THE ROLE OF SCHOOL MANAGEMENT TEAMS IN SUPPORTING MATHEMATICS TEACHING AND LEARNING IN THE SENIOR PHASE

By

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I, NTSABENG ALBERTINA MOSALA, hereby declare that the copyright is vested in the University of the Free State. The royalties on intellectual property emanating from this study will go to the University of the Free State.

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ABSTRACT

The current study investigated the extent to which school management teams (SMTs) give informal and/or formal curriculum advice and support for mathematics instruction in the senior phase schools within Thabo-Mofutsanyana District in the Free State Province, by examining the SMTs leaders' (principals, deputy principals, and HODs) perceptions, knowledge and beliefs about support for mathematics curriculum and instruction in the senior phase.

The study was guided by post-positivist world view, quantitative in nature and uses a questionnaire as a tool for data collection. A sample of 265 participants (89 principals, 87 deputy principals, and 89 HODs) from 89 senior phase schools was purposively selected. The questionnaires were preliminarily analysed descriptively using the Statistical Package for the Social Sciences (SPSS). Deeper analysis involving analysis of variance (ANOVA) tests were undertaken. Qualitative data analysis, which involves coding, was used to analyse open-ended questions. The self-administered questionnaire was validated by various method including mean inter-item correlation pilot study.

The findings indicated that the principals, deputy principals and deputies have positive perceptions on the support for mathematics teaching and learning ($\bar{x}$=3.68). The findings also indicated no significant difference in the perceptions of SMTs' leaders' (principals, deputy principals and HODs) on support for the mathematics teaching and learning in the senior phase ($F_{(2,262)} = 0.142$, $p > 0.05$). The findings also indicated that SMTs' knowledge about support for the mathematics curriculum are quite positive ($\bar{x}$=3.83).

Furthermore, the results show that are no significant differences in the SMTs' knowledge on the five sub-scales on SMTs' knowledge ($F_{(2,262)} = 4.790$, $p > 0.05$). Regarding Beliefs of the SMTs' on support for the mathematics teaching and learning in the senior phase, the SMTs' beliefs are relatively positive ($\bar{x}$=3.92). In addition to these, the differences in the beliefs of the instructional leaders (principals, deputy principals and HODs) beliefs ($F_{(2.262)} = 0.916$, $p > 0.05$) was not significant. The SMTs'

perceptions on practical support for mathematics teaching and learning were altogether positive ($\bar{x}$=3.71). Likewise, the difference in the practical support provided by the SMTs for mathematics teaching and learning was not significant ($F_{(2.262)}$ = 0.894, $p > 0.05$).

These findings demand a structured support professional development for HODs to support mathematics teaching and learning because it was evident the principals and their deputies have the least involvement in practical issues related to supporting mathematics teachers professionally. Teacher development programmes should be structured such that HODs are trained to provide holistic support to mathematics teaching and learning in the senior phase.

Key words: Instructional leadership, Distributed leadership, Professional teacher development, School management teams, Teacher leadership.

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DEDICATION

I dedicate this work to my late mother, Cecelia Libuseng Mosala, who was a single parent, for the educational inspiration she spurred me with and for giving me a springboard to realise my purpose in life.

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ACRONYMS AND ABBREVIATIONS

ANA	Annual National Assessment
ANOVA	Analysis of Variance
CCK	Common Content Knowledge
DBE	Department of Basic Education
DF	Degrees of Freedom
EEA	Employment of Educators Act 76 of 1998
FET	Further Education and Training
HOD	Head of Department
IQMS	Integrated Quality Management System
KCC	Knowledge of Content and Curriculum
KCS	Knowledge of Content and Students
KCT	Knowledge of Content and Teaching
M	Mean
NCLB	No Child Left Behind
NGO	Non-Government Organisation
PAM	Personnel Administrative Measures
SCK	Specialised Content Knowledge
SD	Standard Deviation
Sig.	Significance
SMT	School Management Team

SPSS	Statistical Package for the Social Sciences
TIMSS	Trends in Mathematics and Science Studies

CHAPTER ONE

ORIENTATION AND BACKGROUND TO THE STUDY

1.1 INTRODUCTION

Leadership in every institution is very important in order to give guidance to every individual who forms part of the institution. Leaders provide guidance on good practices and prevent deviation from this, minimising cases where people do whatever they like. Therefore, schools, as the institutions of teaching and learning, need leaders who take responsibility for the overall functioning of the schools such as the way instruction is conducted in the classrooms for each and every subject (Minadzi & Kankam, 2016). Studies illustrate that many changes in teaching and learning practices, such as introducing strategies and methods to be implemented in the classrooms, are initiated by the school leadership. For example, Avramides, Hunter, Oliver and Luckin (2014) found that successful school leadership does not consider positions but rather how the curriculum is implemented and facilitated in a school-based setting. According to Leithwood (2016), school leaders are the source of instructional leadership, as they are the ones who are expected to inspire excellence and commitment among the teachers and they are potentially in the best position to provide necessary support to improve learners' performance.

Globally, there is continued interest in how teachers are supported to enhance learners' achievement in various subjects (Robinson, Lloyd & Rowe, 2008). Based on the literature, there is accumulative indication that leadership makes a positive impact in school results (Robinson et al., 2008). The school based leadership often consists of the principal, the deputy and the Heads of Department (HODs) who are collectively referred to as the School Management Team (SMT). For learners' performance to improve significantly, the SMT should work in collaboration with subject teachers (Minadzi & Kankam, 2016). In South Africa, the primary school SMTs and educators are expected to develop a shared vision to enhance learners' performance in mathematics and literacy. Leaders can influence learners' mathematics performance in many ways, directly and indirectly. However, when the pupils underperform, especially in the key subjects such as numeracy and literacy the primary focus is

usually on the subject teachers and less on the school leaders. In addition, many studies often focus on high school mathematics performance and less is known about the influence of leadership, particularly the contribution of the SMTs and their support in teaching and learning of mathematics to ensure the learners perform better in the subject (Lochmiller, 2015).

In South African context, school-based leaders, known as the school management teams (SMTs), have the responsibility to guarantee the holistic functioning of the schools. Therefore, effective educational policy implementation is subjected to the effectiveness of leadership among principals, deputy principals and HODs in schools and educational organisations across the country (Dhuey, 2010). The principals, deputy principals and HODs as instructional leaders are responsible for the overall functioning of their schools. Their task is to ensure that learners achieve good results in all subjects. They are required, inter alia, to direct and supervise the development of all the subjects in their schools (Dhuey, 2010). Many studies have shown how leaders, especially principals, can work to bring out the best in others, including motivating staff to improve outcomes for learners in high school mathematics but there is limited evidence on the studies conducted for the lower grades (Vidoni & Grasstti, 2008). Mangin (2007) highlights the fact that the principals' knowledge of how teachers interact with learners and their colleagues should be enhanced for the effective implementation of the content and better learner results. She also argues that leaders need to be rich in content knowledge to support teaching and learning of mathematics effectively (Mangin, 2007).

School leaders need to understand the needs of teachers in the classroom and the gaps in the curriculum delivery in other to support them adequately in the teaching of mathematics. Mathematics teachers, like other subjects are expected to teach effectively and ensure that learners' performance is increasing. To achieve that goal, teachers need support from instructional leaders.

The implication is that the SMTs should view themselves as immediate people to provide support when subject teachers are faced with challenges regarding curriculum delivery and instruction. They are expected to offer curriculum support and guidance to mathematics teachers and other subject teachers. To achieve this goal, the instructional leaders should be knowledgeable about the needs of teachers and the kind of support needed by teachers. Their core duty is to ensure that teaching and

learning is effective in schools as stipulated in the Personnel Administrative Measures (PAM) document (DBE, 2016). They must be certain about the kind of support they need to render as per their individual positions in the school management. In addition to knowledge, instructional leaders' support for mathematics teaching and learning is influenced by how school leaders view themselves as leaders and their beliefs regarding the kind of support relevant for mathematics teaching and learning. Thus, the HODs are required to poses in-depth knowledge of mathematics and be certain about the kind of support relevant for teaching and learning of mathematics.

Additionally, Bush, Joubert, Kiggundu and van Rooyen (2009) are of the opinion that there is no evidence of a successful school in the absence of talented instructional leaders. Furthermore, these scholars argue that not only are individual leaders important but the entire leadership structure of a school (Bush et al., 2009). Therefore, this study investigated the extent in which SMTs give informal and/or formal curriculum advice and how do they develop teachers professionally and ensure continuous support for mathematics instruction in various senior phase schools within the Thabo-Mofutsanyana District of the Free State in South Africa.

Mathematics teachers, as with other teachers, need support from their school based instructional leaders and a capacitating school environment for effective instruction. It is critical for school leaders to support teachers as they experiment with the ever-changing curriculum and new instructional strategies (Harris & Spillane, 2008), thus leaders require knowledge and leadership interventions with the goal of professional teacher development (Ntshoe & Seleso, 2014). The SMTs at all schooling phases are important for educational change and the development of educators. They are the content coordinators and are responsible for improving learners' achievement through teacher development and instruction change. However, Ndimande (2005) argues that the majority of SMTs do not create staff development programmes that are subject-based to assist teachers in their daily instructional processes. To improve mathematics instruction, the focus needs to be on better teaching methods and support for instruction by the school's leadership. The quality, range, and flexibility of teachers' classroom work in mathematics instruction are related to their professional growth (Lochmiller, 2015). One of the roles of the SMTs is to arrange professional support and opportunities for growth and professional development of teachers to improve learner performance (Leithwood, 2016). Therefore, the current study investigated the

SMTs' perceptions, beliefs and knowledge about the support for teaching and learning of mathematics, specifically the role they play in supporting instructional processes in mathematics.

1.2 PROBLEM STATEMENT

The main problem, as highlighted in the literature, is that mathematics teachers need support and professional development from their SMTs. Learners in the senior phase (grades 7 to 9) are currently not performing as expected in mathematics. Worldwide, major concern has been raised over poor school performance in mathematics following the release of international research results such as Trends in Mathematics and Science Studies (TIMSS, 2012). For instance, the outcomes of the assessments administered in South Africa, Botswana, and Honduras showed that learners demonstrated low performance in mathematics and science (TIMSS, 2012). Ige and Jita (2020) reported that different reasons were put forward by researchers for the low performance of learners in mathematics and science in South Africa. Heather, Rowan and Ball (2005) reported that a lack of basic content knowledge and support from school leaders has resulted in poor performance of learners in mathematics in recent years. The subject teachers are still the focus when learner's performance is unsatisfactory. Nevertheless, instructional leadership problems can seriously affect mathematics teaching and it is regarded as a critical subject that needs attention from both the SMT and teachers.

In the South African context, it was found that learners are underperforming in mathematics (DBE, 2014). In South Africa, the Department of Education uses Annual National Assessments (ANA) as the measuring tool to annually record progress in learner achievement, concerning accomplishing the good results in mathematics, and ensuring that at least 60% of learners achieve certain levels in Literacy and Numeracy. In the Statement of Release on the Annual National Assessment (ANA) Results for 2013 (DBE, 2013), the Minister of Basic Education, Angie Motshekga, stated that there was a decline in mathematics results for the year 2012 for grades 6 to 9. This has been the researcher's experience with unsatisfactory performance in mathematics being seen since the ANA was implemented. Research on how mathematics teachers are supported by school leaders, with the aim of holistic performance, is therefore necessary. School leaders must also work collaboratively with subject teachers, and

instructional leadership should ideally be shared or distributed among all stakeholders involved to contribute positively and improve the national results.

In mathematics teaching and learning, the role of the SMTs is related to the efficiency and effectiveness of the schools. This implies that teachers and school leaders cannot be successful without working together. Minadzi and Kankam (2016) found that the majority of SMTs in primary schools studied do not consider themselves as having a role to play in the delivery of the content to learners in the classroom. These SMTs do not allocate subjects to themselves or recognise themselves as part of the curriculum change which requires the application of effective strategies to meet the diverse needs of learners in the classrooms (Minadzi & Kankam, 2016). Lochmiller (2015) found that school leaders do not recognise themselves as the initiators of change and transformation when giving subject teachers professional and content-based support. This may result in the poor performance in mathematics. SMT members see their roles as being in administration, attending meetings and implementing directives from the department district offices and not in developing teachers professionally and individually in terms of subject matter (Lochmiller, 2015).

Professional development should not be considered as the only task for district officials such as subject advisers. According to Frem, Newman and Youngs (2000), professional development is effective when it is administered through both external development and school-based initiatives, whereby the principals, deputies, HODs and senior teachers are equally involved in providing support according to different teachers' instructional needs. However, Rapporteur, Halasz and Pont (2007) argue that professional development has failed to develop or improve teaching and that professional development is usually implemented in ways that do not accommodate different schools' needs. Professional development for mathematics teachers should concentrate on shared instruction and learners' performance in each specific school (Rapporteur et al., 2007).

Shared leadership and teacher leadership are ways to enhance learner performance in mathematics. However, there is little information in scholarly literature on how subject teachers are supported by the SMTs and how this affects the learners' achievement in senior phase schools (Conteh, 2015). This argument is supported by Donaldson, Leclasseur and Mayer (2016) who found that mathematics teachers have

the largest school-based influence from their colleagues for learners' performance but there is limited literature on how mathematical content knowledge is distributed among the school leaders such as principals, deputy principals and HODs (Donaldson et al., 2016). Donaldson et al. (2016) observed that mathematics teachers have higher quality instructional support for content understanding from other teachers than from the SMTs.

1.3 RESEARCH QUESTIONS

The study seeks to answer the following primary research question:

> To what extent do SMTs give informal and/or formal curriculum advice and how do they develop teachers professionally and ensure continuous support for mathematics instruction in various senior phase schools within the Thabo-Mofutsanyana District of the Free State in South Africa?

This primary research question will be further investigated through the sub-questions below.

- What are the SMTs leaders' (principals, deputy principals and HODs) perceptions, knowledge, and beliefs about support for mathematics curriculum and instruction in the senior phase?
- Will there be any significant difference in the perceptions of SMT leaders' (principals, deputy principals and HODs) about support for the mathematics curriculum and instruction in the senior phase?
- How do the SMTs (principals, deputy principals and HODs) practically support mathematics curriculum and instruction at the senior phase, if at all?
- How can the influence or lack thereof by SMTs on mathematics curriculum and instruction be explained?

1.4 AIMS AND OBJECTIVES OF THE RESEARCH

The purpose of this study is to investigate the role of the SMTs in supporting instructional processes in mathematics, mainly in the senior phase.

The specific objectives of the present study are therefore:

- To investigate the SMTs leaders' (principals, deputy principals and HODs) perceptions, knowledge, and beliefs about support for mathematics curriculum and instruction in the senior phase.
- To explore the differences in the perceptions of SMT leaders' (principals, deputy principals and HODs) about support for the mathematics curriculum and instruction in the senior phase?
- To investigate the SMTs (principals, deputy principals and HODs) practically support mathematics curriculum and instruction at the senior phase, if at all.
- To explore the influence or lack thereof by SMTs on mathematics curriculum and instruction.

1.5 PURPOSE OF THE STUDY

The current study investigates the role of SMTs in supporting instructional processes in mathematics, mainly in the senior phase. As mentioned in the previous section, there are three objectives arising from the study. Firstly, the researcher will investigate the SMTs leaders' (principals, deputy principals and HODs) perceptions, knowledge and beliefs about support for mathematics curriculum and instruction in the senior phase. The researcher further wishes to investigate the SMTs (principals, deputy principals and HODs) practically support mathematics curriculum and instruction at the senior phase, if at all. Finally, influence or lack thereof by SMTs on mathematics curriculum and instruction.

Based on current education trends engendered by the "No Child Left Behind" (NCLB) guidelines (Winstead, 2011), the researcher feels that there is a need for mathematics educators to be given the necessary support and development in terms of content knowledge, instructional processes and curriculum delivery. The researcher aims to find out what kind of support is given to both teachers and learners to raise the bar for mathematics in senior phase schools.

1.6 SIGNIFICANCE OF THE STUDY

Globally, there are still challenges in mathematics performance and instructional practices, as seen in the learners' achievement data from the Trends in International Mathematics and Science Study (TIMSS, 2012). Thus, this study will primarily investigate the role of formal school leadership, which includes principals, deputy principals, HODs and other head teachers of the senior phase, in ensuring that learners perform better in mathematics. This is important because mathematics provides the foundation for many other subjects. The SMT is expected to share instructional leadership at this level to help teachers in building a solid foundation in mathematics at this level.

In South Africa, learners' poor performance in mathematics continues to be a burning issue. Since the introduction of the ANAs for grades 7, 8 and 9 in mathematics several years ago, it has been observed that learners do not perform as expected (DBE, 2014). There are many contributing factors to this problem, not least of which is the role of the school leadership (Ndimande, 2005).

This research would provide insights on how school leaders can provide support to subject teachers for the improvement of teaching and learning of mathematics. It will also provide a unique contribution to the scholastic literature by identifying the role of school leaders in supporting educators to improve instruction in mathematics. The research has practical value because it will identify the kind of support given to mathematics teachers from their SMTs for the effective instructional processes and the importance of shared leadership by both subject teachers and SMTs. The researcher will examine relevant studies on the impact of school leadership in professional teacher development. The study has the potential to provide information on the level of mathematics instructional knowledge and the competence of various school leaders. The findings of the research will give direction on the interventions that must be put in place by various stakeholders in providing support in mathematics instruction. At a personal level, the study will help the researcher as a mathematics teacher to understand the role of school leaders in improving learners' academic performance in mathematics.

