants completed, as well as the data collected from the questionnaires. An analysis, interpretation and discussion of the collected data form part of Chapter 6.

# CHAPTER 6: RECOMMENDATIONS BY PRACTICING MATHEMATICS TEACHERS TO OPTIMISE TEACHING ENVIRONMENTS

# 6.1 INTRODUCTION

Chapter 5 reported on various challenges that were identified through interviews with participants. Aspects causing difficulties in all five the categories (physical challenges, socioeconomic challenges, teacher-faced challenges, management challenges and affective aspects) were pointed out by all the participants. I used the information gained from the interviews to generate an individual questionnaire for each participant. Each participant completed a questionnaire designed to address the positive and negative challenges identified by him/her (see Sections 3.6.6 and 5.3). All the negative aspects were addressed in Part A of the questionnaires, and all the positive aspects were addressed in Part B of the questionnaires. In this chapter, I present the data, followed by an analysis, interpretation and discussion of the data. The aim of this chapter is to answer the fourth secondary research question: What are the recommendations of practicing mathematics teachers for addressing the challenges they face and nurturing the positive aspects they encounter in Thaba Nchu secondary school mathematics teaching environments?

# 6.2 PROFILES OF THE PARTICIPANTS' TEACHING EXPERIENCE

Five tables (Tables 5.7; 5.9; 5.11; 5.13 and 5.15) give a summary of the aspects identified during the interviews with each participant, as analysed in Chapter 5. The tables aim to give the reader an overall view of the positive and negative challenges experienced by each participant in his/her teaching environment. This information was used as the basis for developing each individual questionnaire.

# 6.2.1 Participant A.1

To give the reader a clear picture of participant A.1, a summary of the data collected during the interview with participant A.1, as well as the questions used in the individual questionnaire developed for participant A.1, are given in Sections 6.2.1.1 and 6.2.1.2.

# 6.2.1.1 Summary of information collected from the interview with participant A.1

The detailed summary of the interview with participant A.1 is given in Section 5.2.1.

Physical challenges				
Positive	Negative			
Resources				
Textbooks	Textbooks			
Physical state of classrooms				
Socioecono	omic challenges			
Positive	Negative			
Learner support provided by the school	Learners' attitudes and behaviour tow <u>a</u> rds their parents			
Learner attendance	Parental support			
Parental involvement				
Teacher-faced challenges				
Positive	Negative			
Teacher support	Attitudes of learners			
	Discipline			
Crime/Violence	Crime/violence			
Manageme	ent challenges			
Positive	Negative			
Teacher support				
Mathematics department				
Affecti	ve aspects			
Positive	Negative			
Positive aspects of teaching	Teaching in a township school			
Self-development	Negative aspects of teaching			

The aspects identified in Table 6.1 guided the development of the questionnaire in Section 6.2.1.2.

# 6.2.1.2 The questionnaire given to participant A.1 to complete

The questionnaire is divided into two parts. Part A (see Figure 6.1) addresses the negative aspects identified by participant A.1, whereas Part B (Figure 6.2) addresses the positive aspects identified by participant A.1. Figure 6.1 lists the questions used in Part A of participant A.1's questionnaire. The questionnaire is attached to this report as Appendix N.

# A.1: QUESTIONNAIRE

- 1. How, can you, as a teacher, address the challenge of working with textbooks, which you feel are not up to standard?
- 2. What do you think is an effective way to teach learners respect for their parents and teachers?
- 3. What can you do to assist parents/guardians with supporting their children at home with schoolwork related challenges or anything else related to the child's daily activities?
- 4. How can a teacher assist learners with gaining confidence in doing mathematics?
- 5. Describe a good disciplinary system, which a teacher can use in the mathematics class, to prevent possible bad behaviour of learners.
- 6. What advice can you give to other teachers about safety and avoiding crime/violence when traveling between the home and school?
- 7. Teaching in a township school can be hard. What should a teacher do to cope with the frustrations?
- 8. What practical ways can you think of, which a teacher can implement in his/her teaching method to address the following aspects:
  - Learners who are not interested in doing mathematics.
  - Learners with bad attitudes towards the teacher.

Figure 6.1: Part A of the questionnaire completed by participant A.1

Figure 6.2 lists the questions used in Part B of participant A.1's questionnaire. The questionnaire is attached to this report as Appendix N.

## PART A

# A.1: QUESTIONNAIRE

- 1. Suggest ways in which teachers can add to the availability of resources for future use.
- 2. How can teachers and learners assist in preserving textbooks for the use by learners in years to come?
- 3. What do you think can be done to keep the number of learners in a class reasonable to ensure there is enough space in the classroom for the learners to work effectively?
- 4. Learner support from the school (management, teachers and other role-players) is essential. What are your thoughts on ways to sustain this kind of support?
- 5. What can be effective ways to motivate good school attendance by learners?
- 6. How can parents/guardians be motivated to stay involved in their child's schoolwork?
- 7. Teacher support from the school (management, other teachers and the SGB) is necessary. What do you see as good support to teachers from the school?

How can good teacher support be nurtured?

- 8. How can the school, teachers, parents, learners and the community, ensure that crime/violence will not become a problem at the school?
- 9. Good teamwork among the teachers in the mathematics department at a school is of utmost importance. What can be done to promote good partnerships?

Figure 6.2: Part B of the questionnaire completed by participant A.1

A summary of the answers to these questions follows in Section 6.2.1.3.

6.2.1.3 Summary of responses to questionnaire by participant A.1

After the questionnaire completed by participant A.1 had been coded, the different codes were grouped into themes. Table 6.2 shows the code, supported by an appropriate quote, as well as the theme under which it is categorised.

In Table 6.2, the reference at the end of a quote, e.g., [A.1; A(1):2], refers to the position of the quote in the transcription found in Appendix O.

- A.1 participant
- A part of the questionnaire where the quote can be found

(A – Part A; B – Part B)

- (1) page number on the transcription
- 2 line number on the page

Table 6.2: Summarv of answers t	o the questionnaire	completed by participant A.1	. supported by appropriate quotes
	e ane queenenniane		, capperied by appropriate quetee

Code	Supporting quote	Theme
Teaching practice	Use previous exam papers with the text book [A.1; A(1):5]	Classroom management
Methods of teaching respect	Corporal punishmentat home and in school [A.1; A(1):9]	Classroom management
Support to parents	Give the parents a diary to control learners wordgive parents CDs of content to learn and help learners [A.1; A(1):15]	Parent/guardian-related aspects
Learner support	ratio of learners must be minimizedhelp individual [A.1; A(1):19]	Learner-related aspects
Methods to discipline	Learners must write every activitylearner to present a lesson on maths [A.1; A(1):23]	Classroom management
Safety	use a transport pass the street which are not corrupt [A.1; A(2):3]	School-related aspects
Teacher-learner relationship	know the need of the learnerrefer them to SBST [A.1; A(2):7] [SBST: School based support team]	Classroom management
Classroom management	small number of learnersclassroom rules [A.1; A(2):8]	Classroom management
Teaching practice	multiple examples. Solve the problems many ways. Peer teaching [A.1; A(2):13]	Classroom management
Methods to teach respect	Discipline learners [A.1; A(2):16]	Classroom management
Teacher-learner relationship	Show love [A.1; A(2):16]	Classroom management
Resources (other)	Make videos when presenting a lessonquestion papers electronically [A.1; B(1):3]	Resources

Code	Supporting quote	Theme
Textbooks	pay money for textbook before handing outrefund them when they return the book [A.1; B(1):7]	Resources
Class size	Admission of learners must not exceed… Ensure that learners can pass, wont have learners retaining [A.1; B(1):12]	Classroom management
Teacher support	be paid at the extra classesdepartment must pay well [A.1; B(1):17]	Teacher-related aspects
Learner attendance	Issue out certificategood attendance [A.1; B(1):19]	Learner-related aspects
Parental Involvement	Offering jobs at schoolgiving the, a certificateconsistence in helping their child [A.1; B(1):22]	Parent/guardian-related aspects
Teacher (extrinsic) motivation	Motivate…paying for extra classes. Issuing certificates…good performance [A.1; B(2):3]	Teacher-related aspects
Teacher support	Having workshops on the content…dealing with bad behaviour of learners [A.1; B(2):6]	Teacher-related aspects
Safety	Invite parents at school to come and address the learners on how to behave. Police to present [A.1; B(2):10]	School-related aspects
Mathematics department	Team teachers to teach the same gradethey can work togethergiving each other opportunity to teach the topic he/she masters [A.1; B(2):14]	School-related aspects

# 6.2.2 Participant A.2

To provide the reader with a clear picture of participant A.2, a summary of the data collected during the interview with participant A.2, as well as the questions used in the individual questionnaire developed for participant A.2, are given in Sections 6.2.2.1 and 6.2.2.2.