1.7 FRAMEWORK OF THE STUDY

This study is reinforced by instructional leadership. Instructional leadership is about revealing the capacities of school based leaders, teachers, learners and parents to ensure effective mathematics teaching and learning. To be successful in improving learners' performance in all subjects including mathematics, the effective principals, deputy principals and HODs must be well informed about their duties have knowledge about the development of the school curriculum through supporting subject teachers. In order for the holistic performance of the schools, every stakeholder in the schools should understand the trends in the development of the school curriculum. In this way, one must be able to play a role in supporting both teachers and learners in instructional processes Leithwood (2016).

Instructional leadership is basically an influencing process, which depends on how members of the school management teams (SMTs) interact with teachers. Effective instructional leadership can be observed when school leaders may empower teachers and when stakeholders in schools work together as a team to enhance learners' achievement. Instructional leadership skills of school based leaders have been considered as one of the main factors on school effectiveness and teacher empowerment. In this way there is a directly proportional relationship between instructional leadership skills of the school based leaders management skills and school effectiveness and performance, learners' progress, and the reform of schools (Siman, 2016).

Distributed or shared instructional leadership also guided this study. In most well-performing and successful schools, the leadership and instruction is shared among school leaders and teachers (Briggs & Wohlstetter, 2003). By sharing responsibilities in terms of mathematics instruction, the researcher focuses not only on the principal but also other leaders within the school. Recent literature emphasises the importance of school leaders for instructional improvement (Conteh, 2015). Conteh (2015) is also of the opinion that principals, as the main members of the SMTs, have a critical role to play in influencing distributed leadership practices which will have a positive influence on learners' performance. According to Heck and Hallinger (2009), there are few studies that have investigated the contribution of distributed leadership on subject improvement. Therefore, the researcher will focus the study on distributed leadership

as a framework to examine the practices of SMTs in supporting mathematics teaching and learning at the senior phase level.

Based on the distributed leadership framework, we assume that various stakeholders, such as head teachers and their deputies, HODs, mentors and others, have an impact in ensuring that the teachers are supported professionally and academically (Evans, 2014). For the current study, the researcher seeks to investigate how SMTs give informal and/or formal curriculum support to mathematics teachers and teaching in the senior phase.

The influence of the SMT on the performance of learners is related to the instructional leaders' views on content and curriculum delivery, and their leadership practices in the improvement of mathematics instruction (Harris & Spillane, 2008). This is also integrated with how instructional leaders within schools distribute in the work of subject-matter improvement. The distribution of instructional leadership within schools implies that all leaders work collaboratively to support teachers about the subject matter. According to Conteh (2015), principals are not the only individuals who provide leadership for the improvement of a school. This is supported by Busher and Harris (1999) who argue that successful schools that have the ability to improve learner performance are also led by instructional leaders who make a significant and positive contribution to the effectiveness of their teachers. This study is also guided by literature on the professional growth of subject teachers by school leadership (van der Berg, Taylor, Gustafsson, Spaull & Armstrong, 2011).

1.8 RESEARCH METHODOLOGY

This section deals with the research design and methods that the researcher considers the most appropriate for investigating the role of SMTs in supporting mathematics teaching and learning in the senior phase (grade 7 to 9). The research paradigm guiding the study is post-positivism and the research approach is quantitative. According to Creswell (2009), this analysis allowed for statistical treatment of the data and enabled the researcher to investigate the SMTs' perceptions, knowledge and beliefs about support for mathematics curriculum. A survey will be conducted in various schools within the Thabo-Mofutsanyane district of the Free State in South Africa. The survey was used for the collection of information such perceptions and

beliefs of respondents the information to a specific variable (Creswell, 2009). The researcher used a questionnaire to collect data that answered the research questions. The purpose of the questionnaire was to determine the SMTs' level of competence, perceptions and beliefs about the support for mathematics instruction, and to explore their practical role in supporting mathematics teachers in their daily instruction and how this affects learner academic performance. The questionnaire was designed to be uncomplicated and user-friendly.

The researcher used separate questions for principals, deputy principals and HODs addressing the same theme as a way of collecting specific data. That enabled the researcher to answer the questions about the senior phase school leaders and their role in supporting mathematics instruction. This was done because the questions asked were specific to the SMTs and their different roles in supporting mathematics teaching and learning. The post-positivism paradigm assists the researcher in determining the role of school structures and practices in improving mathematics teaching and learning.

The survey was conducted in the schools of the Thabo-Mofutsanyana District. This provided a quantitative or numeric description of trends, attitudes, or opinions of the chosen population to draw a conclusion. A survey allowed the collection of data from a larger number of school leaders in the district. The quantitative instrument was in the form of a five-point Likert-scale, to elicit various kinds of responses from the participants. The question Items were constructed and adapted from previously used instruments found in various research studies reported in the literature.

The target population for this study specifically included principals, deputy principals and HODs. The selected population includes the SMTs who are involved in the professional development of mathematics teachers and the instructional processes.

There will be about two hundred and sixty-five (N = 265) participants from 89 (senior) primary schools in the Thabo-Mofutsanyana District. One principal, one deputy principal and one HOD will represent each school. In the case of the schools where there are no HODs, senior teachers were considered.

The purposive sampling technique was adopted for this study as the study focused mainly on the SMTs who bear some responsibility for the senior phase. This method of sampling ensured that the target population of the SMTs as instructional leaders is

selected from different schools with different levels of mathematics performance in the senior phase schools within the district.

The data was coded and organised according to the responses from the participants. The researcher broke down the data and synthesised it to find thematic patterns and areas that are crucial to answering the research questions. The statistical analysis was conducted using the Statistical Package for the Social Sciences (SPSS) Version 25 to establish the descriptive features of the data such as frequencies, means and standard deviations. Means and standard deviation between leaders' knowledge and support practices were explored.

The data collected through the questionnaire instrument was captured using Microsoft Excel spreadsheets, which was later imported to SPSS version 25 for analysis. A quantitative approach was administered, and the calculated frequencies of each answer given per question were expressed as percentages. Frequency tables were used to visualise the frequencies (Hill & Shih, 2009).

Participation in the survey was voluntary and permission to conduct the study was requested from the university, from the Free State Department of Education and the selected schools in the Thabo Mofutsanyana District as required by the ethical protocols of the university. The participants were informed of the purpose of the research and they completed a consent form which emphasises their right to withdraw should they wish to. No confidential information of the participants was revealed. They remained anonymous and their personal information was protected. Only the data related to answering the research questions was used in the study. The methodology will be further explored in chapter three of the thesis.

1.9 DELIMITATIONS OF THE STUDY

The research study focuses on the role of school leadership in terms of teacher support for instructional processes mainly in the senior phase. Only school leaders (principals, deputy principals and HODs) that are known as school management teams (SMTs) from Thabo Mofutsanyane District in the Free State Province were considered. The role of the SMTs in supporting mathematics teaching and learning is the focus of

the research as a key process to ensure that learners' performance in mathematics is improved.

1.10 LIMITATIONS OF THE STUDY

One of the limitations of the current study is that it focuses on only school leaders' role in relation to improving mathematics performance. The impact of the teachers and their contributions to mathematics performance are excluded. Also, the learners taking mathematics in the selected schools are not involved in this study.

There are schools where there is only one HOD who oversees all subjects in a phase. For such schools, it could not be easy to investigate the level of mathematics competence or knowledge available to aid teachers who need support. There might be schools where there are no HODs at all. To minimise this limitation, senior teachers were considered.

The use of a questionnaire as a tool for data collection instead of structured interviews does not necessarily allow for open-ended responses from the school leaders or the collection of qualitative data. Another limitation of the study could be the reluctance by some members of the SMTs to answer the questions asked. The study is also focused on one district within the Free State Province and may not be generalisable to the entire Free State or South African population of school leaders for mathematics in the senior phase.

1.11 DEFINITION OF OPERATIONAL TERMS

1.11.1 Instructional leadership

Instructional leadership is referred to as taking a leading role in instructional improvement efforts of developing teachers, curriculum delivery and availability of resources to support the instructional processes (Mangin, 2007).

Mangin (2007) added that instructional leadership is referred to as leadership practices that school administrators undertake to improve instructional processes and the setting of acceptable performance to ensure teaching and learning process is effective. Thus, the study seeks to investigate the instructional leadership practices

employed by the SMTs in developing mathematics teachers for the senior phase schools.

1.11.2 Distributed leadership

Distributed leadership is defined as one of the forms of leadership that involves all the different forms of cooperation undertaken by the principals, deputy principals teachers and other members of the SMT who lead the school's development (Heck & Hallinger, 2009).

According to Spillane (2005), distributed leadership is defined as a shared organisational quality rather than a sole attribute, based on the individual roles and functions. The school leadership will be examined according to the distributive leadership perspective, which emphasises the ways in which leadership is shared across all stakeholders who are involved in drawing conclusions for a particular institution.

Goksoy (2015) explains distributed leadership as a shared task among stakeholders in an institution of teaching and learning. He claims that it is more than the actions of individual leaders, it is considered as the interaction between many leaders, regardless of formal or informal positions (Goksoy, 2015). According to Goksoy (2015), the theory of distributed leadership encourages teamwork and the spirit of working cooperatively in different institutions of learning. It is basically the interaction between leaders and followers in order to accomplish one goal, i.e., so for learners' outcomes to be improved. For the current study the researcher explores the extent in which leadership is distributed amongst teachers and the SMTs to enhance the learners' performance in mathematics.

1.11.3 Professional development

By means of professional development teachers are given the necessary support to master the content, teaching skills and effective strategies (Evans, 2014). In this regard, teachers are able to evaluate their own teaching and learners' performance. Teachers are given the means to address challenges arising from teaching and

learning (Evans, 2014). According to Evans (2014), professional development should improve and assist teachers with skills and strategies to master the content.

1.11.4 School Management Teams (SMTs)

SMTs are defined as the school-based management consisting of principals, deputy principals, HODs and senior teachers (Printy, 2008). These leaders are responsible for the overall performance of the school including the increase in both teachers and learners' performance. The SMTs are innovators in transformational leadership responsible for distributing instructional leadership among educators (Printy, 2008).

The SMT refers to all school leaders occupying supervisory positions, such as the principals, deputy principals and HODs, these leaders are responsible for the managerial and leadership tasks assigned to them (Printy, 2008). According to the Naicker and Waddy (2002), every person in the school management teams is charged with obligations involving organisation, decision making, instructional leadership and policy making.

1.11.5 Teacher leadership

Mangin (2007) views teacher leadership as the teacher's capacity to contribute to educational reform, decision making and the manner in which instructional processes should be conducted in a school setting for greater success and the sustainability of the school. All teachers, regardless of their position, are responsible for learners' achievement.

1.11.6 Roles

Roles are defined as the functions that any individual or group can play in an institution. For this study, roles are defined as functions of the SMTs in enhancing learners' performance by providing support to the subject teachers in senior phases (Ndimande, 2005).

1.12 LAYOUT OF THE RESEARCH REPORT

The study is organised into five chapters.

Chapter one introduces the study. It also addresses the focus of the study. It includes the background, the purpose, the significant, the research questions and the overall objectives of the study.

Chapter two presents the review of literature.

Chapter three outlines the methodology of the study.

Chapter four captures the findings of the study.

Chapter five gives the conclusion and recommendations.

1.13 CHAPTER SUMMARY

In this chapter, an introductory overview and background, problem statement, research questions and the objectives of the study were presented. The research methodology, delimitation and limitations of the study were outlined, and the definitions of key concepts in this study were highlighted.

In chapter two the literature review continues and focuses on the objectives of the study revealing, relevant information on different aspects and theoretical and conceptual frameworks about the role of the school management teams in supporting mathematics instruction and curriculum.

In chapter three, the research design that the researcher considers to be most appropriate to investigate the role of instructional leaders in providing support for mathematics instruction and curriculum will be discussed in detail with specific focus on the research problems, questions, sampling, instruments used for the purpose of the study, data collection strategy and how the data was processed.

Chapter four will present evidence of the data gathered from participants through questionnaires. Data will be analysed using SPSS. Themes identified from questionnaires and will be analysed and discussed.

In chapter five, the findings based on the main research question in this study are examined which sought to answer. This includes:

1. The SMTs leaders' (principals, deputy principals and HODs) perceptions, knowledge and beliefs about support for the mathematics curriculum and instruction in the senior phase.

2. The SMTs' (principals, deputy principals and HODs) practical support for mathematics curriculum and instruction at the senior phase.
3. The significant difference in the perceptions of SMT leaders' (principals, deputy principals and HODs) on support for the mathematics curriculum and instruction in the senior phase.
4. The influence, or lack thereof, by SMTs on mathematics curriculum and instruction.

Finally, the researcher will make recommendations in relation to the outcome of the study and make suggestions for future research.

In the next chapter, the aims of the study will be addressed by reviewing the literature in relation to key conceptual and theoretical

Frameworks relevant and related to the role of the school management teams (SMTs). The key concepts, instructional leadership and distributed leadership will guide this study.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

School management is faced with the responsibility of ensuring appropriate management skills of curriculum changes and that effective instructional processes are followed so that teachers' and learners' classroom needs are catered for. Instructional leadership and distributed leadership, therefore, play an important role in the professional development of competent teachers and learner performance. The literature review for this study concerns the role of each member of the SMT in providing support for the mathematics curriculum and instruction and their roles in providing instructional leadership and distributed leadership to ensure professional teacher development. This review is mainly focused on the individual role of the instructional leaders in providing support and their influences in teaching and learning for mathematics. This review is conducted to examine the roles of instructional leaders in providing teaching and learning support for mathematics teachers. The review also covers the challenges experienced by SMTs in proving support for instructional processes in mathematics as instructional leaders.

Instructional leadership has become a popular subject among educational policymakers and powerful educational components of the schools. The instructional leadership field was created to advance new leadership within the school context and enhance the teaching profession by empowering teachers. According to Wenner and Campbell (2016), instructional leaders are continuing to further their studies in tertiary institutions and thus learning more about their positions. Furthermore, instructional leaders focus on leadership for mathematics, science, and literacy. The increase in instructional leaders furthering their studies or empowering themselves with skills enables them to provide necessary instructional support to subject teachers. Their responsibilities include maintaining classroom-based instructional responsibilities while also taking on leadership responsibilities outside the classroom context (Wenner & Campbell, 2016).

Globally, pressure to help all learners perform well in all subjects is greater than ever. South Africa is also under a lot of pressure to ensure better performance of all learners in mathematics. Mathematics is one of the school subjects where learners are not performing as expected across the globe. South Africa continues to face the challenge of underperformance in mathematics for all phases and grades. According to Setlhodi-Mohapi and Lebeloane (2014), there is an improvement in grade 12 senior certificate level although there is high demand to strengthen the foundation in instructional processes of mathematics. It could be seen from the assertion of Setlhodi-Mohapi and Lebeloane (2014) that the rejuvenation of instructional processes in mathematics teaching seems to be antidote to underperformance in mathematics in South African schools.

The South African Schools Act (SASA), 1996 (Act 84 of 1996) is aimed at guaranteeing that all learners perform better in all school subjects. Thus, teachers are faced with the challenge of improving learners' performance in mathematics as one of the school subjects. In this regard, the school-based leadership, known as 'the SMT', in the South African context is anticipated to play a pivotal role in minimising this challenge. The SMTs are leading the teaching and learning process. Hence, they are regarded as instructional leaders. Teachers and instructional leaders are continually seeking new and better strategies to enhance learners' achievement. Leadership for teaching and learning has been major concept in improving learners' performance around the world.

Printy (2008) suggests that instructional leadership should be shared among formal or informal leaders for learners to succeed in schools. Also, Leithwood (2016) states that school leaders are the source of instructional leadership, as they are the people who are expected to inspire greatness and commitment among the teachers, and they are potentially in the best position to provide necessary support to improve learners' performance. On the other hand, the current NCLB movement (Winstead, 2011) has put more pressure on the district officials, SMTs and teachers. South African schools are managed by participants of the SMTs, which comprises mainly of the principal, the deputy principal and the HODs.

In this chapter, relevant literature concerning the influence of the SMT in teaching and learning of mathematics will be discussed. The chapter will firstly reflect on the concept of leadership and its relevance to the study. It will also review literature on the SMT's

roles, responsibilities, competence, and perceptions about supporting mathematics teachers in the instructional processes to enhance performance in the subject. Finally, the challenges faced by the school leadership in supporting mathematics instructional processes are reflected on.

2.2 THEORETICAL FRAMEWORK

The theoretical framework is defined as a set of terms and relationships within which the problem is investigated. It is a brief explanation of the key variables operating within the area of interest of the research. It is bases on the researcher's overarching view on how the variables are related to yield a more powerful or comprehensive model of applicable phenomena that have not been available before.

2.3 PURPOSE OF THE STUDY

The aim of this study is to investigate the role of the SMTs in supporting instructional processes in mathematics, mainly in the senior phase. There is a gap between the actual roles of the SMTs and the expectations of mathematics teachers. Teachers are unaware of the actual roles of the SMTs in supporting mathematics teaching and learning. As mentioned in the previous chapter, there are three objectives arising from the study. Firstly, the researcher investigates the level of mathematics instructional knowledge and competence of various school leaders. Secondly, the researcher further wanted to investigate the influence of SMTs on mathematics teaching and learning in the senior phase. Finally, the researcher wanted to explore the extent to which the influence on and support of the SMTs for mathematics instructional processes or lack thereof can be explained.

The current atmosphere created by the NCLB movement means that every child should be ready to learn when they start school, and they must succeed (Winstead, 2011). The ever-changing educational dynamics put pressure on educators to help every student succeed. Educators and their SMTs are continually seeking new and better structures to enhance learners' performance. As a result of these standards, the SMTs are forced to seek strategies and best practices to assist educators improve learners' performance. The researcher feels that there is a need for mathematics educators to be given necessary support and development in terms of content knowledge and delivery. The researcher would also like to find out what kind of support

is given to both teachers and learners in raising the bar and leaving no child behind in mathematics senior phase schools.

2.4 DEFINITION OF LEADERSHIP

Leadership is a process in which the individual affects other group members to accomplish the desired outcomes or organisational objectives. The school-based leadership comprises the principals, deputy principals and HODs. These individuals work collaboratively to ensure the mission and vision of school are met. The two types related to the leadership roles of principals, deputy principals and HODs are instructional and distributed leadership (Printy, 2008). The two types of leadership mentioned by Printy (2008) are popular in educational circles across the world.

2.4.1 Instructional leadership

Instructional leadership in the South African educational context emphasises a move towards a more shared and participatory approach to the practices of SMTs in schools. Instructional leadership is a more critical or significant role than transformational leadership in this context. Although both leadership processes need to be incorporated together for better results. This indicates that school leaders perform better when they have both curriculum knowledge and good leadership skills. Therefore, both are requirements for improving schools' performance. According to Printy (2008), there are three models for instructional leadership. The purpose of the models is to encourage collaboration between the school leaders and educators. The models include distributed leadership between educators and their leaders, leadership content knowledge, and instructional rounds. The models can be used collectively to create a positive teaching and learning environment in schools.

Instructional leadership is a paradigm for school leadership and, according to Hallinger and Moosung (2013), this paradigm is fundamental for the school's effectiveness, professional development, and overall performance. In their research, Hallinger and Moosung (2013) state that teachers, HODs and deputy principals were not considered instructional leaders in the past. There was little or no discussion of instructional leadership as a shared function. Instructional leadership was solely dependent on the principals. Instructional leadership does not rely on principals only. Rather it is a collective work for all leaders who form part of the school-based management and the

teachers. It is viewed as a management tool that influences the effectiveness of the instructional process. It is regarded as an indirect vehicle for curriculum delivery (Leithwood, 2016).

Instructional leadership is a tool possessed by principals, deputy principals and HODs that enhances or reveals the abilities of teachers, learners, school-based stakeholders and parents to guarantee successful curriculum delivery. For the holistic effectiveness or performance of the school, every stakeholder in the school should understand the trends in the development of the school curriculum. Thus, one must be able to play a role in supporting both teachers and learners in instructional processes Leithwood (2016) describes instructional leadership as a professional association or partnership involving school-based leaders and teachers. It is defined as a collective work involving principals, deputy principals and HODs and their role in supporting teachers in fulfilling their duties. Instructional leadership is concerned with how the members of the SMT may empower teachers more effectively (Leithwood, 2016).

The instructional leaders, known as the SMTs in the South African context, play a critical role in the school's effectiveness. The schools' effectiveness is measured by the performance of the learners in all subjects offered in schools. Thus, the teachers need support from the school management to produce results (Khan, Ahmad, Ali & Rehman, 2011). Instructional leadership can improve mathematics performance by assisting teachers to act and by ensuring that leadership is shared among teachers (Palmer, Hermond & Gardiner, 2014).

Instructional leaders are viewed as individuals who foster high expectations and standards for teachers and learners to be effective in the teaching and learning process. Yet, with so many expectations, these leaders invest little effort in empowering teachers with the knowledge and necessary developmental programmes (Hallinger & Moosung, 2013). On the other hand, Printy (2008) states that principals, deputy principals and HODs are key culture builders in terms of objectives and goals for the effectiveness of schools. According to Printy (2008), instructional leadership is a process of working towards a productive objective in the teaching and learning process. The objectives of instructional leadership involve providing support to teachers for them to be effective in curriculum delivery. In support of this, Leithwood

(2016) states that instructional leadership involves supervision of tasks assigned to teachers during the instructional processes.

According to Bayer (2016), instructional leadership is viewed as a responsibility where school-based leadership is contributing positively to learners' performance and the professional development of teachers. Principals, deputy principals and HODs should be goal-oriented to take the lead in ensuring success in teacher development. They are also expected to provide support in instructional processes to ensure success in all subjects and, as instructional leaders, they are managers who take control and align the school's academic mission and vision.

Instructional leadership is primarily a process, which depends on how school-based leaders co-operate with teachers to increase learners performane. Jita and Mokhele (2014) suggest that instructional guidance and effective leadership can be observed when school leaders empower teachers and when stakeholders in schools work collaboratively to enhance learners' achievement. Siman (2016) confirms that the leadership skills of school leaders have been considered as one of the main aspects in school effectiveness and teacher empowerment. In this way, instructional leadership skills of the SMTs have a major impact on the schools' effectiveness, learners' progress, and restructuring of schools (Siman, 2016)

Many researchers have noted the impact that instructional leadership can have on mathematics instructional process. Instructional leadership is the key role among the factors that contribute to classroom instruction. Scholars have concluded that instructional leadership works with distributed leadership so that best practices are shared, professional growth is encouraged among peers, assistance is offered, and content-specific issues receive attention (Leithwood, 2016).

However, conceptualisations of what instructional leadership is in mathematics teaching and learning support vary. Wenner and Campbell (2016) argue that instructional leaders are not assigned the same duties or responsibilities in schools. In the literature, instructional leaders are given titles such as headmaster, principal, deputy principal, middle manager, subject specialist, subject leader, etc. This division makes it difficult for other instructional leaders to understand their roles in teaching and learning. Thus the present study seeks to understand the role of the principals,

deputy principals and HODs in supporting teaching and learning, and mainly how these instructional leaders provide support for teachers who are teaching mathematics in grades 7, 8 and 9, which are the preparatory grades for high school.

2.4.2 Distributed leadership

Teachers and school leaders share responsibilities in terms of the leadership styles and the impact of the school leadership on improving learners' results. The leaders who engage the teachers positively by involving them in decision-making processes produce good results. The research showed that shared leadership is directly proportional to the performance, aims and objectives of the school as the institution of learning. The concept of school leadership is rooted in a distributed leadership theoretical framework which stresses that leadership need not be located only in the position of the principal, deputy principals and HODs but can include a range of people who work at different levels in a school, such as teachers. Successful school leaders recognise the value of creating communities of individuals who work as partners toward common goals (Printy, 2008).

Working together to improve learner achievement is the routine work of everyone in the school. This requires teachers, together with their SMTs, to employ instructional methodologies collaboratively and thus cater for diversity in the classrooms. Distributed leadership refers to distributing the responsibilities among teachers in order to enhance motivation, knowledge and affect. The leadership must not revolve around only one individual. This means that educators should contribute towards the school improvement plans and strategies. With regard to content knowledge, school leaders must also take a leading role. They should not only focus on how learners learn; they should understand how teachers use skills to transfer knowledge to learners. The leaders also need to have a clear understanding of how the resources are used to create a positive atmosphere for teaching and learning to take place (Leithwood, 2016).

Distributed leadership refers to the exercise of leadership which include both teachers and school-based leaders, regardless of managerial positions. Teachers may be involved in leadership activities by working towards school improvement and learner achievement. School-based leaders are expected to distribute leadership activities to

teachers, as part of professional development and to enhance growth. School leaders play an important role in improving school performance by influencing motivations and capacities of teachers, as well as the school context. In this regard, an effective shared school leadership is essential to improve the competence and equity of schooling (Leithwood, 2016).

Principals are no longer the only instructional leaders in schools. The school leadership comprises of the principal, the deputy principal and the HODs. These leaders are expected to share practices together to empower teachers. The restructuring of school leadership to enhance the professional growth to teachers has resulted in distributed leadership in schools. Distributed leadership is concerned with individuals who lead within and beyond the classroom context. Leadership needs to be distributed as it is not the sole preserve of the individual at the top; rather it can be exercised by everybody within the organisation (Printy,2008).

It is evident from the previous research that teacher leadership is a fundamental element in the drive to produce new teaching strategies into the teaching profession after so many years of centralised reform. Rather than the notion of traditional leadership, the study suggests that leadership should be shared, thus distributed leadership emphasises collective responsibilities and collaborative working (Leithwood, 2016).

How leadership can be shared or distributed within the members of the SMTs and subject teachers to provide for a more sustainable means of building the type of school climate that could create effective schools that produce good results, and the essential roles played by the school-based leaders at different levels of management in the teacher development processes thus deserve to be provided with more attention in both research and practice. Leadership roles of the instructional leaders is significantly and positively correlated to the effectiveness of individual teachers, which suggests a close relationship and possible alignment between principals, deputy principals and HODs at different ranks of management in ensuring the effectiveness of curriculum delivery (Leithwood, 2016).

2.5 DEFINITION OF SMTS

SMTs are defined as the school-based management consisting of principals, deputy principals, HODs and senior teachers (Printy, 2008). These leaders are responsible for the holistic functioning of the school, including the increase in both teachers' and learners' performance. They make decisions affecting both teachers and learners. Thus they have a huge influence on how mathematics instruction is delivered in schools. They make decisions regarding subject and time allocation for each learning area offered in schools. This means that the SMTs' individual perspectives can determine the progress of individual teachers or have a greater influence on how mathematics is taught in schools (Prendergast & O'Meara, 2016). The SMTs are innovators in transformational leadership responsible for distributing instructional leadership among educators (Printy, 2008). According to the Naicker and Waddy (2002), they should interact with all teachers or informal leaders to give them support and implement mentorship strategies as instructional leaders.

The SMT is concerned with school-based leadership roles and responsibilities to enhance teachers' and learners' achievement. This involves instructional leaders with a set of talents to empower teachers who continue to teach learners also. They have an influence that extends beyond their classrooms to others with the aim of energising and mobilising them to improve learners' achievement (Dhuey, 2010). However, Lee and Nie (2015) emphasise the fact that the SMTs need to be empowered in order to develop teachers and improve learners' performance

2.6 STUDIES ON THE ROLES AND RESPONSIBILITIES OF SMTs (PRINCIPALS, DEPUTY PRINCIPALS AND HODS)

According to the Employment of Educators Act, No. 76 of 1996 (EEA), principals, deputy principals and HODs have essential duties and responsibilities to perform as per their job descriptions, which include administrative work where they are responsible for the professional management of the schools; they are accountable for school finances by keeping proper records; undertake regular monitoring of their schools to safeguard school premises and equipment; and maintain discipline. They are also required to ensure that teaching and learning are effective through supporting teachers and learners with instructional processes and curriculum-related activities. In

this section, the role and responsibilities of the SMTs, their competency, and issues facing instructional leaders in supporting the teaching and learning of mathematics in the senior phase will be discussed.

2.6.1 Roles and responsibilities of principals as instructional leaders

Even though principals have numerous roles, and these are all very important, enabling quality teaching and learning that improve the developmental, academic, and psychosocial needs of learners remains their primary role. The principals are responsible for the overall functioning of the school and for ensuring that the education of the learners is supported in a proper manner and in accordance with approved policies. The principal influences the decision making of teachers and they commit to working together as a team for the benefit of the school and progressing on the common instructional goal. School principals manage their team so that teachers are able to reach a common goal or consensus regarding the learners' performance. According to Printy (2008), principals bring about the changes in quality of results. This implies that there is a link between the principal's instructional leadership, the teachers' collaboration, and the performance of the learners in mathematics. Printy (2008) says that principals create structures for better collaboration with teachers. The principals should take a leading role in motivating educators for the betterment of our education system.

In every institution of learning there should be a relationship between principals and educators for the benefit of learners with regard to their performance in all subjects including mathematics. This includes the way in which the parties are engaged in instructional programmes, including the instruction, curriculum, standards or assessment. The principal should encourage the teachers to put their interests in the school before their own. The leader provides the intellectual stimulation and considers educators as the leaders too. The principal is the key factor in motivating educators and, by so doing, the educators will motivate their colleagues. The teachers are influenced by good practices; thus it is important for the school principals to be engaged in the classroom context as well. The principal cares about what is happening in the classroom situation in terms of how the educators interact with learners and the content taught. The principals should be managers rather than leaders alone (Printy, 2008). The manager knows how to share the work or responsibilities with other

stakeholders and works directly within their surroundings. Although the interaction of teachers in high schools is mostly departmental, the principal should also be involved. The principals are more likely to support instructional directions when they have knowledge about the initiatives or have had the opportunity to learn about them. The principals and teachers should be accountable and work collaboratively for improving learners' achievement (Printy, 2008).

There is evidence from previous research that the school leaders are faced with a demand to raise the bar in regard to student achievement. Research on educational leadership shows that principals require support to promote teaching and learning. Earlier research looked at how school leadership has moved from an individual perspective to a collective or organisational perspective. The principals need to work collaboratively with the teachers in order to promote learners' achievement. They need to be critical thinkers and leaders in collaboration with teacher engagement and decision making. School leaders who engage the teachers positively by involving them in decision-making processes produce good results (Printy, 2008).

The research also included the ways in which school leaders respond to accountability pressure and to support for the particular accountability policies. The policymakers and practitioners have questioned whether learners have enough opportunities to learn content material that will enable them to produce better results and be responsible citizens after pursuing the learning process. Most institutions have constituted the learning standards for core subjects in all grades. The motive behind this was to ensure that all learners produce good outcomes, and this will be achieved by having access to a common curriculum. The teachers should work collaboratively to ensure that this common goal is achieved. These standards indicate that learners should be taught so that they can learn better. For this to be successful, more attention was given to college and career readiness in mathematics and language learning.

Supporters of the standards indicated that our current education policies create an education system that leads to inequality among learners as the learning opportunities for learners in schools are highly variable. This is a result of variations among schools and from grade to grade. In order to meet these standards from the curriculum implementers, the principal or the school leader needs to include the teachers collaboratively to ensure that the different learners' needs are met.

Studies have consistently shown that school leadership influences student achievement through the teachers or school culture. The school leaders support conditions that allow other school members to work together toward excellence. They ensure that teachers are productive by providing the kind of leadership that accommodates all. The shared kind of leadership contributes to the organisational capacity of the school and to the nature of professional community, both of which contribute differentially to instruction, and through instruction, to the achievement of the school. There is a link between the principals' management styles, the teachers' collaboration, and the performance of the learners. All the studies recognise that principals and teachers necessarily collaborate to accomplish productive learning environments, quality instruction, and high levels of student achievement. It was found that for a school as an institution to be productive, there should be positive influence between the principal and the teachers, the leadership responsibility should be distributed, and there should be a spirit of teamwork or collaboration between the school principal and the teachers (Printy, 2008).

The research shows that the principals who pursue their studies further, or who participate in writing projects, have better leadership skills. Those principals can help teachers to do their work properly and improve learners' results. Principals are more likely to support instructional directions when they have knowledge about the initiatives or have had the opportunity to learn about them. It is vital for the school leaders to be well informed in as far as the pedagogy of mathematics is concerned or to have knowledge of the curriculum and subject matter to be able to manage all the dynamics in the classroom context. Thus, the teachers can be supported and be developed with regard to the instructional processes (Hallinger & Murphy, 2013).

Sisman (2015) indicates that schools with principals who have knowledge of the curriculum or subject matter perform better than those of principals with leadership skills only. It was also found that schools with principals who have knowledge of mathematics and science produce better results when compared to other schools. The study showed that leadership is measured in two ways, that is, trust that teachers have in their principal, and teamwork between the teachers and their leaders. This kind of relationship between the school principal and the educators has a major impact on

creating positive teaching and learning environment that will promote learners' achievement (Sisman, 2015).

According to Hallinger and Murphy (2013), there are two domains that have a positive impact on building good relationships and teamwork among the teachers and the school principal. These domains are professionalism and collective responsibility in school leaders and educators. The teachers are influenced by good practices. Thus it is important for the school principals to be engaged in the classroom context as well. The more the leaders are involved in the instructional processes, the more the teachers are motivated, which can improve the performance of learners (Hallinger & Murphy, 2013). Sisman (2015) also states that the leadership skills of school principals are closely associated with effective schools' performance.

The purpose and goals of principals as instructional leaders are to support, improve and enhance teaching and learning. Their school-based leadership practices are strongly correlated to the professional development activities and approaches they provide for deputy principals, HODs and teachers (Mark, 2013).

2.6.2 Roles and responsibilities of deputy principals as instructional leaders

Deputy Principals are responsible for assisting the principal in managing the school and promoting the education of learners in a proper manner, and they are also responsible for the professional growth of HODs and teachers. Principals require support from their deputies so that they can be informed about the progress of mathematics teachers and to promote teaching and learning. They are responsible for the development of curriculum and HODs. It is the responsibility of every deputy principal to ensure that HODs in their schools are performing optimally to enhance the teaching and learning process in their departments. When the HODs are given the necessary support by deputy principals and are developed professionally, they will be able to assist teachers in teaching and learning of mathematics. With proper training, HODs can become important forces for improved academic performance in mathematics and become valuable assistants to mathematics teachers in their departments and instructional programmes will be effectively implemented as well. The engagement of deputy principals in classroom teaching can enhance performance in the subject as they will be better informed.

The role of deputy principals is quite crucial in the overall management of schools and in capacitating HODs, as they are responsible for the curriculum in schools. However, most principals seem to underestimate their role, especially when it comes to HODs' professional growth, and thus prefer to perform most of the developmental tasks themselves.

2.6.3 Roles and responsibilities of HODs as instructional leaders

Ghavifekr, Hoon, Ling and Ching (2014) define HODs as subject leaders, subject coordinators and, to some extent, pastoral heads who are required to exercise leadership. Their role is to provide assistance for strategies to be implemented in the classroom and the development of the subject matter. They provide monitoring and evaluation of the instruction and resources that can enhance teaching and learning for a particular subject. The HODs are responsible for reporting to the principal and deputy principals about the current issues and challenges happening in the school. Moreover, they are also responsible for routine jobs in their department, such as teaching, examining and conducting administrative work (Leithwood, 2016).