6.2.2.1 Summary of the information collected by the interview with participant A.2

A detailed summary of the interview with participant A.2 can be found in Section 5.2.2.

Physical challenges			
Positive	Negative		
Resources	Technology use in the classroom		
	Physical state of the classroom		
Socioecono	omic challenges		
Positive	Negative		
Learner support by the school	Parental support		
Parental involvement	Parental involvement		
	Stationery		
Teacher-faced challenges			
Positive	Negative		
Discipline			
Crime/violence			
Motivation of learners	Motivation of learners		
Teaching practice			
Relationships with colleagues	Relationships with colleagues		

 Table 6.3: Profile of participant A.2's teaching experiences

Management challenges		
Positive	Negative	
Teacher support	HOD	
Mathematics department		
Affective aspects		
Positive	Negative	
Positive aspects of teaching	Negative aspects of teaching	

The aspects identified in Table 6.3 guided the development of the questionnaire in Section 6.2.2.2.

# 6.2.2.2 The questionnaire given to participant A.2 to complete

The questionnaire is divided into two parts. Part A (see Figure 6.3) addresses the negative aspects identified by participant A.2, whereas Part B (see Figure 6.4) addresses the positive aspects identified by participant A.2. Figure 6.3 lists the questions used in Part A of participant A.2's questionnaire. The questionnaire is attached to this report as Appendix P.

# A.2: QUESTIONNAIRE

- 1. How can teachers be assisted to equip themselves to be able to use technology effectively in the mathematics classroom?
- 2. What practical actions, promoting optimal teaching and learning, can teachers and even learners themselves take to cope with classrooms in an average to a below average physical state?
- 3. How can a teacher try to address the challenge of learners not having any or not the necessary stationery?
- 4. What can a teacher do to assist parents/guardians with supporting their children at home with schoolwork related challenges or anything else related to the child's daily activities?
- 5. Suggest ways in which parents/guardians can be motivated to become involved in their children's schoolwork.
- 6. What practical ways can a teacher use to motivate learners in the mathematics class?
- 7. What can a teacher do to ensure that a bad relationship with a colleague does not influence his/her teaching environment negatively?
- 8. How will you advise another mathematics teacher on how their mathematics department can operate effectively without proper guidance from a HOD?

Figure 6.3: Part A of the questionnaire completed by participant A.2

Figure 6.4 lists the questions used in Part B of participant A.2's questionnaire. The questionnaire is attached to this report as Appendix P.
# A.2: QUESTIONNAIRE

- 1. What can be done to maintain the good availability of resources in a school?
- 2. How can one nurture good learner support from the school (management, teachers and other role-players)?
- 3. Suggest practical methods a teacher can use to keep learners motivated in the mathematics class.
- 4. Describe an effective disciplinary system which teachers can use to maintain proper discipline in the mathematics class?
- 5. What advice can you give other teachers on lesson preparation as part of good teaching practice?
- 6. What can teachers do to ensure healthy, positive relationships with their colleagues?
- 7. Teacher support from the school (management, other teachers and the SGB) is necessary. What do you see as good support to teachers from the school? How can good teacher support be nurtured?
- 8. What can be done to maintain good teamwork as part of a well-functioning mathematics department?
- 9. How can a teacher motivate him-/herself to stay positive and find joy in his/her daily teaching?

Figure 6.4: Part B of the questionnaire completed by participant A.2

A summary of the answers to these questions follows in Section 6.2.2.3.

# 6.2.2.3 A summary of responses to questionnaire by participant A.2

After the questionnaire completed by participant A.2 had been coded, the different codes were grouped into themes. Table 6.4 shows the code, which is supported by an appropriate quote, as well as the theme under which it is categorised.

In Table 6.4, the reference at the end of a quote, e.g., [A.2; A(1):2], refers to the position of the quote in the transcription found in Appendix Q.

- A.2 participant
- A part of the questionnaire where the quote can be found

(A – Part A; B – Part B)

- (1) page number on the transcription
- 2 line number on the page

**Table 6.4:** Summary of answers to the questionnaire completed by participant A.2, supported by appropriate quotes

Code	Supporting quote	Theme
Technology	assisted by people who know technologyat least a month [A.2; A(1):3]	Resources
Classrooms	Teachers should motivate learnersprotect their classesequipment in the class [A.2; A(1):8]	Classroom management
Resources (other)	The school should buy its own stationaryfundraising to raise the money [A.2; A(1):12]	Resources
Support to parents	call a meeting of parents [A.2; A(1):17]	Parent/guardian-related aspects
Parental Involvement	be motivated by various teachers [A.2; A(1):20]	Parent/guardian-related aspects
Learner motivation	incentives in the form of awards [A.2; A(1):24]	Learner-related aspects
Relationships between teachers	try to resolve the conflict as soon as possible [A.2; A(2):3]	Teacher-related aspects
Mathematics department	talking about the performance of the learnersthe challenges [A.2; A(2):6]	School-related aspects
Resources (other)	storeman to control the storeroom where these items are kept at all times [A.2; B(1):2]	Resources
Learner support	activitieslearner centered [A.2; B(1):6]	Learner-related aspects
Learner motivation	rewarding their good performance [A.2; B(1):9]	Learner-related aspects
Classroom management	making a lesson interestingprevent learners from boredom [A.2; B(1):12]	Classroom management

Code	Supporting quote	Theme
Teaching practice	Tell other teachers the benefits [A.2; B(1):15]	Classroom management
Relationships between teachers	do things together [A.2; B(1):18]	Teacher-related aspects
Teacher support	sending teachers to various courseshow to discipline learners without using corporal punishment [A.2; B(2):3]	Teacher-related aspects
Teacher support	improving on it [A.2; B(2):6]	Teacher-related aspects
Mathematics department	Teachers must not compete among themselves [A.2; B(2):9]	School-related aspects
Teacher intrinsic motivation	thorough preparationbeing organized [A.2; B(2):12]	Teacher-related aspects

# 6.2.3 Participant B.1

To provide the reader with a clear picture of participant B.1, a summary of the data collected during the interview with this participant, as well as the questions used in the individual questionnaire developed for participant B.1, are given in Sections 6.2.3.1 and 6.2.3.2.

# 6.2.3.1 Summary of information collected by the interview with participant B.1

A detailed summary of the interview with participant B.1 can be found in Section 5.2.3.

Physical challenges		
Positive	Negative	
Resources	Technology use in the classroom	
Class size	Class size	
	Physical state of the classrooms	
Water	Water	
	Transport	
	Hostels	
Socioeconomic challenges		
Positive	Negative	
Learner support by the school	Parental support	
	Learner attendance	
	Poverty	
Teacher-faced challenges		
Positive	Negative	
Discipline	Discipline	
Crime/violence	Teacher class attendance	
	Teacher subject knowledge	

Table 6.5: Profile of participant B.1's teaching experiences

Management challenges	
Positive Negative	
	Communication
	Principal
	SGB
_	Extra classes
Affective aspects	
Positive	Negative
Positive aspects of teaching	Negative aspects of teaching

The aspects identified in Table 6.5 guided the development of the questionnaire in Section 6.2.3.2.