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The department heads in schools are considered ideal leaders of the curriculum because of their duties, responsibilities and roles in the school. Thus, they are seen as the bridge to connect the principals, deputies and teachers, able to raise staff morale, organise resources, and ensure the continuity of the school curriculum development. HODs are also teachers who have been appointed or promoted to teacher leader roles for a specific purpose, such as improving their colleagues' performance. Those teachers are known as master teachers, and they modify the performance of teachers for the benefit of learners. They enhance collaboration between teachers and also provide mentoring and coaching.

The appointment of HODs is mainly based on academic considerations of the candidates. Although HODs are responsible for the performance of the entire department, their main task is to develop teachers professionally (Leithwood, 2016). They are responsible for monitoring and control of the content. They also share leadership roles with teachers in different departments in schools. They involve

teachers in improving school results and decision making. HODs have the responsibility of providing guidance and leadership in particular subjects. Unlike the other members of the SMTs, such as the principals and the deputy principals, they have a direct influence on quality teaching and learning within specific departments (Leithwood, 2016).

In South Africa, the work of HODs is determined in terms of section 4 of the EEA (1998). According to this Act, their job is dependent on the approaches and needs of a particular school. Their workload also includes general administrative activities, teaching, personnel, extra- and co-curricular activities, and communication. The core duties of HODs, according to the Personnel Administrative Measures (PAM), include facilitating the learning process and support teaching and learning. They are responsible for closing the gaps or challenges faced by subject teachers.

HODs are in charge of a subject or a phase, and they are required to engage in class teaching, according to the workload for the particular subject. HODs for mathematics, as subject or class teachers, are expected to be familiar with the content or the Mathematical Knowledge for Teaching (MKT) so that they are able to provide necessary support to teachers. Shulman (1987) specified seven categories of professional knowledge required for teaching. These categories are content knowledge; general pedagogical knowledge; curricular knowledge; knowledge of learners (their characteristics, cognition, motivation and development); knowledge of educational contexts; knowledge of educational aims, goals and purposes; and pedagogical content knowledge (PCK).

2.6.3.1 Content knowledge for HODs

Content knowledge is the subject matter knowledge (Ball, Thames & Phelps, 2008). Many prospective and practising teachers have, or express, a lack of confidence in their mathematical content knowledge. One of the requirements for HODs is to have knowledge of the content. The HOD for mathematics teaching and learning should have the necessary skills to give support to teachers. HODs are immediate instructional leaders and have direct influence on the levels of success that teachers can provide to learners.

2.6.3.2 General pedagogical knowledge

It is of vital importance for the school leaders to be well informed in as far as the pedagogy is concerned or to have knowledge of the curriculum in order to be able to manage the dynamics in the classroom context (Ball et al., 2008).

2.6.3.3 Curricular knowledge

Special content knowledge is required for mathematics teaching and learning. This is referred as content knowledge. The HODs are responsible for empowering teachers with mathematical skills and knowledge particular to teaching. They are also expected to be the most knowledgeable in curriculum delivery. They can be used as consultants and resource persons for teachers in different departments. The roles of HOD and expectations are clearly stipulated as management of the curriculum, management of staff and learners and any other resource available in a school (Ball et al., 2008).

2.6.3.4 Knowledge of learners

HODs, as middle-level administrators, should have a clear picture of how learners learn so they can provide assistance where there is a need. HODs provide a communication link between the learners and the teachers in their departments (Ball et al., 2008).

2.6.3.5 Knowledge of educational aims

HODs play a crucial role in managing the teaching and learning process and in ensuring the quality of teaching in schools. However, there is a gap between the roles perceived as belonging to the HODs and their actual roles. According to the PAM policy document, 2016, it is the responsibility of the HODs to assist teachers in ensuring that learners acquire and apply knowledge and skills in a meaningful way to improve results in all learning areas. They are responsible for preparing learners for learning, irrespective of their socioeconomic background, race, gender, skills and values. They should play their roles effectively to ensure that learners progress from grade to grade, as required by the department of education (Ball et al., 2008).

2.6.3.6 Pedagogical content knowledge

According to Ball, Hill and Bass (2005), many teachers exhibit weaknesses and lack a deep conceptual understanding of mathematics. They also lack confidence and

content knowledge when teaching mathematics. Thus, professional growth and development are needed. Ball et al. (2005) argue that teachers need to be developed separately according to their specific needs for content delivery and that the act of teaching provides opportunity for their personal integration. HODs, as direct supervisors for mathematics teachers, are required to provide support for teaching and learning.

According to Ball, Hill and Bass (2005), the HODs for mathematics should possess all the domains of professional knowledge. They should have **Common Content Knowledge (CCK).** CCK deals with the ability to master the common mathematical concepts, such as calculating and providing correct answers to mathematics questions and problems. Thus HODs, as immediate supervises for teachers, are responsible for this type of knowledge. They need to understand mathematical problems so that they are able to identify wrong answers in any instructional processes and setting of papers. This knowledge allows the HODs to understand the language of mathematics and select proper teaching aids to enhance teaching and learning of mathematics.

HODs should have **Specialised Content Knowledge (SCK)**. SCK is the mathematical skills and knowledge particular to teaching. The HOD, as subject specialist, should be able to present mathematical ideas correctly. They should be able to assist both teachers and learners (Ball et al., 2005).

- **Knowledge at the mathematical horizon**

The HODs are responsible for taking the lead in making connections across the topics in the mathematics curriculum and putting them into practice and improving teaching strategies in the classrooms. They are charged with the responsibility of organising activities that support teaching and learning and administering teaching and learning. Their role is to assist teachers in making connections between the different strands in mathematics and how it fits into the mathematics which is taught later (Ball et al., 2005).

- **Knowledge of Content and Students (KCS)**

The HOD provides curriculum leadership in a particular discipline. It is their duty to ensure that learners are disciplined and motivated to learn (Ball et al., 2005). .

- **Knowledge of Content and Teaching (KCT)**

The school leadership is responsible for content delivery and empowering others. HODs, as instructional leaders and immediate supervisors of teachers, play a vital role in ensuring quality teaching and learning in schools and should assist mathematics teachers with strategies and skills that can enhance the understanding of mathematical concepts for learners. They are responsible for selecting appropriate representations to illustrate the content (Ball et al., 2005).

- **Knowledge of Content and Curriculum (KCC)**

The processes of leading and managing a subject, learning area, or phase require knowledge of the content, curriculum management, curriculum planning, classroom practice, and curriculum development. Therefore, HODs need to articulate the strands in the curriculum delivery. They understand the mathematics curriculum well so that they can conduct teacher development. They need to be familiar with the structure of the mathematics curriculum in particular (Ball et al., 2005).

2.7 SMTS AND PROFESSIONAL TEACHER DEVELOPMENT

In instructional leadership and policy research, teachers' professional development, particularly teachers' ability to grow as content specialists and change instructional practices, has been identified as an important factor in learners' performance in all subjects. The SMTs, as instructional leaders, are responsible for such development. The SMTs' professional development leadership is an important factor in school improvement processes. Principals, deputy principals and HODs are expected to provide formal training for teachers, and the training provided should be clearly focused on classroom practices. Professional development needs to focus on departmental policy expectations (Leithwood, 2016).

Researchers and policymakers have paid more attention to how mathematics teachers are supported by school-based leaders in improving teaching and learning in mathematics over the past few decades. Their focus is on professional development for teachers (Printy, 2008). For instructional leaders to inform the process of developing the curriculum-related professional development activities or programmes by the provider community, it is important that data be collected on the developmental needs of subject teachers and learners (Printy, 2008).

The former US President George H. Bush and governors of the country established the Education Goals 2000 to respond to the findings in the report 'A Nation at Risk'. Among the measures taken to create a foundation for educational reform is that all educators should have access to programmes for professional development to gain the skills needed to prepare all learners for the next century. Thus, the SMTs are responsible for teachers' participation in professional development and what impact that participation has in instructional processes (Printy, 2008). They should employ strategies for the ongoing learning of teachers and staff development in their daily instructional processes. The SMTs should continually improve their practices and create teams that develop a common sense of organisational goals and shared ideas about how things work in different institutions for learners' performance, effective teacher professional development and progression (Leithwood, 2016).

The principals, deputy principals, and HODs lead efforts to empower all teachers in delivering content in all subjects. They are responsible for arranging adequate time, money, and other resources to ensure ongoing professional development. The instructional leaders are also responsible for modelling their own professional growth in order to provide adequate guidance to educators Wieczorek (2017).

When teachers are given professional support, they are able to grow. Teachers can act as coordinators in developmental programmes. This includes teachers who act as mentors or coordinators of continuous professional development. They are more concerned with special educational needs, such as providing induction and mentoring of teachers who are new to the school or continuing professional development activities. Thus, instructional leaders are responsible for development of all stakeholders in schools. They should allow for provision of skills needed to prepare teachers to fulfil their duties as mentor coordinators (Leithwood, 2016).

The roles and responsibilities of the SMTs are increasingly focused on strengthening instructional leadership, thereby spotlighting the importance of continued professional development for teachers. The SMTs ensure the development of the school staff by providing the leadership skills necessary for effective teaching and learning. According to Wieczorek (2017), SMTs need to purposefully focus more attention on professional development programmes for teachers in the context of continued accountability

pressure. However, Wieczorek (2017) notes that there has been a decline in teacher training and development since the implementation of the NCLB policy.

The members of the SMT are expected to ensure that all teachers are given the necessary support. This can be achieved by ensuring that teachers are provided with content skills. These include skills in team building, management, and problem-solving techniques (Bulawa, 2012).

2.7.1 Principals' roles in professional development for mathematics teachers

Principals, as the main instructional leaders, are charged with the responsibility for conducting all affairs and decision-making in all subject-related matters in a school. This means they are responsible and accountable for a variety of tasks and activities that ensure all subjects function effectively. To achieve positive outcomes in mathematics instruction and other school subjects, principals need to prioritise the professional development of teachers. Professional development programmes for teachers remain the most important aspect of the principal's task since the success of the school depends on the effectiveness of the instruction that teachers deliver and learners receive (Printy, 2008).

2.7.2 Deputy Principals' roles in professional development for mathematics teachers

The deputy principals, as senior managers, are responsible for the effective implementation of the programmes that develop teachers in terms of content and instructional processes. Deputies are responsible for the day-to-day management of the curriculum implementation, professional growth of teachers, and operational activities of the school. They are responsible for helping principals with their knowledge, skills and experience in school management and administration of certain subjects to implement curriculum change successfully and professional development of mathematics teachers. Although deputy principals rely on HODs as far as teaching and learning events are concerned, it is their duty to ensure teachers have the necessary content knowledge to deliver mathematics instruction. Thus, deputy principals are suitably placed to identify gaps in mathematics curriculum delivery in the classroom and report to the principal Wieczorek (2017).

2.7.3 HODs' roles in professional development for mathematics teachers

The HODs, as integral members of SMTs, have the managerial capacity to organise or arrange professional development problems for teachers in their departments. HODs are the experts in the subject content and it is their responsibility to identify when there is a need for teachers to be developed. They are usually appointed based on their qualifications, experience and expertise in the subject(s) they are envisaged to manage. HODs are thus regarded as school-based specialists (Ball al., 2008)

2.8 EMPHASIS ON MATHEMATICS

Mathematics is one of the subjects offered in schools. It is defined as a language that of symbols and notations for describing numerical, geometric and graphical relationships. Mathematics involves human activity, observations and investigations of patterns to develop mental processes. It enhances critical thinking and problem solving, which are needed for decision making and understanding the world (Ball et al., 2008).

According to Ball et al. (2008), mathematics is a subject that develops human's systematic and logical thought. It helps to analyse situations, hypothesise, plan, and solve problems appropriately. It is regarded as a tool related to the study of science and technology. Mathematics is the subject that prepares learners for the real world.

Although mathematics is considered a key subject in developing critical thinking and enhancing problem-solving, performance in the subject is still poor. One of the reasons for the poor performance in the subject is the lack of content knowledge among educators (Ball et al., 2008); thus, teachers must be empowered professionally.

2.9 SMTS' PERCEPTIONS OF MATHEMATICS TEACHERS

How the SMT may perceive mathematics teachers may differ. Differences in status or position may affect the degree of social intimacy and social contact that develops between mathematics teachers and their respective members of the SMT at different levels of management (Lee & Nie, 2015). The HODs, as immediate supervisors of teachers, may have different perceptions compared to how deputy principals and principals view teachers. According to Lee and Nie (2015), HODs are closest to mathematics teachers on the classroom frontline, and they tend to work more closely with the teachers on a daily basis in solving problems arising in classroom instruction

and learner discipline. As a result, in the context of teacher development, the HODs may often have more opportunities to exercise their empowering behaviours towards the group of teachers they supervise, and mentor compared to the principal and deputy principals.

There is a need to examine instructional leaders' perceptions towards mathematics teachers in relation to the role they play to provide support to teachers and developmental programmes that are employed in schools to empower mathematics teachers. The current study aims at determining if there might exist differences between school-based leaders' perceptions of the roles fulfilled by teachers. A better understanding of how leaders may perceive the instructional process followed by mathematics teachers and their different classroom practices can provide more insight into how to align practices across levels of management for better strategies to empower teachers (Orphanos & Orr, 2014).

The instructional leaders' perceptions about teachers play a key role in performance of the schools. Therefore, leaders should focus much attention on the teachers' negative emotions, because their support can enhance teachers' positive mood Wieczorek (2017).

2.10 COMPETENCE AND SKILLS REQUIRED FOR THE SMT TO SUPPORT TEACHERS

2.10.1 Competence and skills required by principals

According to Sisman (2016), instructional leadership skills and the levels of competence for school principals can be classified according to categories. These classifications are related to how the school vision, mission and goals are identified and defined. The principals, as instructional leaders, are responsible for building consensus about school goals by providing the necessary resources for teaching, learning, coordination, management, control and evaluation of teaching and the curriculum, monitoring evaluating, and developing the staff. Thus, creating close relationships and cooperation among the staff can enhance an effective teaching and learning climate, enabling support from society and the environment. Principals are role models for every individual who is in the school context. Sisman (2016)

categorised the competencies of principals as instructional leaders according to five dimensions:

1. Identifying and sharing school goals.
2. Management of instructional programmes and teaching process.
3. Evaluation of teaching process and learners.
4. Supporting and developing teachers.
5. Creating a safe learning and work environment.

- **Identifying and sharing school goals**

It is the duty of all school principals to identify and share the school's objectives. All stakeholders must know these goals. In this instance, the schools' vision and mission must be communicated to other members of the SMT (deputy principals and HODs), teachers, learners, and the school support staff (Sisman, 2016).

- **Management of instructional programmes and teaching process**

Principals, as the accounting officers, are responsible for the management of instructional programmes. They should ensure that departmental programmes and policies are employed correctly in a school context. It is crucial for principals to ensure that teaching processes are managed correctly (Sisman, 2016).

- **Evaluation of teaching processes and learners**

This dimension involves teaching, inspection, evaluation of programmes, and monitoring and evaluating learners' performance. It is a reflection done by principals after providing support for teachers. Principals, as instructional leaders, are supposed to discover the cause or causes of a learning barrier and determine what learning has not taken place to support teachers in putting intervention strategies in place. The school principal should discuss and provide feedback about the teaching process and results of student evaluation with other members of the school. In addition, she or he needs to make use of the results in determining the success level of the school and programme goals (Sisman, 2016).

- **Supporting and developing teachers**

One of the main responsibilities of the school principal is to help everyone in the school develop their professional qualifications and to enable teachers to make use of their

new knowledge and qualifications in the school. Otherwise, all the effort made in developing teachers' performance would be futile. In this respect, the school principal has an essential role in rewarding and acknowledging teachers for their various accomplishments (Sisman, 2016).

- **Creating a safe learning climate and work environment**

School principals need to create and maintain a positive teaching and learning environment and climate, which helps students and teachers to work enthusiastically. Therefore, school principals should know and motivate various stakeholders in the school. They should lead and enable to create and share innovative ideas related to teaching and learning (Sisman, 2016).

2.10.2 Competence and skills required by deputy principals

Deputy Principals, as principals, need to create an atmosphere conducive to teaching and learning. They need to spend more time on content-related matters. It is critical for deputy principals to understand the impact their support has on mathematics teachers. The research shows that deputy principals assist principals in performing the instructional leadership behaviour of determining and sharing the objectives of the school at the highest level (Sisman, 2016). Depending on the leadership skills of deputy principals as curriculum managers, student learning and achievement may increase, and schools become more effective.

Deputy Principals, as part of the top management of schools, have the responsibility to concentrate on learner performance. For the holistic achievement of learners, they need to empower HODs and teachers with curriculum knowledge and instruction. Deputy Principals' instructional leadership skills can have an influence on how teachers and HODs are developed professionally to improve learners' results as well. Instructional leadership skills possessed by Deputy Principals can enhance learners' performance in all subjects and assist teachers and their HODs improve classroom practices. Deputy Principals review the policies and processes at the school to increase the quality of teaching and learning, provide support, and evaluate instruction (Sisman, 2016).

2.10.3 Competence and skills required by HODs

One of the core duties of HODs is to ensure that learners' performance is improved in all subjects. They are responsible for the performance of both teachers and learners. To succeed in managing the performance, one needs to master the subject content and knowledge to be able to provide professional development to others. According to Adey (2000), as middle managers, HODs are generally failing to fulfil their role in relation to monitoring, evaluation and the identification of development needs of individual teachers in their department.

2.11 CHALLENGES FACED BY SMTS IN SUPPORTING TEACHING AND LEARNING OF MATHEMATICS

One of the major challenges facing the SMTs has been the need to improve the performance of mathematics teachers. Intensive programmes of teacher development to address the challenges faced by teachers in the classrooms are needed. According to research, school leaders are failing to give necessary support to teachers. They are not planning or organising professional development programmes for teachers (Adey, 2000). This is because of problems, issues and demands faced by the SMTs which make their instructional leadership roles complex and highly demanding. The high expectations upon teachers have created a gap between their administrative responsibilities and their roles as instructional leaders.

2.11.1 Challenges confronting principals

Principals are expected to provide professional development to teachers, as stipulated by the policy document and the PAM, which emphasises that instructional leaders should have strategies to support teachers. However, recent studies suggest that progress in the implementation of the strategies to develop teachers has been slow, uneven, and lacking deep penetration into instructional processes to meet the needs of individual teachers (Hallinger & Moosung, 2013). Principals' practices that shape teacher professional development experiences in schools are less effective because of the high administrative responsibilities and expectations of teachers that limit their roles as instructional leaders.

The demands from different individuals in the school have a negative impact on the performance of principals as instructional leaders. Principals, as instructional leaders,

are expected to assist every stakeholder in the school, and those high expectations result in challenges for many principals (Bayar, 2016). The research indicates that effective instructional leadership affects the learners' results positively. Thus principals need to overcome their challenges for the better performance of learners. Bayar (2016) confirms that when principals invest in providing support and development for teachers, the learners' achievement increases.

Teachers perceive their principals and other members of the SMT as exercising empowering behaviour in their daily practices. They do not view principals as instructional leaders who are capable of empowering them with skills that can enhance learners' performance and improve classroom practices (Lee & Nie, 2015). Principals are seen as individuals who are responsible for the delegation of authority rather than providing support.

As principals are responsible for the entire functioning of the school, they sometimes fail to pursue subject-related duties because of their workload. According to Sisman (2016), these duties are mainly providing schools with funding, dealing with infrastructure problems, scheduling meetings with visitors, attending various meetings, taking phone calls, and engaging in correspondences. Nevertheless, since the main function of a school is to provide teaching and learning, school principals need to focus on this objective. Research indicates that school principals spend the majority of their time on the same routines that are not directly related to education. Principals are expected to be not only the director of school as a business but also the instructional leader (Dhuey, 2010).

Bayer (2016) points out that most school principals lack content knowledge to assist mathematics teachers with subject-related matters. In this instance, they depend on second parties, such as HODs, for knowledge of the subject. This indicates a need for principals to be developed in terms of content knowledge so that they are able to assist teachers with content-related matters.

2.11.2 Challenges faced by deputy principals

According to Printy (2008), deputy principals are largely dependent on principal mentoring and initiatives. Findings from Dhuey's (2010) research adds more validity

to the concept that principals, as instructional leaders, have more control in school leadership than their deputies.

2.11.3 Challenges faced by HODs

HODs are facing challenges that make it hard to provide necessary support and development to teachers. The great demands made on them and large workload create difficulties for them in effectively playing their roles as administrators as well as providing instructional leadership. The ever-changing government policies also put pressure on them. Despite the challenges they face, they are responsible for producing results for all subjects they are heading and for developing teachers (Ghavifekr et al., 2014).

The HOD, as the specialist in mathematics teaching and learning, is responsible for the improvement of results in all grades. Their challenge in trying to meet those objectives is to identify individual teachers' problems to be given support in identifying teaching methods and strategies that will ensure that learners perform better. According to Ghavifekr et al. (2014), the HODs should influence functions and/or roles of the teachers to improve learners' performance in mathematics. It is thus important for HODs to understand how mathematics instruction is facilitated in each classroom and to be aware of the influences on teachers in the teaching and learning of mathematics.

2.12 CHAPTER SUMMARY

In this chapter, the relevant literature regarding the influence of the SMT in teaching and learning of mathematics was explored. The chapter reflects on the concept of leadership and its relevance to the study. It explored literature on the SMT's roles, responsibilities, competence and perceptions about supporting mathematics teachers in instructional processes to enhance performance in the subject and the roles of the SMTs in the professional development of mathematics teachers. Finally, it alluded to the challenges faced by SMTs in supporting mathematics instructional processes.

CHAPTER THREE

RESEARCH METHODOLOGY AND PROCEDURES

3.1 INTRODUCTION

This chapter presents a detailed description and justification of the research methodology employed in the present study. Research methodology, according to Creswell (2009), refers to the overall collection of methods and procedures or rules within a well-defined epistemology that guide the research. Creswell (2009) explains that research methodology is a plan for selecting subjects, research sites, and data collection procedures to answer the research question. It is defined as a theoretical framework, principles, and concepts undergirding the approaches and methods of a study.

This chapter describes the research design, research sample, data collection instruments, sampling, procedure for data collection, and data analysis methods with specific reference to the relevance of the quantitative research which made use of a questionnaire as the data collection instrument. The purpose of this research was to seek insight into how school leaders contribute to assisting mathematics teachers in improving instructional processes and learners' performance. In chapter two of the study, a literature review on the role of the SMT in supporting mathematics teaching and learning in the senior phase (grade 7 to 9) was conducted.

In this chapter, the methods employed to collect data from various members of the SMTs who participated in the study are discussed. The researcher used a quantitative approach and a survey as the main data collection instrument for the study. A quantitative approach made it possible for the researcher to make clear distinctions in the process of gathering and analysing data. This approach was adopted because it enables the researcher to collect a precise number of participants (Cohen, Manion & Morrion, 2007). Post-positivism was chosen as the research paradigm for this study. An account of how the study was conducted and designed is also presented.

This chapter provides a detailed description of the research methodology applied to answer the research questions outlined in chapter one. The primary research question is:

> To what extent do the SMTs give informal and/or formal curriculum advice, and how do they develop teachers professionally to ensure continuous support for mathematics instruction in the senior phase?

To explore the primary question in-depth, the following sub-questions need to be addressed:

- What are the SMTs leaders' (principals, deputy principals, and HODs) perceptions, knowledge, and beliefs about support for mathematics curriculum and instruction in the senior phase?
- Will there be any significant difference in the perceptions of SMT leaders' (principals, deputy principals and HODs) about support for the mathematics curriculum and instruction in the senior phase?
- How do the SMTs (principals, deputy principals, and HODs) support mathematics curriculum and instruction practically in the senior phase, if at all?
- How can the influence, or lack thereof, of SMTs on mathematics curriculum and instruction be explained?

3.2 RESEARCH PARADIGM

3.2.1 Post-positivism

The research paradigm chosen for this study is post-positivism, which is an offspring of positivism and is adapted from it. According to Rosa (2011), the post-positivism paradigm embraces multiple realities based on all human experiences and concerns multiple perceptions about reality. Thus, the paradigm assisted the researcher to identify school leaders' perceptions, knowledge and beliefs about mathematics curriculum and instruction in the senior phase.

For this study, the researcher decided to incorporate both inductive and deductive approaches, but with more focus on deductive enquiry, as quantitative data collection

is a critical part of the study. This method involved the distribution of a questionnaire as a form of data collection (Mouton, 2015). The chosen research paradigm allowed the researcher to rethink the theory based on the empirical observations and practical aspects with the aid of a questionnaire to gather information in the context of the present study (Creswell, 2009). Post-positivists accept that there is a specific reality, but only a certain level of objectivity exists, rather than absolute objectivity. This paradigm emphasises the probability of a certain reality. The researcher found it practical for the study as it will assist in revealing the reality or the likelihood of SMTs providing support for mathematics teaching and learning.

It is not possible for researchers to draw conclusions based on what they know alone. Post-positivism thus assists in determining the nature of reality based on empirical observations and allows for reasoning based on interpretations of acquired information.

Post-positivism has the feature of pragmatism as it brings together theory and practice, allowing the researcher to incorporate different suitable techniques for collecting and analysing the data collected (Henderson, 2011). This paradigm provides another approach that can move positivism from its narrow perspective to a broader picture and thus examine real-world problems as it uses a deterministic philosophy in which probability affects the outcomes. Post-positivism challenges the traditional notion of absolute truth of knowledge and it recognises that we cannot be positive in our claims of knowledge when investigating human behaviour. The researcher observed an increased need for post-positivism as a means to better represent the role of SMTs in solving mathematics instructional problems because the study was meant to investigate the nature of reality that exists between the instructional leaders and mathematics educators.

From a post-positivist worldview, knowledge is created based on sensory experiences and can be advanced by means of observations and experiments (Creswell, 2009). This approach is associated with the underlying assumption that there is truth to be revealed and it involves numerical data that can be analysed using statistics (Mukherji & Albon, 2010). According to Henderson (2011), in post-positivism, knowledge is not neutral; it is socially constructed. Therefore, the researcher investigated how the SMTs

collaborate and share instructional leadership roles with teachers to ensure improvement in mathematics results. The researcher was interested in finding out how school leaders interact with teachers and their views about mathematics instruction support given to teachers. For this study, the researcher posed questions to principals, deputy principals and HODs to collect data on the role of the senior phase school leaders in supporting mathematics instruction. The objective of the researcher was to investigate the role of SMTs and how they incorporate their teaching experience in assisting other teachers to ensure positive results in mathematics. This paradigm assisted the researcher in determining the effects of school structures and practices in improving mathematics teaching and learning.

3.3 RESEARCH APPROACH

The research approach is the plan and the steps or procedures followed for a particular study (Creswell, 2009). Those plans and procedures involve several decisions specifically for the proposed research. The research approach chosen by the researcher was a quantitative method.

3.3.1 Quantitative methods

The quantitative data collection method used in this study was in the form of a survey questionnaire developed by the researcher for the study. The quantitative method of data collection involves exploring how variables relate to one another (Creswell, 2009). This method assisted the researcher in investigating how school leaders interact with subject teachers to increase the level of performance in mathematics. It also involved the procedure whereby the data was collected, analysed, interpreted, and the findings of the study were written up. By using this method, the researcher gathered responses from a large group of participants and was able to analyse the roles of different members of the SMTs in supporting mathematics teaching and learning.

The quantitative method of data collection assisted the researcher in meeting the objectives and determining relationships among the school leaders and mathematics teachers, and it was aligned with the post-positivism paradigm. Quantitative data is measured typically using a questionnaire so that numerical data can be collected and analysed using statistical procedures. This method also allows for deductive reasoning and generating the findings for the current study.

3.4 RESEARCH DESIGN

Maree (2007) defines research design as a detailed plan for how a research study is to be conducted. This research is quantitative in design. The researcher identified compelling reasons for undertaking a quantitative study, as described by Creswell (2009), and determined it as the most appropriate research methodology for the purpose of this study. According to Creswell (2009), a quantitative research design includes the systematic scheduling of the time at which observations and interviews are made to make conclusions about a concept. Also, Bless and Higson-Smith (2006) consider the research design as a set of procedures that guides the researcher in the process of verifying a particular hypothesis and excluding all other possible hypotheses and predictions. It is a general plan of the investigation which the researcher uses to obtain evidence to meet the objectives of the research or a set of procedures a researcher follows allowing the researcher to draw conclusions about the relationship between variables (Baxter & Jack, 2008). The research design chosen for this study is a survey.

3.4.1 Survey

A survey relates to identifying a sample, the sampling procedure, and target population. It provides a quantitative description of numeric trends, attitudes, perceptions, and beliefs of a population by studying a sample of the population. For the present study, a survey was conducted using a five-point Likert scale (*1 = strongly agree*; 2 = *agree*; 3 = *uncertain*; 4 = *disagree*; 5 = *strongly disagree*). There were close-ended questions including biographical background questions which were developed and modified from sources in the literature. The open-ended questions gave respondents an opportunity to add detailed views regarding the influence or lack thereof by the SMTs on mathematics curriculum and instruction.

The researcher used the survey as part of the research design to gather information in the form of numeric descriptions of trends, attitudes and opinions of the SMTs and their role in enhancing performance in mathematics (Creswell, 2009). The closed-ended questions were meant to measure the perceptions, beliefs, attitudes and practical support of school leaders in mathematics instruction. The survey enabled the researcher to collect data and evidence from the school leaders about competencies

and involvement in the professional development of teachers through structured questionnaires. The sampling was purposive, as it was mainly focused on the SMTs who bear some responsibility for the senior phase mathematics instruction. Purposeful samples are sometimes called “judgmental sampling” because the researcher selects particular elements from the population that will be representative or informative about the topic of interest (Creswell, 2009).

3.5 SAMPLING PROCEDURE

3.5.1 Selection of respondents

Sampling refers to a process used to select a portion of the given population for the study (Creswell, 2009). A purposive sampling technique was used to select the relevant sample to provide the best information to meet the purpose of this study. The researcher decided to conduct the study in the Thabo-Mofutsanyane District because it is the district where she lives and she thus has access to all the schools in the district. The researcher thus spent less time and money by hand delivering the questionnaire to the schools (Creswell, 2009). The researcher identified about 265 participants from 89 intermediate and general secondary schools within this district. The sampling of schools and participants was linked to the aims of the project. The criteria required the participation of one principal, one deputy principal, and one HOD from each school. In the schools where there were no HODs, the senior teachers were considered. To adhere to the policy of gender equity and equality, the researcher has taken gender issues into consideration.

3.5.2 Context of the study

The population of this study consisted of school leaders, such as principals, deputies and HODs from 89 schools in Thabo-Mofutsanyana District in the Free State Province, which is one of the rural districts in the province. The district consists of about 104 schools with grades 7, 8 and 9. These schools are intermediate schools and general secondary schools, which recently added grade 8 and 9 to the Further Education and Training (FET) phase. For the current study, 89 principals, 87 deputies, and 89 HODs, including senior teachers, were sampled from those schools.

3.5.2.1 Principals

The principals of the schools contribute to teacher development and learners performance in important ways. They establish the school vision that can serve as a guide for teachers' collaborated work, and they provide support for teachers' efforts (Printy, 2008). Principals serving as instructional leaders have a strong influence over the configuration of their schools, they play a major role in teacher development, and therefore, their perceptions are equally important. In this study, the researcher wanted to find out the extent to which the principals give informal or formal curriculum advice and how they develop teachers professionally to ensure continuous support for mathematics instruction in the senior phase. Thus, 89 questionnaires, including from the pilot study, were distributed and completed by principals of senior phase schools.

3.5.2.2 Deputy Principals

The effectiveness and efficiency of a school also depend on deputy principals as instructional leaders (Bush, 2009). The researcher wanted to find out the extent to which deputies enhance the teaching and learning of mathematics and the role they play in professional teacher development with reference to their specific position. Eighty-seven (87) questionnaires were completed and returned by deputy principals from the sampled schools.

3.5.2.3 HODs

The HODs play a pivotal role in the school by affecting the quality of individual teacher instruction (du Plessis, 2013). The researcher observed how the HODs, as immediate supervisors of teachers, interact and engage with subject teachers. The researcher was interested in finding out the role of the HODs as the immediate supervisors of mathematics teachers, and 89 HODs including senior teachers concerned with mathematics were surveyed. The researcher also wanted to find out how mathematics teachers are supported and developed professionally in terms of curriculum delivery.

3.5.3 Population and sample size

A population is a group of people who have the same characteristics. For this study, the selected sample consists of 89 principals, 87 deputies, and 89 HODs *(N=265)*. The Free State Province has five districts, and only Thabo-Mofutsanyane was selected for sampling. This district is divided into six local municipalities, namely, Maluti-a-

phofung, Dihlabeng, Setsoto, Nketoana, Mantsopa, and Phumelela. The researcher believed that findings in Thabo Mofutsanyana District could be applicable to other districts with similar characteristics and, therefore, they may be generally applicable in terms of the nature of the problems identified for the study.

The schools were selected through the convenience or purposive sampling method based on the researcher's knowledge of the district. Thus the sample was chosen for a specific purpose. The principals, deputies and HODs (including senior teachers) were selected because they are the members of the SMTs and they are all directly in involved with mathematics teachers as instructional leaders.

3.5.4 Criteria for selecting the population

Purposeful and non-random sampling was selected for this study whereby schools that belong to the Thabo Mofutsanyana District and cover the senior phase level were selected. Purposeful sampling was used because the research intended to involve participants who would provide the most useful information to answer the research questions raised for this study.

Thabo Mofutsanyana has about 104 schools in the senior phase. The researcher selected 89 schools. These schools are public schools, farms schools, and independent schools, also known as formerly white schools. The schools were considered because of the complete structure of the SMTs. Most of the schools had at least a principal, deputy and HOD for mathematics. Only two schools had incomplete members of the SMTs. In those schools, deputy principals were not appointed. This resulted in a sample of 87 deputies from 89 schools visited. Performing and non-performing schools in terms of mathematics were considered.

Purposive sampling assisted the researcher in selecting schools that provided relevant information to answer the research questions since the primary focus of the study was to determine the role of SMTs in supporting mathematics teaching and learning in the senior phase. Purposive sampling allowed the researcher to come to a deeper understanding of the results of the study by focusing on instructional leadership support in mathematics teaching in depth.

3.5.5 Number of schools with senior phase in the Thabo-Mofutsanyana District (n=104)

Out of 104 senior phase schools, 89 schools were visited. These schools included the secondary schools that recently added grade 8 and 9 and primary schools that included grade 7 within the district. The schools that were selected were sampled purposively because of the availability of grades 7, 8 and 9, which are the preparatory grades for the FET phase in the South African context.

Table 3.1: Number of sampled schools for each town with the senior phase in the Thabo-Mofutsanyana District

Town	Number of schools
Phuthaditjhaba	49
Bethlehem	09
Harrismith	12
Reitz	06
Warden	04
Ficksburg	05
Fourisburg	03
Senekal	02
Rosendal	01
Clocolan	01
Marquard	03
Vrede	03
Paul-Raux	01
Lindley	02

Clarens	01
Petrus-Steyn	01
Afrikaskop	01
Total	**89**

3.6 DATA COLLECTION

In terms of data collection protocol, Cohen et al. (2007) indicate that before data are collected, the researcher must follow appropriate procedures to gain official permission to undertake any research in the target community. Permission was requested from the Free State Department of Education to collect data from principals, deputy principals and HODs in the schools with grade 7, 8 and 9 in the Thabo-Mofutsanyane District. In order to maintain confidentiality, the names of the respondents were not mentioned. Only the names of the schools were needed for research purposes. The researcher personally distributed and collected the questionnaires from respondents. This gave the researcher an opportunity to explain the purpose of the study in person.