#### 6.2.3.2 The questionnaire given to participant B.1 to complete

The questionnaire is divided into two parts. Part A (see Figure 6.5) addresses the negative aspects identified by participant B.1, whereas Part B (see Figure 6.6) addresses the positive aspects identified by participant B.1. Figure 6.5 lists the questions used in Part A of participant B.1's questionnaire. The questionnaire is attached to this report as Appendix R.

# B.1: QUESTIONNAIRE

- 1. Suggest ways in which teachers and learners can assist if a school has problems with water availability.
- 2. What practical actions can teachers and even learners themselves take to cope with classrooms in an average to a below average physical state, to ensure optimal teaching and learning?
- 3. How can late-coming of the learners be effectively addressed by all role-players (school, teachers, learners, parents/guardians)?
- 4. What problems, related to a learner's learning, could be solved if learners can stay in hostels on the school grounds?
- 5. What do you think can be done to keep numbers of learners in a class, reasonable?
- 6. What can a teacher do to assist parents/guardians with supporting their children at home with schoolwork related challenges or anything else related to the child's daily activities?
- 7. What can be done by the school, parents, learners and the community, to minimize the effect of low-income households on learners' attendance and performance?
- 8. How can low class attendance by teachers be addressed in a way which will motivate the teachers to be more committed to teaching and being in class?
- 9. What practical methods can be implemented to change a teacher's insufficient content knowledge to sufficient content knowledge?
- 10. What can be done to improve communication between the principal, SMT, SGB and the staff?

Figure 6.5: Part A of the questionnaire given to Participant B.1

Figure 6.6 lists the questions used in Part B of participant B.1's questionnaire. The questionnaire is attached to this report as Appendix R.

# B.1: QUESTIONNAIRE

- 1. What can be done to maintain the good availability of resources in a school for future use?
- 2. How can one nurture good learner support from the school (management, teachers and other role-players)?
- 3. Describe an effective disciplinary system which teachers can use to maintain proper discipline in the mathematics class.
- 4. What strategies can you suggest to ensure that crime/violence does not become a big problem in your school?
- 5. How can a teacher motivate him-/herself to stay positive and find joy in his/her daily teaching?

Figure 6.6: Part B of the questionnaire given to Participant B.1

A summary of the answers to these questions follows in Section 6.2.3.3.

# 6.2.3.3 Summary of responses to questionnaire by participant B.1

After the questionnaire completed by participant B.1 had been coded, the different codes were grouped into themes. Table 6.6 shows the code, supported by an appropriate quote, as well as the theme under which it is categorised.

In Table 6.6, the reference at the end of a quote, e.g., [B.1; A(1):2], refers to the position of the quote in the transcription found in Appendix S.

- B.1 participant
- A part of the questionnaire where the quote can be found

(A – Part A; B – Part B)

- (1) page number on the transcription
- 2 line number on the page

PART B

**Table 6.6:** Summary of the answers from the questionnaire completed by participant B.1, supported by appropriate quotes

Code	Supporting quote	Theme
Resources (other)	short-term solutionrequest learners to bring 2 L water to schoolcould be used in the bathroomslong-term solutionraise funds for a borehole [B.1; A(1):3]	Resources
Classrooms	kept clean and tidy, regularly clean walls, plastic chairsget sponsors to paint the class [B.1; A(1):9]	Classroom management
Learner attendance	parents need to be informed if their children are late for schoolThe school can keep record of latecomingsend info to parents via SMS [B.1; A(1):13]	Learner-related aspects
Learner support	sufficient study time. Regular meals, help with homework [B.1; A(1):18]	Learner-related aspects
Class size	specificnumber must be admittedlearners can be placed in other nearby schools with smaller numbers [B.1; A(1):22]	Classroom management
Support to parents	diary to record the homework in. Parents can the sign the diary [B.1; A(2):4]	Parent/guardian-related aspects
Learner support	feeding schemesextended to Saturdayscan also attend extra classes [B.1; A(2):9]	Learner-related aspects
Teacher class attendance	SMT can control class attendance by teacherscan be placed on a "well done" list in the staffroom on a weekly basis [B.1; A(2):14]	Teacher-related aspects
Teacher support	Senior teacher can be used [B.1; A(2):19]	Teacher-related aspects
Staff communication	Daily info session (10 min)…ensure all are on the same page [B.1; A(2):22]	School-related aspects
Resources (other)	Good control over resources, regular inventories [B.1; B(1):3]	Resources

Code	Supporting quote	Theme
Learner support	Congratulate good results by learners [B.1; B(1):7]	Learner-related aspects
Teacher support	Praise them [teachers] [B.1; B(1):7]	Teacher-related aspects
Methods to teach respect	Promote respect between learners and teachers and vice versa. [B.1; B(1):8]	Classroom management
Classroom management	Lay down ground rulesRemind learners [B.1; B(1):11]	Classroom management
Safety	school fence are in good conditionexcess control with registermonitors on school groundsMake the community aware that they own the school [B.1; B(1):14]	School-related aspects
Teacher intrinsic motivation	well-balanced diet, exercise moderatelyassociate with positive people [B.1; B(1):19]	Teacher-related aspects

# 6.2.4 Participant B.2

To provide the reader with a clear picture of participant B.2, a summary of the data collected during the interview with participant B.2, as well as the questions used in the individual questionnaire developed for participant B.2, are given in Sections 6.2.4.1 and 6.2.4.2.

# 6.2.4.1 Summary of information collected in the interview with participant B.2

A detailed summary of the interview with participant B.2 can be found in Section 5.2.4.

Physical challenges		
Positive	Negative	
Resources	Textbooks	
Sports grounds and facilities	Sports grounds and facilities	
Socioeconomic challenges		
Positive	Negative	
Learner support by the school	Parental involvement	
Uniforms	Latecoming	
Discipline		
Teacher-faced challenges		
Positive	Negative	
Teacher support	Attitudes of learners	
Discipline	Crime/violence	
Teacher qualifications	Motivation of learners	
Teacher attendance	Support from DoE	
Mathematics department	Language of teaching	
Class size	Class size	

Table 6.7: The profile of participant B.2's teaching experiences

Management challenges		
Positive Negative		
SGB		
Management of resources		
SMT		
Affective aspects		
Positive	Positive Negative	
Positive aspects of teaching	Negative aspects of teaching	

The aspects identified in Table 6.7 guided the development of the questionnaire in Section 6.2.4.2.

#### 6.2.4.2 The questionnaire given to participant B.2 to complete

The questionnaire is divided into two parts. Part A (see Figure 6.7) addresses the negative aspects identified by participant B.2, whereas Part B (see Figure 6.8) addresses the positive aspects identified by participant B.2. Figure 6.7 lists the questions used in Part A of participant B.2's questionnaire. The questionnaire is attached to this report as Appendix T.

# B.2: QUESTIONNAIRE

- 1. What do you suggest can be done to ensure the availability of textbooks from the beginning of the year?
- 2. How can parents/guardians be motivated to become involved in their children's schoolwork?
- 3. How can the late-coming of learners be effectively addressed by all role-players (school, teachers, learners, parents/guardians)?
- 4. How can learners be motivated to be positive towards mathematics and their teachers?
- 5. What can ensure a healthy working relationship between teachers and the DoE?
- 6. How can the use of drugs on the school grounds be addressed, other than what the school has already in place?
- 7. What are your thoughts on ways to address the challenge of having English as the language of teaching?