3.6.1 The questionnaire

A questionnaire is a set of written questions or statements to which the research participants respond in order to obtain data which is relevant to the research topic (Mukherji & Albon). This approach is chosen because of its manageability, especially its efficiency in the use of time. A structured questionnaire was used to gather data from SMT members in the schools with the senior phase grades across the Thabo Mofutsanayana District. It was used to determine the extent to which the SMTs, as instructional leaders, influence both the teachers' and learners' performance in mathematics. The questionnaire was selected as a data-gathering tool because it allows for a uniform answering style and is easier and quicker to administer and analyse (Cohen et al., 2007). The questionnaire consisted of open- and closed-ended questions.

A questionnaire must show respect for respondents and use straightforward language and terminology. In the case where the respondent needed explanation and clarity about some questions, the researcher was patient and provided one-on-one attention. The questionnaire was not too long to complete. The questionnaire was hand-delivered and there was no cost to return it. To avoid possible non-return of questionnaires, the researcher communicated regularly with the SMTs involved and personally visited the schools to follow up on and collect questionnaires within as short a timeframe as possible.

The researcher formulated the questionnaire as follows:

- Section A: Biographical information of the respondents.
- Section B and C: Closed-ended questions, with each section focusing on specific themes relevant to the aims of this study.
- Section D: Open-ended questions.

3.6.2 Sources of data

The procedure chosen as part of the quantitative method allowed for data collection through the questionnaire, which comprised of closed- and open-ended questions, with reference to specific themes, to answer the research question for this study. Demographic data about principals, deputies and HODs were also collected. The data was collected from March to June 2017 for the pilot study. The data collection for the main study ran from August to September 2017 and commenced again in January 2018 until March 2018. The reason for the break in data collection was because collection of data from schools during the fourth term is not allowed in the Free State Province. The data collection period thus lasted for nine months (including the pilot study). The population selected to be part of this study consisted of various school leaders (principals, deputy principals and HODs) from schools with grades 7, 8 and 9.

3.7 DATA ANALYSIS

The data were analysed descriptively using the SPSS, and coded and organised according to the responses from the participants. The researcher broke down the data and synthesised it in order to find the patterns and areas that are considered to be crucial to answering the research questions. Statistical analysis was conducted using

SPSS to establish the descriptive features of the data, such as frequencies, means and standard deviations (SDs). Analysis of variance (ANOVA) tests, overall means, and SDs between leaders' perceptions, knowledge, beliefs and support practices were conducted and the results explored.

The data collected through the questionnaire instrument was captured in Microsoft Excel files, which were imported to SPSS for analysis (Hill & Shih, 2009). As mentioned above, a quantitative approach was followed, and the calculated frequency of each answer given per question was expressed as a percentage. Frequency charts were used to visualise the data (Hill & Shih, 2009).

3.7.1 Questionnaire analysis

The initial step in questionnaire analysis involves data reduction, which is known as coding for open-ended responses to prepare the data for analysis (Cohen et al., 2007). Before the pilot study, the questionnaires were edited, mistakes corrected, and questions were given numeric codes. They were reviewed thoroughly for completeness. According to Cohen et al. (2007), the process of coding entails the assigning of code numbers to each answer in a questionnaire. The questions were coded and categorised according to the research questions of the present study. The results were recorded and the data interpreted in the light of the available literature. The data is also tabulated and represented graphically.

3.8 RELIABILITY AND VALIDITY OF THE QUESTIONNAIRE

3.8.1 Reliability

The reliability and validity of the data depend on the quality of information collected. Reliability is a measure of consistency over time and over similar samples on all occasions with the same person or across the entire data collection process (Cohen et al., 2007). Thus, the researcher structured the questionnaire to enhance consistency. Reliability of the data was also dependent on the honesty of the respondents in responding to questions in the structured questionnaire and the

methods, approaches and techniques must exactly measure the objectives for the present study.

Different methods were used to test the effectiveness of the instruments used to collect data (Creswell, 2009). The mean inter-item correlation is another measure of reliability used in this study. The mean inter-item correlation indicated a high level of internal consistency for the scale used for the survey data. This is discussed in the next section.

3.8.1.1 Mean inter-item correlation

Mean inter-item correlation is the technique used in most studies of this kind. Therefore, mean inter-item correlations were calculated using SPSS 25 for the SMTs' perceptions (Table 3.2a and 3.2b), SMTs' beliefs (Table 3.3a and 3.3b), SMTs' knowledge about the support for mathematics teaching and learning (Table 3.4a and 3.4b), and the SMTs' practical support (Table 3.5a and 3.5b).

Table 3.2a: Mean inter-item correlation for SMTs' perceptions

Variable	Mean	SD	N
Perceptions about mathematics curriculum support and performance	3.68	1.12	265
Perceptions about creating career opportunities	2.47	1.54	265
Perceptions about distributed leadership	2.69	1.49	265
Perceptions about professional development	2.75	1.49	265
Perceptions about providing guidance	3.00	1.56	265
Overall	3.41	1.44	265

The SMTs' perceptions show good internal consistency, with mean inter-item correlations ranging between 2 and 4, as reported in Table 3.2a above. In the current study, the overall mean inter-item correlation is 3.41. This is very good according to the reliability guidelines.

Table 3.2b: Mean inter-item correlation for SMTs' perceptions

	Interclass correlation[a]	**95% confidence interval**		**F-test with true value 0**			
		Lower boundary	**Upper boundary**	**Value**	**DF1[d]**	**DF2**	**Sig.**
Single measures	.038[b]	-.001	.083	1.195	264	1056	.030
Average measures	.163[c]	-.007	.313	1.195	264	1056	.030

The results on SMTs' perceptions have good internal consistency, with the alpha coefficient reported of 0.30 for single measures and 0.30 for the average measures, as shown in the Table 3.2b above. In the current study, the interclass correlation alpha coefficient is 0.38. This is very good based on the reliability guidelines, which show that this value should range between 0.2 and 0.4 to be considered satisfactory.

Table 3.3a: Mean inter-item correlation for SMTs' knowledge

Variables	**Mean**	**SD**	**N**
Knowledge about content knowledge support	2.69	1.50	265
Knowledge about better teaching approaches	2.50	1.50	265
Knowledge about creation of extra classes	3.39	1.26	265
Knowledge about quality teaching	3.83	0.92	265

Knowledge about monitoring and control	3.12	1.41	265
Overall	3.10	1.32	265

The results on SMTs' knowledge shows good internal consistency, with mean inter-item correlations ranging between 2 to 4 reported in Table 3.3a. In the current study, the overall mean inter-item correlation is 3.10, which is very good based on the reliability guidelines.

Table 3.3b: Mean inter-item correlation for SMTs' knowledge

	Interclass correlation[a]	**95% confidence interval**		**F-test with true value 0**			
		Lower boundary	**Upper boundary**	**Value**	**DF1**	**DF2**	**Sig.**
Single measures	.036[b]	-.003	.082	1.188	264	1056	.034
Average measures	.158[c]	-.013	.309	1.188	264	1056	.034

The SMTs' perceptions have good internal consistency, with an alpha coefficient reported of 0.34 for single measures and 0.34 for the average measures, as shown in the Table 3.3b above. In the current study, the interclass correlation alpha coefficient is 0.38. This is very good based on the reliability guidelines, which show that this test result should range between 0.2 and 0.4 to be considered satisfactory.

Table 3.4a: Mean inter-item correlation for SMTs' beliefs

Variable	**Mean**	**SD**	**N**
Beliefs about positive relations	3.17	1.41	265
Beliefs about co-responsibilities	3.91	0.98	265

Beliefs about resource provision	3.76	0.94	265
Beliefs about positive environment	3.86	0.87	265
Beliefs about relevant programmes	3.88	0.81	265
Overall	3.71	1.00	265

The SMTs' beliefs show good internal consistency, with mean inter-item correlations ranging between 2 to 4, as reported in Table 3.4a. In the current study, the overall mean inter-item correlation is 3.71, which is very good based on the reliability guidelines.

Table 3.4b: Mean inter-item correlation for SMTs' beliefs

	Interclass correlation[a]	**95% confidence interval**		**F-test with true value 0**			
		Lower boundary	**Upper boundary**	**Value**	**DF1**	**DF2**	**Sig**
Single measures	.238[b]	.184	.298	2.564	264	1056	.030
Average measures	.610[c]	.531	.680	2.564	264	1056	.031

The SMTs' beliefs have good internal consistency, with an alpha coefficient reported of 0.30 for single measures and 0.31 for the average measures, as shown in the Table 3.4b above. In the current study, the interclass correlation alpha coefficients for single and average measures are 0.238 and 0.610, respectively.

Table 3.5a: Mean inter-item correlation for SMTs' practical support

Variables	**Mean**	**SD**	**N**

Practical support about departmental year plans	3.67	0.99	265
Practical support about staff developmental programmes	3.71	0.99	265
Practical support about moderation of tasks	3.38	1.24	265
Practical support about curriculum implementation	3.20	1.33	265
Practical support in communicating subject matters	2.77	1.50	265
Overall	3.35	1.21	265

The results for SMTs' practical support for teaching and learning show good internal consistency, with mean inter-item correlations ranging between 2 to 4, as reported in Table 3.5a. In the current study, the overall mean inter-item correlation is 3.35, which is very good based on the reliability guidelines.

Table 3.5b: Mean inter-item correlation for SMTs' practical support

	Interclass correlation[a]	95% confidence interval		F-test with true value 0			
		Lower boundary	Upper boundary	Value	DF1	DF2	Sig.

Single measures	0.16[b]	0.11	0.22	1.95	264	1056	0.33
Average measures	0.49[c]	0.38	0.58	1.95	264	1056	0.33

The results for the SMTs' practical support have good internal consistency, with the alpha coefficient reported of 0.30 for single measures, and 0.33 for the average measures, as shown in Table 3.5b above. In the current study, the interclass correlation alpha coefficient is 0.33. This is very good based on the reliability guidelines, which indicate that this should range between 0.2 and 0.4 to be considered satisfactory.

3.8.3 Pilot study

Before the questionnaire was used in the main study, a pilot study was carried out to establish the validity of the study. The pilot study was done in 10 senior phase schools in the Thabo-Mofutsanyana District, and 30 questionnaires were distributed and completed. Respondents for the pilot study included principals, deputies and HODs concerned with mathematics. That pilot study aimed at determining the following: the effectiveness of the questionnaire in terms of time taken by the pilot group to answer the questions; whether the layout of the questionnaire was clear; and to solicit any useful comments from the pilot group. The aim was to test whether the study was feasible and the aims could be achieved. As a result of that pilot study, useful changes were made to the questionnaire. Adjustments were made to some of the questions. Ambiguous questions were amended to obtain the required information from the participants.

Ten schools were selected for the pilot study, as shown in the table below.

Table 3.6: Sampled schools for the pilot study

School	Population size	Sample
School A	1 Principal 1 Deputy principal 3 HODs	1 Principal 1 Deputy principal 1 HOD

School B	1 Principal 1 Deputy principal 3 HODs	1 Principal 1 Deputy principal 1 HOD
School C	1 Principal 1 Deputy principal 3 HODs	1 Principal 1 Deputy principal 1 HOD
School D	1 Principal 1 Deputy principal 2 HODs	1 Principal 1 Deputy principal 1 HOD
School E	1 Principal 1 Deputy principal 3 HODs	1 Principal 1 Deputy principal 1 HOD
School F	1 Principal 1 Deputy principal 3 HODs	1 Principal 1 Deputy principal 1 HOD
School G	1 Principal 1 Deputy principal 2 HODs	1 Principal 1 Deputy principal 1 HOD
School H	1 Principal 1 Deputy principal 3 HODs	1 Principal 1 Deputy principal 1 HOD
School I	1 Principal 1 Deputy principal 2 HODs	1 Principal 1 Deputy principal 1 HOD
School J	1 Principal 1 Deputy principal 3 HODs	1 Principal 1 Deputy principal 1 HOD

3.9 LIMITATIONS OF THE STUDY

Some participants may choose to leave the research or fail to return questionnaires, and it is their right to withdraw from the study at any time. This problem can be minimised by overestimating the size of the sample rather than underestimating the

sample required or intended. The sampling for the study was limited to one district, the Thabo-Mofutsanyana District, and SMTs for mathematics were only included.

Thus, teachers, learners, and district officials as representatives of schools and other teaching subjects were excluded in the data collection, analysis, results and findings. However, this study has the potential to provide important insights that can be extended, with caution, to other districts, other school role players, and other school subjects.

3.10 DELIMITATIONS OF THE STUDY

Delimitations are the boundaries the researcher places around the study to ensure it remains manageable (Punch, 2000). For this study, these delimitations are described below.

a. Only the school leaders from Thabo Mofutsanyane District in the Free State Province will be sampled.
b. SMTs who are supporting mathematics teachers are the key concept for the study. The researcher is one of the teachers who needs to be supported professionally for effective mathematics teaching and learning. Therefore, the researcher did not include the school where she is teaching in the research context. This may have influenced the subjectivity of the study and led to the researcher's bias affecting the results unduly.
c. The study was restricted to data collection about the capacity of the SMTs and the views of principals, deputy principals and HODs. Other possible sources of data in this research could have included teachers, learners and district officials as representatives of schools.
d. The researcher also limited the data collection to the form of questionnaires as qualitative interviews would have made data collected from 300 participants very time-consuming and difficult to transcribe and analyse.

3.11 RESEARCH ETHICS

According to Leedy and Ormrod (2005), before conducting any research that involves human as the participants, it is important to consider the ethical implications of the research. Creswell (2009) also indicates that ethical practices must be observed

before undertaking any investigation that involves humans as the target population. Thus, the researcher has taken the ethical issues into described below into consideration.

3.11.1 Gaining access or permission

Participation in the survey and answering the questionnaire was voluntary for all participants. Permission to conduct the study was requested from the University of the Free State, the Free State Department of Education, and the schools involved. The participants were informed of the purpose of the research and how their involvement fits into the research. They completed a consent form which emphasises their right to exit the study should they wish to.

3.11.2 Informed consent

Informed consent of target participants must be obtained by the researcher before conducting the study. Informed consent means that the researcher and the participants agree about the procedures undertaken in the research (Leedy and Ormrod, 2005). This means that the participants are made aware of the nature of the investigation, what their involvement entails, their right to withdraw if they feel any discomfort in the process, and what will be done with the data collected.

The researcher requested permission to access the research site before collecting data, including for the pilot study. Letters requesting permission were written and delivered to the Free State Department of Education and the school principals of the selected schools within Thabo Mofutsanyane District, as required in the ethical protocols of the University, before accessing any of the schools. This is crucial because the researcher must determine and respect the decision of the participants to participate or not and the views of other role players. The researcher was mindful of the needs of the schools and the participants by not distracting them in the daily instructional processes and respecting the busy schedules of the members of the SMT (Creswell, 2009).

3.11.3 Privacy, anonymity and confidentiality

The members of the SMTs were informed that their participation was voluntary, and the researchers used pseudonyms for confidentiality. No confidential information of

the participants was revealed. They remained anonymous and their personal information was protected and was only used for research purpose as necessary.

3.12 CHAPTER SUMMARY

The purpose of this study was to investigate the role of the SMT as instructional leaders in assisting mathematics teachers in improving learners' results in the Thabo Mofutsanyane District. The importance of instructional leadership has been discussed in various chapters of this study. It has been emphasised throughout that the members of SMT occupy the leadership role in the school and are responsible for the overall functioning of the school, which includes teacher development and learners' performance in all subjects.

This chapter presented a detailed description of the research methodology for the study. Initially, the chapter explored the post-positivist worldview as the means to describe the relationship of the research study with the participants. The post-positivism paradigm positioned the study as a quantitative research design. The study was designed as a large-scale survey and called for numerical data and descriptive statistics to ascertain the SMTs (principals, deputy principals and HODs) roles in supporting mathematics teachers in the sampled senior phase schools. The questionnaires were hand-delivered to 89 sampled schools in the Thabo-Mofutsanyana District. Thus a self-administered, structured questionnaire was deemed to be an appropriate instrument to gather data in this study. The data collected were analysed descriptively using the SPSS. The importance of credibility, transferability and dependability as aspects of trustworthiness, acknowledgement of the relevant ethical issues, and an outline of the limitations and delimitations of the study were also covered.

CHAPTER FOUR
DATA ANALYSIS AND PRESENTATION OF FINDINGS

4.1 INTRODUCTION

In the previous chapter, the methodology of the research was explained. The research design, which is quantitative in nature, was also fully discussed. In this chapter, the analysis of the responses of participants to the questionnaires is presented. The questionnaires were distributed to 89 schools covering grade 7, 8 and 9 in the Thabo Mofutsanyana District. The researcher sought to provide answers to the primary research question: “To what extent do SMTs give informal and/or formal curriculum advice, and how they developed teachers professionally to ensure continuous support for mathematics instruction in the senior phase?”

In order to explore the primary question in-depth, the following sub-questions were addressed:

- What are the SMTs leaders’ (principals, deputy principals, and HODs) perceptions, knowledge and beliefs about support for the mathematics curriculum and instruction in the senior phase?
- How do the SMTs (principals, deputy principals, and HODs) practically support the mathematics curriculum and instruction at the senior phase, if at all?
- How can the influence, or lack thereof, of SMTs on mathematics curriculum and instruction be explained?