Figure 6.7: Part A of the questionnaire given to Participant B.2

Figure 6.8 lists the questions used in Part B of participant B.2's questionnaire. The questionnaire is attached to this report as Appendix T.

# B.2: QUESTIONNAIRE

- 1. What can be done, by teachers and learners, to maintain the good availability of resources in a school for future use?
- 2. How can teachers and learners preserve textbooks for use by learners in years to come?
- 3. What is essential for teachers and learners to do, to keep sports grounds functional?
- 4. How can good learner support from the school (management, teachers and other role-players), be maintained?
- 5. Suggest practical ways, which a school can implement, to assist learners with school uniform challenges, if needed.
- 6. Describe an effective disciplinary system which teachers can use to maintain proper discipline in the mathematics class.
- 7. Teacher support from the school (management, other teachers and the SGB) is necessary. What do you see as good support for teachers?

How can good teacher support be nurtured?

- 8. How can teachers be motivated to keep their qualifications on a high standard?
- 9. What can be done to encourage good daily attendance by teachers?
- 10. Advise how good teamwork among the teachers in the mathematics department of a school, can be nurtured.
- 11. What do you think can be done to keep the number of learners in a class reasonable, to make sure effective teaching and learning take place?
- 12. What can be done to maintain good teamwork in the school, including the SMT and SGB?
- 13. How can a teacher motivate him-/herself to stay positive and find joy in his/her daily teaching?

Figure 6.8: Part B of the questionnaire given to Participant B.2

A summary of the answers to these questions follows in Section 6.2.4.3.

# 6.2.4.3 Summary of responses to questionnaire by participant B.2

After coding the questionnaire completed by participant B.2, the different codes were grouped into themes. Table 6.8 shows the code, supported by an appropriate quote, as well as the theme under which it is categorised.

In Table 6.8 the reference at the end of a quote, e.g., [B.2; A(1):2], refers to the position of the quote in the transcription found in Appendix U.

- B.2 participant
- A part of the questionnaire where the quote can be found (A - Part A; B - Part B)
- (1) page number on the transcription
- 2 line number on the page

**Table 6.8:** Summary of the answers to the questionnaire completed by participant B.2, supported by appropriate quotes

Code	Supporting quote	Theme
Textbooks	counted on timeLTSM committeeorder surplus [B.2; A(1):3] [LTSM: learning and teaching support material]	Resources
Parental involvement	parent meeting parents must be asked or motivated to check their kids' school Parent/guardian-related work on daily basissigning all the bookshave his/her kid class teacher's aspects contact detailsper term must at least visit school [B.2; A(1):9]	
Learner attendance	start at 8:00encouraged to be in the premises 30 min beforedo not comply Learner-related aspects will be called for disciplinary hearing in the presence of his/her parentsplay their roleeven asked to call the school to check [B.2; A(1):16]	
Learner motivation	teacher who master the contentknows how to deliver itusing different Learner-related aspects strategieslearners helping each othercompete with one another but in a good manner [B.2; A(1):24]	
Teacher support	stop protecting learners more than teachersteachers are afraid to discipline learners [B.2; A(2):3]	Teacher-related aspects
Safety	learnershave drugs problem must be identifiedconsistent counsellinginvolve parents [B.2; A(2):9]	School-related aspects
Language of teaching and learning	development of kids from preschoolDoE can engagepreschools must sing one song when it comes to the development [B.2; A(2):15]	Classroom management
Resources (other)	Anything broken by a teacher or learner must be reported…responsible person Resources can replace it [B.2; B(1):3]	

Code	Supporting quote	Theme
Textbooks	Teacherscheck textbooks every termlearners who lost his or her book/sgiven a letterto parents to buy lost book/s [B.2; B(1):7]	Resources
Sports grounds	draw up a sport programme with different sporting codesduring sport days the grounds can be used [B.2; B(1):12]	School-related aspects
Learner support	RCL learnerscheck every learner class to class that they are in full uniformwho didn't wear full uniformsent home to wear proper full uniform. [B.2; B(1):19]	Learner-related aspects
	[RCL: Representative Council of Learners (South Africa)]	
Classroom management	giving each learner a job to dostudents work in groupsteacher must move around to maintain discipline [B.2; B(1):24]	Classroom management
Teacher extrinsic motivation	study furtherDoE must at least appreciate them with a little incentive to motivate them [B.2; B(2):7]	Teacher-related aspects
Teacher attendance	capped leave [B.2; B(2):10] [capped leave is explained in Section 6.3.5.1]	Teacher-related aspects
Mathematics department	planning is done together, weekly feedback is given to one anotherteachers help each other [B.2; B(2):14]	School-related aspects
Class size	admission can be done after schools have identified number of learners passed and failedone reliable person working with itavoid corruption of admitting learners illegally [B.2; B(2):19]	Classroom management

Code	Supporting quote	Theme
Staff unity	SMTdevelopmental sessionorganize teacher developmentSGB developmenteach termcombined development of all stakeholdersgood effective team work will be maintained [B.2; B(3):3]	School-related aspects
Teacher intrinsic motivation	leaving no stone unturnedproducing results and pass learnerscreating a conducive classroom between you and the learners [B.2; B(3):9]	Teacher-related aspects

# 6.2.5 Participant C.1

To provide the reader with a clear picture of participant C.1, a summary of the data collected during the interview with participant C.1, as well as the questions used in the individual questionnaire developed for participant C.1, are given in Sections 6.2.5.1 and 6.2.5.2.

6.2.5.1 Summary of information collected by the interview with participant C.1

A detailed summary of the interview with participant C.1 can be found in Section 5.2.5.

Physical challenges		
Positive	Negative	
	Technology use in the classroom	
	Physical state of the classroom	
	Transport	
	Sports grounds and facilities	
Socioeconomic challenges		
Positive	Negative	
Learner support by school	Learner attendance	
	Parental involvement	
	Poverty	
Teacher-faced challenges		
Positive	Negative	
	Language of teaching	
	Teachers' work ethic	
	Teachers' attitudes	

Table 6.9: Profile of participant C.1's teaching experiences

Management challenges			
Positive	Negative		
Principal			
Affective aspects			
Positive	Negative		

Positive aspects of teaching

The aspects identified in Table 6.9 guided the development of the questionnaire given in Section 6.2.5.2.

# 6.2.5.2 The questionnaire given to participant C.1 to complete

The questionnaire was divided into two parts. Part A (see Figure 6.9) addressed the negative aspects identified by participant C.1, whereas Part B (see Figure 6.10) addressed the positive aspects identified by participant C.1. Figure 6.9 gives the questions used in Part A of participant C.1's questionnaire. The questionnaire is attached to this report as Appendix V.

#### C.1: QUESTIONNAIRE

- 1. Suggest practical ways which a school can apply to make it possible for the mathematics teachers to use technology in class and at school?
- 2. What practical actions, promoting optimal teaching and learning, can teachers and even learners themselves take to cope with classrooms in an average to a below average physical state?
- 3. How can transport challenges, to and from school, possibly be addressed to increase learner attendance as well as create opportunities to have extra classes after school?
- 4. What can be done to offer extramural physical activities at school, if no facilities or sports grounds are available?
- 5. How can good learner support from the school (management, teachers and other role-players), be maintained?
- 6. What can be done to motivate parents/guardians to become involved in their children's schoolwork?
- 7. What can be done by the school, parents, learners, and community to minimise the effect of low-income households on learners' attendance and performance?
- 8. What are your thoughts on ways to address the challenge of having English as the language of teaching?
- 9. How can teachers be encouraged to have good, positive work ethics to increase daily attendance by teachers?
- 10. What can be done to encourage and motivate teachers to have a positive attitude towards their subject, teaching environment, and the learners?

Figure 6.9: Part A of the questionnaire given to Participant C.1

Figure 6.10 lists the questions used in Part B of participant C.1's questionnaire. The questionnaire is attached to this report as Appendix V.

#### C.1: QUESTIONNAIRE

- PART B
- 1. What can be done to nurture a principal's excellent example and the positive influence he/she has on the rest of the staff?
- 2. How can a teacher motivate him-/herself to stay positive and find joy in his/her daily teaching?

Figure 6.10: Part B of the questionnaire given to Participant C.1

A summary of the answers to these questions follows in Section 6.2.5.3.

# 6.2.5.3 Summary of responses to questionnaire by participant C.1

After the questionnaire completed by participant C.1 had been coded, the different codes were grouped into themes. Table 6.10 shows the code, supported by an appropriate quote, as well as the theme under which it is categorised.

In the table the reference at the end of a quote, e.g., [C.1; A(1):2], refers to the position of the quote in the transcription found in Appendix W.

- C.1 participant
- A part of the questionnaire where the quote can be found
   (A Part A; B Part B)
- (1) page number on the transcription
- 2 line number on the page

**Table 6.10:** Summary of the answers to the questionnaire completed by participant C.1, supported by appropriate quotes

Code	Supporting quote	Theme
Technology	trained to apply new mathematical softwaresComputers, laptops and projectors should be made available as a teaching aid [C.1; A(1):3]	Resources
Technology	e-learning to help both teachers and learners to workafter school hours [C.1; A(1):10]	Resources
Learner attendance	hostel has helped increased learner attendancelearners to be present all the timenumber of school buses or transports should be increased [C.1; A(1):15]	Learner-related aspects
Sports grounds	learners can be taken to the nearby schools that have facilities or sports grounds [C.1; A(1):21]	School-related aspects
Extramural activities	Games like chess, puzzles, word games and so on…to help the learners' thinking abilities…problem solving questions in mathematics [C.1; A(1):23]	School-related aspects
Learner support	grade 12s should be assigned to teachers for mentoring [C.1; A(2):3]	Learner-related aspects
Parental involvement	check and control their children's school regularlyregularly enquire about how their children are doing [C.1; A(2):7]	Parent/guardian-related aspects
Language of teaching and learning	educators should be encouraged to teach more in Englishquestions and testsin English [C.1; A(2):15]	Classroom management
Teacher intrinsic motivation	Teachers be motivated by their hard work [C.1; A(2):20]	Teacher-related aspects
Teacher extrinsic motivation	a word of encouragement [C.1; A(2):20]	Teacher-related aspects
Teacher intrinsic motivation	Take the subjects, the school environment and the learners as theirsown itgive it their bestdevelop love for their work [C.1; A(3):3]	Teacher-related aspects

Code	Supporting quote	Theme
Principal's example	use the principal's excellent exampleas values such as PUNCTUALITY, RESPECT, ACCOUNTABILITYto impact knowledge to the learners [C.1; B(1):3]	School-related aspects
Methods to teach respect	values should be repeatedly saidexplained to the learnersin the process the teachers will lead by example	Classroom management
Teacher intrinsic motivation	need to continue to learn [C.1; B(1):10]	Teacher-related aspects
Relationships between teachers	build good relationship with other colleaguesmake the school environment nice [C.1; B(1):11]	Teacher-related aspects

# 6.3 DISCUSSION OF DATA COLLECTED BY THE QUESTIONNAIRES

An overview of the information given in Tables 6.2; 6.4; 6.6; 6.8 and 6.10 is given in Figure 6.11. The aim of the figure is to help the reader "see" the analysis of the questionnaires; this figure should aid in understanding the discussion that follows.

The questions asked in the questionnaires were formulated in a way that gave participants the opportunity to make recommendations and provide practical suggestions on how to improve or nurture a specific aspect. Analysis of the questionnaires completed by the five participants led to the identification of six main themes, namely, resources; parent/guardian-related aspects; classroom management; learner-related aspects; teacher-related aspects and school-related aspects. The discussion in Section 6.3.1 to Section 6.3.6 combines all the participants' responses and recommendations.

An important feature of the mind map in Figure 6.11 is that it is cyclical. A cyclical mind map means that the themes are not dependent on each other. You can start "reading" the figure at any of the themes.



Figure 6.11: Overview of the information collected from the answers of the questionnaires

#### 6.3.1 Resources

Under the theme resources, three aspects were identified, namely, textbooks, technology, and other resources.

#### 6.3.1.1 Textbooks as resources

Participants were asked to suggest how textbooks can be preserved for future use. Participants suggested that learners take responsibility for the textbooks they use for a year, and that learners pay an amount of money at the beginning of the year, before textbooks are issued. At the end of the year, if textbooks are returned in a satisfactory state, learners are refunded the money they paid at the beginning of the year. Teachers can assist throughout the year by checking the textbooks at least once per term. If a learner loses his/her book, a letter can be sent to the parent, which states that the book must be replaced.

To ensure that the school has enough textbooks at the beginning of an academic year, the usable books must be counted before the end of a year and the numbers must be given to a committee responsible for ordering books for the next year. That committee must also have access to the numbers of learners admitted for the next year, so that they can do the calculations and order the shortfall.

# 6.3.1.2 Technology as a resource

Teachers who struggle to use technology as part of their preparation or lesson presentation, can be assisted by people with good knowledge on using technology in teaching. The assistance, however, must be for a longer period of time, say, for a month. Mathematics teachers must be trained to use and apply mathematics software. Using these programs will make teaching and learning easier. Schools must make computers, laptops and data projectors available to teachers to use in their preparation and presentation of lessons. Another part of technology that can be beneficial to teachers and learners is e-learning, through which content is available electronically at any time of the day. Teachers can use this resource even after school hours.

# 6.3.1.3 Other resources

Under other resources I categorised resources other than textbooks, computer software and electronic equipment.

One practical way to add to resources for future use, is to use mobile devices to make recordings of lessons presented by teachers. These recordings can be stored electronically, and other teachers, or even learners, can use it to study. Storing question papers electronically can contribute to resources that teachers can use.

An important message that participants gave in their answers, is that control of resources is extremely important and necessary to maintain adequate availability of resources. Participants suggested that someone must be appointed to be responsible and take control of the room where the resources are stored. Inventories must be updated regularly to ensure good control. Not only must a school maintain good control over its resources, the resources must also be looked after. If someone, whether a teacher or a learner, breaks something, the breakage must be reported to the principal. The person responsible for the breakage must replace whatever he/she broke.

Water as resource can pose challenges. As a short-term solution, learners and teachers can be requested to bring 2 L bottles filled with water to school every day. This water can be used in the bathrooms. A long-term solution is to raise funds to sink a borehole at the school.

#### 6.3.2 Parent/guardian-related aspects

Learners come from households with different guardianship arrangements. Some learners are cared for by one or even both parents, whereas other learners are under the care of guardians. In this section, reference to parent refer to the adult person looking after the learner, in other words, either the parent or the guardian.

# 6.3.2.1 Parental involvement

Parents who are involved in learners' education is a situation idealised by the participants. One participant suggested that parents can be involved in certain activities, such as feeding schemes. Parents can even receive certificates if they regularly assist their children throughout the year. Teachers can motivate parents to be involved in their children's schoolwork. The school can use parent meetings to ask and motivate parents to be involved by checking their children's homework and books every day, and to sign the books. Parents should ensure that they have the contact

details of their children's class teacher, which will enable parents to enquire about their children's progress and behaviour at regular intervals.

# 6.3.2.2 Support given to parents

Sometimes, parents are uncertain about the way they can be involved. The participants made recommendations for addressing this uncertainty in a way that supports parents.