The questionnaires were completed during focus group discussions with principals, deputy principals and HODs, all of whom constitute what is known as the SMT in the South African context.

4.2 DISTRIBUTION OF QUESTIONNAIRES

Two hundred and sixty-seven (267) questionnaires were distributed to the sample population in 89 schools in the Thabo-Mofutsanyana District. Each school had at least three participants (a principal, a deputy principal, and one or more HODs). Of the 267 questionnaires distributed, 265 were completed and returned. Thus, only two questionnaires were not completed by deputy principals. This gives a total of 265 participants for the study (N = 265). Table 4.1 shows the number of questionnaires distributed, the percentage returned, and percentage not returned.

Table 4.1: The number of questionnaires completed (N = 265)

Questionnaires	Frequency	Percentage (%)
Questionnaires issued	265	100.0
Questionnaires returned not completed	2	0.7
Total questionnaires analysed	265	99.3

4.3 QUESTIONNAIRE ANALYSIS

From Table 4.1, it is evident that 267 completed questionnaires were expected from the respondents, but out of 89 schools visited, two schools only had two members on the SMT (the principal and the HOD for mathematics). Thus, the 265 participants who completed the questionnaires comprised of 89 principals, 87 deputy principals, and 89 HODs.

Descriptive statistics, such as percentages, means, and standard deviations (SDs), were used to analyse the data from the 265 questionnaires administered in 89 schools. The questionnaire was structured according to the following four broad categories:

Section A: Biographical data of the respondents.

Section B: Perceptions, knowledge and beliefs about support for the mathematics curriculum and instruction.

Section C: Practical support for the mathematics curriculum and instruction.

Section D: The SMT's influences and challenges.

4.3.1 Biographical data of the respondents

In the following section, participants were requested to respond to eight major items. Some items elicited information on participants' personal background, such as gender, age, teaching experience and their professional qualifications, as shown in Table 4.2 above. The following sections present discussions around the observed significant indicators that emerged from the responses provided by the participants, with reference to Table 4.2a to 4.2d.

Table 4.2a: Gender, age, and locations of the participants

Biographical data of respondents		**Principals (N = 89)**		**Deputy principals (N = 87)**		**HODs (N = 89)**	
		Frequency	**Percentage (%)**	**Frequency**	**Percentage (%)**	**Frequency**	**Percentage (%)**
Gender	Male	54	60.7	49	56.3	48	53.9
	Female	35	39.3	38	43.7	41	46.1
Age	20 to 29 years	1	1.1	14	16.1	10	11.2
	30 to 39 years	7	7.9	43	49.4	46	51.7
	40 to 49 years	41	46.1	30	34.5	33	37.1
	50 to 59 years	40	44.9	0	0	0	0
Type of school	Farm schools	14	15.7	14	16.1	14	15.7
	Township schools	71	79.8	69	79.3	71	79.8
	Schools in town	4	4.5	4	4.6	4	4.5

The study included both male and female instructional leaders as it is important to include both and the SMTs are constituted of male and female leaders. The participants were purposely sampled, focusing on the individuals who are part of the

SMT, such as principals, deputy principals and HODs. Thus, 33.6% of the participants are principals, 32.8% are deputy principals, and another 33.6% are HODs. From the sample, there were two schools that did not have deputy principals.

The participants who constituted the SMT from each school comprised 60.7% male and 39.3% female principals; 56.3% male and 43.7% female deputy principals; and 53.9% male and 46.1% female HODs. From the analysis, more male respondents participated in the study than females. This is in line with what the Basic Education Minister Angie Motshekga stated in 2013: “only 36% of school principals are women”, who was speaking at the launch of a support network for female principals.

The age of the participants ranged from 20 to 59 years. Most principals (46.1%) were in the age category of 40 to 49. Most deputy principals (49.4%) and HODs (51.7%) were from 30 to 39 years. 15.7% were principals from farm schools, 79.8% administered township schools, and 4.5% were from schools in towns, respectively. Overall, 16.1%, 79.3%, and 4.6% were deputy principals from farm schools, township schools and schools in towns, respectively. There were 15.7%, 79.8%, and 4.5% HODs from farm schools, township schools and schools in towns, respectively. This indicates that more participants were from township schools in the Thabo-Mofutsanyana District. Most of the schools selected for the study have ten or more teachers and have members of the SMTs that were functional. These analyses have offered insight into the demographics and work context of the participants.

Table 4.2b: Qualifications and major subjects taught by participants

Biographical data of respondents		**Principals (N = 89)**		**Deputy principals (N = 87)**		**HODs (N = 89)**	
		Frequency	**Percentage (%)**	**Frequency**	**Percentage (%)**	**Frequency**	**Percentage (%)**
Qualification	Teacher’s certificate	0	0	2	2.3	4	4.5
	Teacher’s diploma	53	59.6	52	59.8	53	59.6
	First degree	27	30.3	23	26.4	24	27.0
	Postgraduate	6	6.7	7	8.0	7	7.9

	diploma or certificate						
	Postgraduate degree (Honours)	3	3.4	3	3.4	1	1.1
Major Subjects	Mathematics	35	39.3	36	41.4	35	39.3
	Languages	50	56.2	37	42.5	45	50.6
	Natural Sciences	1	1.1	7	8.0	6	6.7
	Social Sciences	3	3.4	6	6.9	2	2.2
	Economic and Management Sciences	0	0.0	1	1.1	1	1.1

The members of the SMTs had different professional qualifications. Most participants have a three- or four-year teacher's diploma (59.6%). There are six participants with a teacher's certificate; 158 with a teacher's diploma, which constituted the highest percentage; 7.5% of the participants have a postgraduate diploma or certificate; and 2.6% have postgraduate degrees at honours level.

None of the sampled participants have masters and/or doctoral degrees. Furthermore, the data suggest that a high percentage of participants majored in languages (49.8%) in their professional qualifications. The highest percentage of principals was also observed in this field (56.2%). Overall, 40% of participants specialised in mathematics, 5.3% in natural sciences, 4.2% in social sciences, and two members in economic and management sciences.

4.3.2 Managerial and teaching experience of participants

As stipulated in the PAM document (DBE, 2016), the SMTs as instructional leaders have a core common duty to facilitate teaching and learning in addition to their other management responsibilities. Thus, for this study, the researcher considered both the management and teaching experience of participants as important variables that were likely to inform their performance in this task.

Table 4.2c: Managerial experience of SMTs

Biographical data of respondents		Principals (N = 89)		Deputy principals (N = 87)		HODs (N = 89)	
		Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
Managerial experience	0 to 5 years	3	3.4	5	5.7	5	5.6
	6 to 10 years	32	36.0	40	46.0	45	50.6
	11 to 15 years	49	55.1	36	49.4	32	36.0
	16 to 20 years	5	5.6	6	6.9	7	7.9

The number of years of managerial experience was scaled from 0 to 20 years. The managers with 0 to 5 years consisted of 4.9% of the sampled population; 44.2% of the participants have 6 to 10 years' experience as managers; another 44.2% of the participants have 11 to 15 years' experience; and 6.8% have 16 to 20 years' experience as instructional leaders. Based on the findings, the principals have more management experience compared to the other participant groups, with most (60.7%) having at least 11 years of managerial experience.

Table 4.2d: Teaching experience of SMTs

Biographical data of respondents		Principals (N = 89)		Deputy principals (N = 87)		HODs (N = 89)	
		Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
	0 to 5 years	2	2.2	4	4.6	2	2.2

Teaching experience	6 to 10 years	31	34.8	31	35.6	36	40.4
	11 to 15 years	39	43.8	44	50.6	41	46.1
	16 to 20 years	14	15.7	8	9.2	0	11.2
	Above 20 years	3	3.4	0	0	0	0

The sampled SMT members have taught different subjects before they were promoted to managerial positions. Overall, 46.8% of the participants have 11 to 15 years teaching experience; 37.0% have 6 to 10 years as teachers; 12.1% have 16 to 20 years teaching experience; 3.0% have 0 to 5 years teaching experience; and 1.1% had no teaching experience prior to occupying their current managerial position.

The data show that deputy principals have the most teaching experience, with an average of 50.6% of deputies having 16 to 20 years' teaching experience. This long period of experience that deputy principals have might improve the quality of curriculum support for mathematics teaching and learning that they provide.

4.3.3 Perceptions, knowledge, and beliefs about support for mathematics curriculum and instruction

This section focuses on data gathered from the questionnaire about the SMTs' (principals, deputy principals and HODs) perceptions, knowledge and beliefs about support for the mathematics curriculum and instruction in the senior phase.

4.3.3.1 SMTs' perceptions

Five aspects of the SMTs' perceptions were covered according to the following themes:

a. Effective mathematics curriculum support and performance as the responsibility of instructional leaders.

b. Provision of career opportunities for mathematics teachers in schools and departments.
c. Perceiving distributed leadership as a key to mathematics instruction and curriculum support.
d. Professional development is observed as a factor to support teachers.
e. The instructional leader projects him/herself as a role model in providing guidance for curriculum and instruction.

The questionnaire contained 15 questions on the instructional leaders' perceptions. Five questions were posed to the principals, five to deputy principals, and five to HODs. The questions had the same sub-scales addressing the main theme (perceptions). The sub-scales are:

1. Mathematics performance (views about mathematics curriculum and performance).
2. Career opportunities (instructional leaders' perceptions about creating career opportunities for mathematics teachers).
3. Distributed leadership (viewing distributed leadership as a key to mathematics instruction and curriculum support).
4. Professional development (perceptions of the SMTs on enhancing professional development for teachers).
5. Guidance (observations of school leaders on providing guidance for teachers).

Table 4.3a: Perceptions of the SMT members (principals, deputies and HODs)

S/NO	Statement	Strongly agree		Agree		Uncertain		Disagree		Strongly disagree		Mean	SD
	Perceptions of the SMT members	**F***	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**X**	**SD**
1.	Mathematics curriculum support and performance is my responsibility as the subject leader	25	9.4	203	76.6	-	-	-	-	37	14.0	3.68	1.12
2.	I view myself as a person responsible for career opportunities for teachers in my department	11	4.2	113	42.6	2	0.8	3	1.1	136	51.3	2.47	1.55
3.	I perceive distributed leadership as a key to mathematics instruction	2	0.8	143	54.0	5	1.9	1	0.4	114	43.0	2.69	1.49

4.	Professional development is observed as a factor to support teachers	2	0.8	125	57.4	-	-	-	-	111	41.9	2.75	1.49
5	The instructional leader projects himself or herself as a role model in providing guidance	23	8.7	137	51.7	-	-	-	-	105	39.6	2.90	1.56

*Frequency

Table 4.3a shows that the perceptions of SMTs' yielded high mean outputs for the five items. The lowest mean score is 2.47 (item 2), while the other mean outputs ranged from 2.69 (item 3) to 3.68 (item 1). The higher mean scores show that the perceptions of the participants' about SMTs' support for the mathematics curriculum are relatively positive.

Table 4.3b: Perceptions of the SMTs (principals, deputies and HODs)

Perceptions	**Principals (N = 89)**		**Deputy principals (N = 87)**		**HODs (N = 89)**		**Total (N = 265)**	
	M	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**
Mathematics performance	3.65	1.20	3.67	1.11	3.71	1.06	3.68	1.12
Career opportunities	2.36	1.54	2.48	1.54	2.57	1.57	2.47	1.55
Distributed leadership	2.66	1.52	2.68	1.48	2.73	1.48	2.69	1.49
Professional development	2.81	1.51	2.69	1.50	2.75	1.49	2.75	1.49
Guidance	2.97	1.58	2.85	1.59	2.88	1.54	2.90	1.57
Overall perception	2.89	0.68	2.87	0.70	2.93	0.71	2.90	0.70

The overall mean (M) for principals is 2.89 and the SD is 0.68. The results for the overall perceptions of deputy principals show a mean of 2.87, and the SD is 0.70. The overall mean and SD for the HODs is 2.93 and 0.70, respectively. The overall mean for the total sample is 2.90, and the overall SD is 0.70.

The principals' responses yielded the lowest mean on perceptions for mathematics performance (M = 3.65), while the SD is also low, as compared to other sub-scales. The deputy principals and HODs reported higher means for this sub-scale at M = 3.67 and M = 3.71, respectively. The highest overall mean (M = 3.68) for the entire sampled population was evident for the mathematics performance sub-scale.

Table 4.4: ANOVA test on SMTs' perceptions

Model	Sum of squares	Df	Mean Square	F	Significance
Between Groups	0.138	2	0.069	0.142	0.868
Within Groups	127.630	262	0.487		
Total	127.768	264			

* Significant at 0.05 level

Using the ANOVA test, the researcher analysed the difference in the perceptions reported by the various members of the SMTs. The outputs are presented in Table 4.4. The researcher sought to answer the question: Will there be any significant difference in the perceptions of SMT leaders' (principals, deputy principals and HODs) about support for the mathematics curriculum and instruction in the senior phase?

The results of the study showed that there were no significant differences in the instructional leaders' (principals, deputy principals and HODs) perceptions, as reported in their questionnaire responses. A one-way ANOVA test was conducted to evaluate whether there are significant differences between the SMTs' perceptions for the five sub-scales. The ANOVA is not significant ($F_{(2,262)} = 0.142$, $p > 0.05$), and the result is greater than 0.05 level of significance. With respect to the SMTs, their views showed no differences. They have the same views on support for mathematics curriculum and instruction.

4.3.3.2 SMTs' knowledge

The SMTs' knowledge was covered under the following five themes:

a. The level of confidence in mathematics content knowledge.
b. The ability to advise mathematics teachers about better teaching approaches.
c. The ability to assist teachers in arranging extra classes and being part of the instructional processes.
d. The competency to ensure that quality teaching and learning is maintained in mathematics classrooms.
e. The knowledge to monitor teachers' work and support and develop teachers.

The questionnaire contained 15 questions on the instructional leaders' knowledge. Five questions were posed to the principals, five to deputy principals, and five to HODs. These questions made use of the same sub-scales addressing the main theme (knowledge about the support for mathematics curriculum and instruction). The sub-scales are:

1. Content knowledge (confidence about assisting teachers with mathematics content knowledge).
2. Teaching approaches (able to advise mathematics teachers on better mathematics teaching approaches).
3. Extra classes (the knowledge of instructional leaders about providing support for extra efforts of teachers to improve performance).
4. Quality teaching (competency to ensure that quality teaching and learning is maintained in mathematics classrooms).
5. Monitoring (monitoring teachers' work, providing feedback and support, and developing teachers).

Table 4.5a: Perceptions about knowledge of the SMTs

S/NO	Statement *Perceptions of SMTs about knowledge of support for mathematics curriculum and instruction in the senior phase*	Strongly agree		Agree		Uncertain		Disagree		Strongly disagree		Mean	SD
		F	%	F	%	F	%	F	%	F	%	X	SD
1.	I am always confident about mathematics content knowledge	4	1.5	144	54.3	-	-	1	0.4	116	43.8	2.69	1.51
2.	I manage to advise mathematics teachers about better teaching approaches	-	-	132	49.8	-	-	2	0.7	131	49.1	2.50	1.50
3.	I assist teachers in arranging extra classes after school and I am always part of those classes	9	3.4	199	75.1	-	-	1	0.4	56	21.1	3.39	1.26
4.	I always ensure that quality teaching and learning is maintained	25	9.4	216	81.5	-	-	1	0.4	23	8.7	3.83	0.93
5	Regularly monitor teachers' work, support and develop teachers	8	3.0	177	66.8	-	-	-	-	80	30.2	3.12	1.41

Table 4.5a shows that the SMTs' knowledge about support for the mathematics curriculum yielded high mean outputs for the five items. The lowest mean score is 0.93 (item 4) while the other mean outputs ranged from 1.26 (items 3) to 1.51 (item 1). The high mean outputs show that the SMTs' views on their knowledge about support for the mathematics curriculum are quite positive, which means that the SMT members have a clear understanding of the support needed for mathematics teaching and learning.

Table 4.5b: Comparing perceptions about knowledge of the SMTs based on their positions

Sub-scales	Principals (N=89)		Deputy principals (N=87)		HODs (N=89)		Total (N=265)	
	M	SD	M	SD	M	SD	M	SD
Content knowledge	2.51	1.52	2.34	1.50	3.22	1.37	2.69	1.51
Teaching approaches	2.43	1.50	2.49	1.50	2.58	1.51	2.50	1.50
Extra classes	3.48	1.24	2.49	1.32	3.42	1.23	3.39	1.26
Quality teaching	3.78	0.97	2.49	1.06	3.97	0.71	3.83	0.93
Monitoring	3.06	1.45	3.14	1.42	3.18	1.38	3.12	1.41
Overall knowledge	3.05	0.65	2.30	0.60	3.27	0.64	3.11	0.64

The results of the study show that there were no significant differences between instructional leaders' (principals, deputy principals and HODs) perceptions of their knowledge about support for the mathematics curriculum, as reported in their questionnaire responses (see Table 4.4b).

A one-way ANOVA test was conducted to evaluate whether there are significant differences between the SMTs' perceptions for the five sub-scales. The output of the ANOVA shows there was no significant difference ($F_{(2.262)} = 142$, $p = 0.868$), which is greater than 0.05 level of significance. With respect to SMTs, their views show no difference in terms of support for mathematics curriculum support and instruction.

The questionnaire contained items on a five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = uncertain, 4 = agree, and 5 = strongly agree) about knowledge on support for the mathematics curriculum and instruction. The above table (Table 4.5b)

shows the descriptive statistical analysis of the principals, deputy principals and HODs.

The overall mean for principals' knowledge about mathematics curriculum support and instruction is 3.05, and the SD is 0.65. The results for deputy principals are M = 2.30 and SD = 0.60. The overall mean and SD of the HODs is 3.27, which is the highest overall mean compared to other instructional leaders, and 0.70, respectively.