Each learner should have a diary for recording daily homework. Parents should sign the diary after checking that learners have done the homework. Alternatively, parents can be given a diary, which they can use to control their children's daily homework. Teachers of different subjects can supply parents with CDs containing subject content, which the parents can use to assist learners. When teachers identify a challenge regarding aspects that parents can influence, parent meetings can be called to address these challenges with the parents.

# 6.3.3 Classroom-related aspects

Aspects that can influence what is happening inside the classroom and that were mentioned by participants in responding to the questionnaires, were placed under the theme of classroom-related aspects. The aspects in this theme are not related solely to teachers or learners, but include aspects that influence the teaching process in the classroom.

# 6.3.3.1 Classroom management

Managing a class and everything that is related to teaching that happens in a class, is easier if a teacher teaches a smaller number of learners at a time. This aspect relates directly to class size, which is discussed in Section 6.3.3.4.

Having class rules can assist teachers to control the behaviour in a class. Learners must be reminded of these rules regularly. Keeping the learners constantly busy with interesting lessons, will prevent learners from becoming bored in class. Involving learners in a lesson is an effective way of managing a class. Learners can be given specific tasks to do to ensure they participate in the lesson. Group work can also be applied in a lesson. Each group member gets a task to do or a role to play in the group.

Teachers must move around between the groups in the class, to maintain good cooperation and effective management.

# 6.3.3.2 Teacher-learner relationships

A teacher must know his/her learners, including their needs. These needs do not refer only to academic needs, but to other needs, too, such as emotional and social needs. If a teacher identifies an emotional or social need, the learner must be referred to a school-based support team that is responsible for assisting with this type of challenge. A teacher's attitude towards his/her learners has a big influence on their behaviour in a classroom. Teachers must show learners affection on a professional level, so that the teacher-learner relationship can be on a level founded on trust.

# 6.3.3.3 Maintaining discipline

If discipline is good, it is easy to manage a classroom. To keep learners busy, letting them do many activities and, even letting them prepare and present the lessons, are all ways to ensure good discipline in a classroom.

# 6.3.3.4 Class size

In Section 6.3.3.1, teaching smaller numbers of learners was mentioned. The suggestions of participants for ensuring smaller classes all pointed to admission of learners. Participants believe that the number of learners that the school can accommodate must not be exceeded when learners are admitted. The focus must be on assisting learners to pass. In this way, few learners will have to be retained. If the school reaches its capacity, learners can be referred to neighbouring schools that have space available. The school needs to appoint one person responsible for taking control of admissions. That person should only start admitting learners for the next academic year once he/she knows how many learners passed and failed at the end of a year.

# 6.3.3.5 Methods of teaching respect

One of the participants suggested that corporal punishment must be reconsidered at home as well as at school. The participant stated that they, as teachers, do not have any tools in their hands to reprimand learners, which contributes to the lack of respect they sometimes experience. This teacher believes that, if learners can be disciplined effectively, their attitudes will change and they will respect their teachers. However, schools should focus on enforcing two-sided respect; instead, they must encourage both the respect showed by learners for teachers, and respect showed by teachers for learners.

### 6.3.3.6 Teaching practice

In Section 6.3.3.1 and Section 6.3.3.3 it was mentioned that classroom management is easier, and discipline better, if learners are kept busy constructively. Doing multiple examples in the lesson, showing the learners different methods of solving problems and making use of occasional peer teaching are all strategies a teacher can use as part of his/her teaching practice.

Often, teachers find that textbooks are not at the right level of difficulty, or do not provide the right activities for learners to practise concepts. A teacher can make use of previous years' exam papers to address these textbook shortcomings. Question papers will provide extra exercises, and also expose learners to questions of different levels of difficulty.

Participants recommended that teachers share the benefits of teaching practices they have mastered, such as doing good preparation. Good teaching practices lead to good classroom management.

# 6.3.3.7 Classrooms

Participants were asked to suggest practical ways in which teachers and learners can address challenges related to the physical state of classrooms. The answers given by participants were packed with valuable recommendations. Teachers must motivate learners to take ownership of their classrooms and the equipment in the classrooms. In this way, learners will be motivated to protect their class and the equipment. Teachers and learners must ensure that classes are kept clean and tidy. The walls must be cleaned regularly, and plastic chairs, where applicable, must be looked after. The school, or even the teachers, can try to get sponsors to paint the classrooms.

# 6.3.3.8 Language of teaching and learning

Not all participants believed using English as the language of teaching and learning presented problems; instead, the problem related to teachers' inadequate mastery of English. Teachers must refrain from using local languages for teaching, but should

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teach in English. By sticking to English, teachers will expose learners to the terminology that will be used in test and exam papers. Even teachers at preschool level must implement English as the language of teaching and learning. In this way, all role players who affect learners' development contribute to improving the use and understanding of English.

#### 6.3.4 Learner-related aspects

The aspects grouped under this theme are learner attendance; learner support and learner motivation.

#### 6.3.4.1 Learners' school attendance

Motivating learners to attend school every day needs attention. Motivation is often linked to appraisal or rewards. Rewarding regular attendance by means of a certificate can serve to motivate learners. The participants recommended involving parents, as partners, in the goal of achieving good attendance by learners. Parents need to be informed if their children are late for school, so that parents can ensure that learners leave home earlier, to be in time for school. The school can provide parents with records of learner attendance, using SMS on mobile devices. Learners can be requested to be on the school grounds 30 minutes before the schools starts. If the learners do not adhere to this request, the parents must be informed and asked to assist in getting the learners to school on time. Schools with functional hostels can increase learner attendance, by letting all the learners stay in the hostel, thereby ensuring that learners are always present. If learners have to make use of public transport or specially arranged buses to get to school, the number of buses should be increased, and the departure times of the buses adjusted. Buses that pick learners up at different times give every learner the opportunity to reach school on time.

#### 6.3.4.2 Learner support

Teachers can assist learners, especially in the mathematics class, by having one-toone sessions with learners. This individual assistance will provide invaluable support to learners. Teachers of all the subjects offered by the school must ensure that activities and lessons are learner-centred, as a way of supporting learners. Schools with hostels can support learners by accommodating them in the hostels. Learners who stay in a hostel will have sufficient study time and regular meals, and can be assisted with homework challenges by the staff on duty or the teachers who stay in the hostel.

Feeding schemes at schools provide valuable support to learners during the week. However, to support the learners even more in this regard, feeding schemes should be extended to Saturdays, when learners can attend extra classes, and receive meals too.

Learners can be praised for and congratulated on good results; doing so will provide emotional support. Grade 12 learners can be assigned to specific teachers who can serve as mentors to them.

# 6.3.4.3 Learner motivation

Participants proposed that rewarding learners with certificates could be a valuable method of motivating learners. Learners who receive awards or certificates will be motivated by the acknowledgement of their good performance and hard work.

Teachers play an important role in motivating learners in the mathematics class. A teacher who has mastered the contents and who can keep the lessons interesting will have a positive impact on learners' motivation. Interesting lessons require good pedagogical skills and knowledge of different strategies for presenting content.

# 6.3.5 Teacher-related aspects

The six aspects identified by the completed questionnaires and categorised under the theme of teacher-related aspects are daily teacher attendance; teacher class attendance; teacher intrinsic motivation; teacher extrinsic motivation; teacher support and relationships between teachers.

# 6.3.5.1 Daily teacher attendance

A system that the Department of Education can implement to promote daily attendance by teachers, is a capped leave system. Educators who were permanently employed by Department before December 2001, were entitled to a certain number of leave days per year. Any leave days not taken by the educators in a year, were recorded on the system as capped leave days, which educators could use as they needed it, or the days could be paid out to educators when they resign or retire (RSA DoE 2016:193). The recommendation by participants is that this system be reinstituted.

# 6.3.5.2 Teachers' class attendance

Low class attendance by teachers can be addressed by transferring control over teacher class attendance to SMT members, who can visit classrooms to see if the teachers are in the classrooms, teaching. The names of teachers who attend all their classes, as is expected of them, can be placed on a good performance list in the staffroom, and the list updated every week.

# 6.3.5.3 Intrinsic teacher motivation

Teachers can motivate themselves through proper preparation and having control over their responsibilities. To maintain the pace of being a teacher, and to stay motivated, a teacher must have a well-balanced diet, must exercise, and surround him/herself with people who have positive attitudes and worldviews. Teachers must remember that they are lifelong learners as well. By continuing to learn and being open to new ideas and knowledge will motivate teachers to teach. Hard work, producing results and having learners pass their subjects, will increase the intrinsic motivation level of teachers. Creating a valuable, encouraging and productive environment in a classroom will contribute to learners passing a subject and, thus, contribute to teachers' intrinsic motivation. An important influence on the intrinsic motivation of teachers is teachers taking ownership of the subject, the school and the learners, which is part of a teacher's daily existence. If they make teaching their own, teachers will love their job, which will increase intrinsic motivation immediately.

# 6.3.5.4 Extrinsic teacher motivation

Teachers are, like learners, also motivated by external sources, such as receiving certificates for good performance. A word of appreciation or encouragement is often enough to motivate a teacher.

Teachers can also be paid for the extra lessons they give learners. Teachers can receive incentives from the Department of Education for qualifications they achieve; these incentives will serve as extrinsic motivation to teachers.

#### 6.3.5.5 Teacher support

Being paid for the extra lessons teachers teach, can serve as support for teachers. In Section 6.3.5.4, payment for extra lessons was mentioned as a form of motivation. The Department of Education must take care of its employees by ensuring satisfactory salaries. Teachers need to attend workshops where content topics of their subject are discussed. Workshops that assist teachers by suggesting ways to handle bad behaviour by learners, are helpful and supportive. Teaching teachers different ways of maintaining discipline without resorting to corporal punishment, will lead to better classroom management. A school must constantly evaluate its teacher-support system. By doing this, the school can improve the system, where necessary, to ensure optimum support for its teachers. Senior teachers can be requested to assist other teachers with content knowledge, or address pedagogical knowledge gaps. Schools must make the effort to congratulate and praise teachers for good performance or good results obtained by the learners taught by its teachers. Teachers need to experience support by the Department of Education. The Department must be fair in mediating situations in which learners and teachers are role players.

# 6.3.5.6 Relationships between teachers

Teachers must cherish good relationships with colleagues. If teachers experience problems with relationships with colleagues, they must try to resolve the conflict in the relationship as soon as possible. By resolving conflict, teachers will prevent relationship problems from having a negative influence on teaching. Teachers must strive to work together to strengthen relationships between them. Building strong, positive relationships between teachers will have a positive impact on their teaching and their experience of the school environment.

# 6.3.6 School-related aspects

School-related aspects do not necessarily have a direct influence on teaching or learning, but are linked to the general functioning of a school as a whole. School-related aspects include staff unity, staff communication, the mathematics department, safety, the sports grounds, extramural activities and the principal's example.

# 6.3.6.1 Staff unity

The SMT of a school must organise developmental activities for the teachers and the SGB during the first three terms of the year. A combined developmental activity can be arranged for all the stakeholders. In this way, good teamwork and staff unity will be promoted.

# 6.3.6.2 Staff communication

Good communication is necessary for a well-functioning staff at a school. To improve communication and to ensure that all the staff members are informed, daily information sessions lasting 10 minutes can be implemented.

# 6.3.6.3 School mathematics department

An efficient, functioning mathematics department is beneficial to mathematics teachers, as well as the school. To promote good partnerships within the mathematics department, mathematics teachers can be teamed to teach the same grades, which can lead to collaboration in the department. Mathematics teachers can assist each other with pedagogy and content knowledge, by giving each other the opportunity to give a model lesson on the topics they have mastered.

Good communication is of the utmost importance for an effective mathematics department. Mathematics teachers can discuss the performance of learners, as well as the challenges they, as teachers, experience in the mathematics classes. Weekly feedback sessions can assist with planning and making decisions on interventions, where they are needed. Positive, healthy relationships in a mathematics department show that teachers in this department do not compete against each other. They have the same goal, and acknowledge the strengths and weaknesses of each mathematics teacher in the department.

#### 6.3.6.4 Safety on the school grounds

The safety of teachers and learners must have a high priority at any school. Information sessions, during which advice is given to teachers and learners, can be valuable. Crime and violence is a reality in South Africa, therefore, it is important that everyone is informed. Teachers and learners who make use of public transport must know their surroundings and the routes taken by the specific mode of transport. This knowledge will assist them to make the safest choices when choosing a point at which to exit the bus or taxi.

The school can identify people who can take responsibility for safety at the school. Part of their responsibilities would be to ensure that the school's fence is in a good condition. The school can exert access control at the main gate of the school grounds, where visitors have to enter their details in a register. Monitors can be installed on the school grounds to monitor learner activities during breaks or after school hours.

Involve the community by involving parents and police officers. Parents can come to school and talk to learners about safety, which could include the use of drugs and alcohol. Police officers can be invited to inform the learners about the consequences of crime or violence. Making the community aware that they own the school, and that safety at the school is their responsibility too, could have a positive influence on the teachers and the learners.

Learners with drug-abuse problems, must be identified and assisted by arranging counselling sessions. The parents of learners with drug-abuse problems must be informed and involved in the process of rehabilitating the learners.

#### 6.3.6.5 Sports grounds

Schools with sports facilities must ensure that the grounds are used and kept in a functional state. One way of ensuring the sports grounds are used, is to appoint a sports committee that is responsible for drawing up a list of possible sporting activities. On sports days, the committee can provide a timetable, so that the sports grounds can be used for different sporting activities. If a school does not have sports facilities, learners can be taken to nearby schools that do have sports grounds. Using these sports grounds will create opportunities for extramural activities.
## 6.3.6.6 Extramural activities

Games, such as chess, word games and puzzles, can also be offered as extramural activities. Activities of this kind will assist learners to develop their critical-thinking skills and problem-solving abilities. Both critical thinking and problem-solving are skills needed for mathematics as a subject.

# 6.3.6.7 The principal's example

Teachers must use examples set by principals to teach learners about certain values, such as punctuality, respect and accountability. In the process of repeatedly explaining these values, the teachers will start to lead by example.

# 6.4 CHAPTER CONCLUSION

In this chapter, I presented the data collected from the questionnaires that had been completed by the participants. I analysed, interpreted and discussed the results in a way that enhanced appreciation of the recommendations made by the participants. The recommendations made by the participants not only address the challenges experienced by teachers, but also give guidelines on how to nurture the positive aspects experienced by Thaba Nchu teachers; thus, answering the fourth secondary research question.

In Chapter 7, I apply all the information gathered in Chapters 2, 4, 5 and 6 to present a framework that can be used by mathematics teachers at Thaba Nchu secondary schools to improve and optimise their mathematics teaching environments.

# CHAPTER 7: FRAMEWORK FOR ESTABLISHING IMPROVED MATHEMATICS TEACHING ENVIRONMENTS

#### 7.1 INTRODUCTION

In this chapter, I present a framework for optimising mathematics teaching environments at Thaba Nchu secondary schools. This framework is based on the inputs of the study participants, as discussed in detail in Chapter 6 and summarised in Figure 6.11. The aim of the framework is not only to assist teachers to improve negative aspects of their teaching environments, but also to nurture the positive aspects of their teaching environments.

#### 7.2 SUMMARY OF THE PRECEDING CHAPTERS

Before I present the framework that answers the primary research question of the study, it is necessary to provide a summary of the preceding chapters. Doing so will highlight the important information that serves as the build-up to the framework presentation in this chapter.

Chapter 1 oriented the reader to the study. The chapter discussed literature that served as background for the research focus. The theoretical and conceptual frameworks were given, followed by the research questions, methodology and research plan. Chapter 1 gave the reader an idea of what to expect in the research report.

The aim of Chapter 2 was to give the reader an insight into teaching and, more specifically, teaching in township schools. The theoretical framework that underpins this study was explained in detail, and the reason why each of the theories were used, was motivated. By doing an in-depth literature review, I investigated the information available on teaching environments, and I also answered the first secondary research question: How does literature describe mathematics teaching environments?

The methodology used to perform the research and, thus, to answer the research questions, was examined in Chapter 3. Social constructivism was used as paradigm in this study. Social constructivism focuses on determining how people interpret and understand their experiences in the environment they live in, and investigates how

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these experiences impact on meanings that are socially constructed. My ontological approach to this study was relativism. I realised that the data in this research was not fixed, but flexible. Reality, in this case, was socially constructed. My epistemological conviction regarding the study was that of subjectivism. As the researcher, I am interactively linked to the participants, which lead to data being created as the research study progressed. A qualitative research design was used, linked with autoethnography. The methods used, namely observations, interviews and questionnaires, were discussed in detail. An explanation of the analysis of the data that were collected, followed. Other aspects of methodology that were examined included the characteristics of qualitative research design, methods for ensuring the quality of qualitative research, as well as ethical issues and information regarding the study.

In Chapter 4, my personal perspectives of teaching and facilitation were described in the form of a narrative. This chapter answered the second secondary research question: How did 17 years' exposure to all aspects of teaching, on personal and professional levels, direct the researcher's perspectives of teaching and facilitation? The reason for including this narrative chapter was to give the reader insight into my background, perspectives and experiences of teaching. This background information helps the reader to understand what I based my understanding of the participants' experiences on, and serves as a further motivation for using autoethnography as theory and method.

Chapter 5 was the first analysis chapter of the data that had been collected. This chapter focused on the information gathered from the interviews I had conducted with the participants. The aim of the interviews was to obtain an understanding of the way the participants experience their teaching environments and, thereby, answered the third secondary research question: How do practicing mathematics teachers in Thaba Nchu schools experience their teaching environments? The participants did not only experience challenges in their teaching environments, instead, they identified many positive aspects too. Because not all the participants identified exactly the same positive and negative aspects in their teaching environments, I developed openended, individualised questionnaires for each participant. The individualised questionnaires for each participant.

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the interviews. The open-ended questions asked in each questionnaire were, therefore, a direct result of each participant's experience of his/her teaching environment.

In Chapter 6, the data collected from the individualised questionnaires completed by the participants, were analysed. The questionnaires gave participants an opportunity to make recommendations on how to address the challenges experienced at Thaba Nchu secondary schools, as well as how to nurture the positive aspects experienced at the schools. Chapter 6 answered the fourth secondary research question: What are the recommendations of practicing mathematics teachers for addressing the challenges and nurturing the positive aspects that they encounter in Thaba Nchu mathematics teaching environments? The secondary school participants' recommendations were often practical in nature, making the recommendations unique to a particular community. However, these recommendations are not only applicable to the three secondary schools that were part of this study, but also to any other Thaba Nchu secondary schools with similar circumstances and environments.

After answering all the secondary research questions, I reached the point were the primary research question could be answered by presenting a framework based on the data collected, analysed and interpreted in Chapters 2, 4, 5 and 6.

### 7.3 FRAMEWORK PRESENTATION

The framework that is presented answers the primary research question of this study: What would constitute a framework for the establishment of improved Thaba Nchu secondary school mathematics teaching environments?

Figure 6.1 gave an overview of the information collected from the answers of the individualised questionnaires completed by the participants. After careful coding and analysis of the data collected from the questionnaires, six main themes were identified. These themes are resources, parent/guardian-related aspects, classroom-related aspects, learner-related aspects, teacher-related aspects, and school-related aspects. The sub-themes under each of the six themes were discussed in detail in Section 6.3. Figure 7.1 is a direct outcome of the detail and discussion of Section 6.3



Figure 7.1: Framework for the establishment of improved Thaba Nchu secondary school mathematics teaching environments

The framework is cyclical, meaning that the different parts of the framework function in no specific order. It is not necessary for one part to be addressed first, before another part can be addressed. Each part of the framework carries the same weight, in other words, all the parts are equally important for improving mathematics teaching environments at Thaba Nchu secondary schools. Each part of the framework functions independently of each other, but all the parts are interlinked and necessary to create a functioning teaching environment.

To enhance the interpretation of the information given by the framework in Figure 7.1, another figure, Figure 7.2 is presented. Figure 7.2 includes important suggestions, taken from the data analysis in chapter 6, on how to address aspects presented by the framework in Figure 7.1.







The route I followed to get to the point of developing the framework, is portrayed in Figure 7.3. The diagram indicates the various stages at which the different research questions were answered and should be read from the bottom to the top.



framework in this chapter

### 7.4 VALUE OF THE STUDY

At the time of reviewing the literature for the study, I found no reference to research on mathematics teaching environments in secondary schools in Thaba Nchu; neither is research that focuses on giving voice to teachers and what they experience, easily available. By giving voice to the teachers meant not only to give them the opportunity to talk about their experiences, but also to share ideas and make suggestions to change or improve their teaching environments. This empirical study, thus, makes a considerable contribution to this field of study. The study aimed to bridge the gap in knowledge of mathematics teachers' experiences of their teaching environment in Thaba Nchu secondary schools. The study, furthermore, aimed to increase knowledge on methods of improving and optimising mathematics teaching environments at the Thaba Nchu secondary schools. This new knowledge is based on recommendations made by the main participants in the situations, namely, mathematics teachers at these schools.

#### 7.5 SHORTCOMINGS OF THE STUDY

The results of this empirical study, in which only five secondary mathematics teachers participated, cannot be generalised. The study was done in Thaba Nchu secondary schools, with the purpose of developing a framework for optimising the mathematics teaching environments of Thaba Nchu secondary schools. What can be mentioned is that this study entails an in-depth, qualitative, autoethnographic study, which has the possibility of providing insight into improving mathematics teaching environments in relation to the whole mathematics education sector of South Africa.

#### 7.6 RECOMMENDATIONS FOR FURTHER RESEARCH

Herewith a number of recommendations for further research, based on observations and limitations experienced during this research study:

The study can be done as action research, during which the framework can be implemented in the three schools. In this way, the framework can be refined.

Educators teaching subjects other than mathematics can be included as participants. This study did not focus on mathematics content, which makes it possible to involve participants from other subject departments. This particular study can be researched further by increasing the number of participants. Each participant contributed valuable information, based on his/her perceptions, beliefs and experiences. The more individuals who participate in a study like this one, the more unique recommendations will be given.

A study can be done using more than three schools in Thaba Nchu. Schools have similar environments and situations, but each school also has its own unique characteristics and challenges. These differences will contribute to addressing an even bigger set of challenges or positive aspects, making the findings applicable to more schools.

Schools and teachers from different districts can participate. The results obtained from the different districts can be compared and combined to develop a framework.

#### 7.7 CHAPTER CONCLUSION

Giving mathematics teachers at Thaba Nchu secondary schools the opportunity to share their experiences of their teaching environments led to these mathematics teachers making valuable recommendations for improving these environments. These recommendations can address challenges and nurture positive aspects experienced by the teachers. The recommendations were not only valuable inputs, but also practical plans, which can be implemented by the teachers and, in some cases, learners of the three schools. Teachers must be given a platform where they can communicate and find solutions to the challenges they experience as part of their teaching environments. They must also be given the opportunity to nurture and improve positive aspects of their teaching environments. Who better to make recommendations to improve or to optimise teaching environments, than the teachers who are part of the teaching environments every day?

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