The overall SD and the mean for the total sampled population are 3.11 and 0.64, respectively. The HODs reported the highest mean for competence in mathematics quality teaching and learning (M = 3.97) and the lowest SD of 0.71 as compared to the other sub-scales. This implies that the HODs are more confident and have knowledge about mathematics curriculum support and instruction relative to principals and deputy principals.

The HODs also reported the highest mean (M = 3.18) for knowledge about monitoring teachers' work. The principals reported the highest mean (M = 3.48) on knowledge for supporting extra classes created by teachers to enhance teaching and learning. The HODs reported the highest mean (M = 3.22) for content knowledge as a key role in supporting mathematics instruction.

Table 4.6: The ANOVA test on SMTs' knowledge

Model	Sum of squares	Df	Mean Square	F	Significance
Between Groups	3.821	2	0.399	4.790	0.868
Within Groups	104.493	262	2.309		
Total	108.314	264			

*Significant at 0.05 level

The researcher was interested in testing the differences in knowledge about curriculum and instruction reported by the various members of the SMTs. The findings show that there were no significant differences in the instructional leaders' (principals, deputy principals and HODs) knowledge, as reported in their questionnaire responses (see Table 4.6).

A one-way ANOVA test was conducted to evaluate whether there are significant differences between the SMTs' knowledge for the five sub-scales. The ANOVA was not significant at ($F_{(2,262)} = 4.790$, $p > 0.05$), which is higher than the 0.05 level of significance. With respect to the principals, deputy principals and HODs as instructional leaders, their knowledge of the curriculum support and instruction differs.

4.3.3.3 SMTs' beliefs

The SMT's beliefs were covered by the following aspects:

a. Sound relationships with mathematics teachers influence their performance.
b. Certainty on the creation of co-responsibility among mathematics teachers to improve learner performance.
c. Instructional leaders' belief that it is their responsibility to provide resources to teachers.
d. Beliefs on the responsibility to create a positive environment for improving learner performance in mathematics and supporting teachers.
e. Acceptance of the need to arrange relevant programmes that support teaching and learning to enhance learner academic performance.

There were five questions for principals, five for deputy principals, and five for HODs. The questions had the same sub-scales addressing the main theme (beliefs about the support for mathematics curriculum and instruction). The sub-scales were:

1. Positive relations (sound relationships with mathematics teachers influence their performance).
2. Co-responsibilities (certainty on the creation of co-responsibility among mathematics teachers to improve learner performance).
3. Resource provision (instructional leaders believe that it is their responsibility to provide resources to teachers).
4. Positive environment (belief in the responsibility to create a positive environment for improving learner performance in mathematics and supporting teachers).
5. Relevant programmes (acceptance of the need to arrange relevant programmes that support teaching and learning to enhance learner academic performance).

Table 4.7a: Beliefs of the SMTs on support for the mathematics curriculum and instruction in the senior phase

S/NO	**Statement** ***Beliefs of SMTs about support for mathematics curriculum and instruction in the senior phase***	**Strongly agree**		**Agree**		**Uncertain**		**Disagree**		**Strongly disagree**		**Mean**	**SD**
		F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**X**	**SD**
1.	I believe that a sound relationship with teachers influence their performance	12	4.5	176	66.4	-	-	-	-	77	29.1	3.17	1.41
2.	I believe that the creation of co-responsibility among Mathematics teachers can improve learner performance	48	18.1	193	72.8	-	-	2	0.8	22	8.3	3.92	0.98
3.	As a manager I believe that it is my responsibility to provide resources to teachers	15	5.7	223	84.2	-	-	2	0.8	25	9.4	3.76	0.94
4.	The HODs should create positive environment to improve learner performance in Mathematics.	23	8.7	222	83.8	-	-	-	-	20	7.5	3.86	0.87
5	It is my responsibility as the HOD to arrange relevant programmes to enhance learner academic performance	20	7.5	227	85.7	-	-	1	0.4	17	6.4	3.88	0.81

Table 4.7a shows that the beliefs of SMTs' yielded relatively high mean scores for the five items. The lowest mean score is 3.17 (item 1) while the other mean outputs range from 3.76 (item 3) to 3.92 (item 2). The high mean outputs show that SMTs' beliefs on support for the mathematics curriculum are altogether positive.

Table 4.7b: Beliefs of the SMTs

Beliefs	**Principals (N = 89)**		**Deputy Principals (N = 87)**		**HODs (N = 89)**		**Total (N = 265)**	
	M	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**
Positive relations	3.29	1.38	3.07	1.45	3.16	1.41	3.17	1.41
Co-responsibilities	3.97	0.96	3.85	1.00	3.93	0.97	3.91	0.98
Resource provision	3.61	1.10	3.82	0.87	3.85	0.81	3.76	0.94
Positive environment	3.88	0.90	3.84	0.89	3.87	0.81	3.86	0.87
Relevant programmes	3.84	0.88	3.91	0.73	3.88	0.82	3.88	0.81

Overall beliefs	3.72	0.65	3.70	0.68	3.74	0.59	3.72	0.64

The questionnaire contained items on a five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = uncertain, 4 = agree, and 5 = strongly agree) for beliefs of the SMTs about support for mathematics curriculum and instruction. The above table (Table 4.7b) shows the descriptive statistical analysis of the principals, deputy principals and HODs for this theme.

The overall mean for principals' beliefs about mathematics curriculum support and instruction is 3.72, and the SD is 0.65. For deputy principals, the overall mean is 3.70 and the SD is 0.68. The mean for HODs is 3.74, which is the highest overall compared to the other instructional leaders, and the SD is 0.59, which is the lowest SD compared to the other instructional leaders.

The overall SD and mean for the total sampled population are 3.72 and 0.64, respectively. The principals reported the highest mean on beliefs about positive relations between teachers and school leaders to support mathematics instruction (M = 3.29) and the lowest SD, equal to 1.38, compared to other instructional leaders. This shows that the principals have stronger beliefs about the need to ensure that positive relations are maintained to enhance performance among subject teachers. The other members of the SMT also believe in supporting curriculum delivery to enhance mathematics results, as evident in the SD results (1.45 for deputy principals, and 1.41 for HODs).

Table 4.8: ANOVA test on SMTs' beliefs

Model	Sum of squares	Df	Mean Square	F	Significance
Between Groups	0.720	2	0.036	0.916	0.411
Within Groups	107.701	262	0.088		
Total	108.421	264			

*Significant at 0.05 level

The researcher tested the differences in the beliefs as reported by the various members of the SMTs. The results of the study showed that there were no significant differences between various groups of instructional leaders (principals, deputy

principals and HODs) beliefs, as reported in their questionnaire responses (see Table 4.8). A one-way ANOVA test was conducted to check whether there were significant differences between the SMTs' beliefs for the five sub-scales on the theme investigating instructional leaders' beliefs about support for instructional processes in mathematics. The ANOVA was not significant ($F_{(2.262)} = 0.916$, $p > 0.05$) and the total is more than the 0.05 level of significance. This indicates that the SMTs have relatively similar beliefs overall on support for mathematics curriculum support and instruction.

4.3.4 Practical support for mathematics curriculum and instruction

The five aspects involved in understanding school leaders' practical support and role in the mathematics curriculum and instruction, as part of responding to the main research question "What practical support is available for SMTs for mathematics curriculum and instruction?", are:

a. The principals, deputy principals and HODs have schools/departmental year plans and always stick to them.
b. Staff development programmes are included in the year plans.
c. Mathematics tasks are always moderated before given to learners.
d. The mathematics curriculum is monitored effectively by all stakeholders involved.
e. The SMTs communicate mathematics issues with senior management and department officials as planned.

The questionnaire contained 15 questions on SMTs' practical support for the mathematics curriculum and instructional leaders' perceptions. Five questions were posed to the principals, five to deputy principals, and five to HODs. These questions had the same sub-scales addressing the main theme (practical support). The sub-scales were:

1. Departmental year plan.
2. Staff developmental programmes.
3. Moderation of tasks.
4. Curriculum implementation is monitored effectively.
5. Communication of mathematics issues with other stakeholders.

Table 4.9a: Practical support of the SMTs

S/NO	Statement on practical support for mathematics curriculum and instruction in the senior phase	Strongly agree		Agree		Uncertain		Disagree		Strongly disagree		Mean	SD
		F	%	F	%	F	%	F	%	F	%	X	SD
1.	I have a departmental year plan and always stick to it	6	2.3	228	86.0	-	-	-	-	31	11.7	3.67	0.99
2.	The staff development programmes are included in the year plan	14	5.3	220	83.0	-	-	2	0.8	29	10.9	3.71	0.99
3.	Mathematics tasks are always moderated before given to learners	4	1.5	205	77.4	-	-	1	0.4	55	20.8	3.38	1.24
4.	The mathematics curriculum is monitored effectively	-	-	194	73.2	-	-	-	-	71	26.8	3.20	1.33
5	I communicate mathematics issues with senior management as planned	11	4.2	137	51.7	-	-	13	4.9	104	39.2	2.77	1.50

Table 4.9a shows that SMTs' perceptions on practical support yielded high mean scores for the five items. The lowest mean score is 2.77 (item 5) while the other mean outputs ranged from 3.20 (item 4) to 3.71 (item 2). The high mean outputs show that the SMTs' perceptions on practical support for the mathematics curriculum are relatively positive.

Table 4.9b: Practical support of the SMTs

Sub-scales	Principals (N = 89)		Deputy principals (N = 87)		HODs (N = 89)		Total (N = 265)	
	M	SD	M	SD	M	SD	M	SD
Departmental year plan	3.63	1.06	3.68	0.98	3.71	0.92	3.67	0.99
Staff developmental programmes included in year plan	3.71	1.03	3.70	1.00	3.71	0.96	3.71	0.99
Moderation of tasks	3.29	1.31	3.43	1.21	3.44	1.17	3.38	1.24
Curriculum implementation monitored effectively	3.22	1.32	3.14	1.37	3.22	1.32	3.20	1.33

Communicate mathematics issues with seniors	2.72	1.51	2.85	1.52	2.73	1.48	2.77	1.50
Overall practical support	3.32	0.74	3.36	0.72	3.36	0.65	3.35	0.70

The questionnaire contained items rated on a five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = uncertain, 4 = agree, and 5 = strongly agree) for beliefs of the SMTs about the practical support for mathematics curriculum and instruction. The above table (Table 4.9b) shows the descriptive statistical analysis of the principals', deputy principals' and HODs' responses.

The overall mean for principals' practical support for the mathematics curriculum and instruction is 3.32 and the SD is 0.74. The deputy principals show an overall mean of 3.36 and the SD is 0.72. The overall mean for the HODs is 3.36, which is the highest overall compared to the other instructional leaders, and the SD is 0.65, which is the lowest deviation from the mean.

The overall SD and the mean for the sampled population are 3.35 and 0.70, respectively. The principals reported the lowest mean on moderation of mathematics tasks before they are given to learners (M = 3.29) and communicating on mathematics issues with senior managers (M = 2.72). This indicates that the principals have the least involvement in practical issues related to mathematics support for teaching and learning. The other members of the SMT also believe in supporting curriculum delivery to enhance positive mathematics results. This is evident in their SD results of 1.45 for deputy principals and 1.41 for HODs.

Table 4.10: ANOVA test on school leaders' practical support

Model	Sum of squares	Df	Mean Square	F	Significance
Between Groups	0.112	2	0.056	0.894	0.496
Within Groups	129.986	262	0.113		
Total	130.098	264			

*Significant at 0.05 level

The researcher wanted to test the difference in the practical support provided for mathematics curriculum and instruction by the different members of the SMTs. The

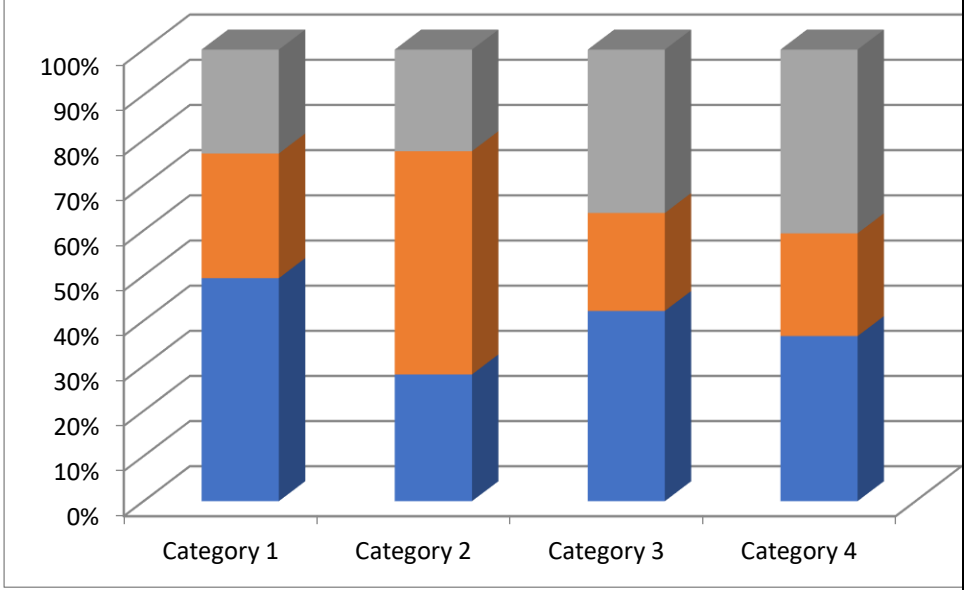
results showed that there were no significant differences in the instructional leaders' (principals, deputy principals and HODs) practical support, as reported in their questionnaire responses (see Table 4.10).

A one-way ANOVA test was conducted to check whether there were significant differences between the SMTs' practical support for instructional processes in mathematics. The ANOVA was not significant ($F_{(2.262)} = 0.894$, $p > 0.05$), having a value more than the 0.05 level of significance. This indicates that the SMTs provide relatively the same support for mathematics teaching and learning.

4.3.4 SMTs' influences and challenges

There were six closed-ended questions intended to gather information on the HODs' overall influence, or lack thereof, on mathematics curriculum and instruction. The questions cover the following aspects:

a. The mathematics teaching experience of HODs.
b. Type of professional development they receive as subject leaders.
c. Opportunities created for them to learn more about the position.
d. How they provide leadership for mathematics instruction.
e. Challenges they faced in leading mathematics instruction.
f. How they address the challenges they faced.



	Frequency (N=89)	Percentage (%)
0 to 5 years	2	2.2
6 to 10 years	36	40.4

11 to 15 years	41	46.1
16 to 20 years	10	11.2
Total	89	100.0

Figure 4.1: Mathematics teaching experience of HODs

The analysis of the HODs' responses on their mathematics teaching experience indicated that two (2.2%) HODs' had 0 to 5 years' experience in teaching mathematics, 36 (40.4%) have taught mathematics for 6 to 10 years, 41 (46.1%) have been mathematics teachers for 16 to 20 years, and 10 (11.2%) have taught mathematics for 16 to 20 years. On average, the 89 HODs who participated in this study have taught mathematics for about two and a half years. Their years of teaching experience can have a positive influence on how they provide support for the mathematics curriculum and instruction. The HODs teaching experiences could be responsible for the support they provided for mathematics teaching and learning since teachers that lack these experiences are inappropriately places to provide such support. Only two HODs from the sampled population have less than six years of mathematics teaching experience.

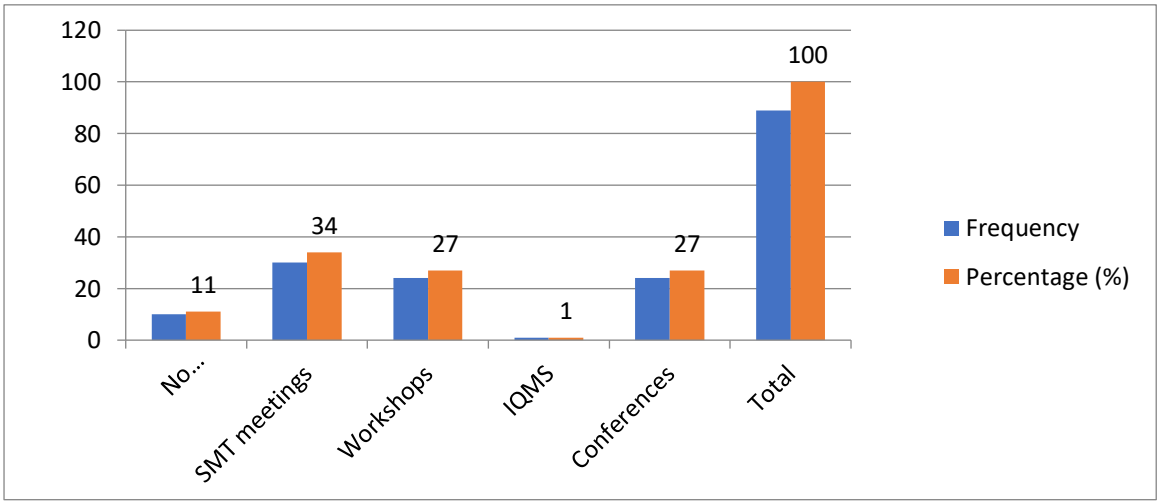


Figure 4.2: Professional development HODs have received as subject leaders

The data on the professional development of HODs as subject leaders were coded according to five categories (see Figure 4.2). Most of the HODs (34%) reported attendance at SMT meetings as part of their professional growth. This implies that they receive professional development by interacting with other instructional leaders (principals, deputy principals, and other school senior managers). Based on the above data analysis, Integrated Quality Management Systems (IQMS) was least reported to

professional development for HODs. About 11% of the HODs reported that they do not receive any professional development.

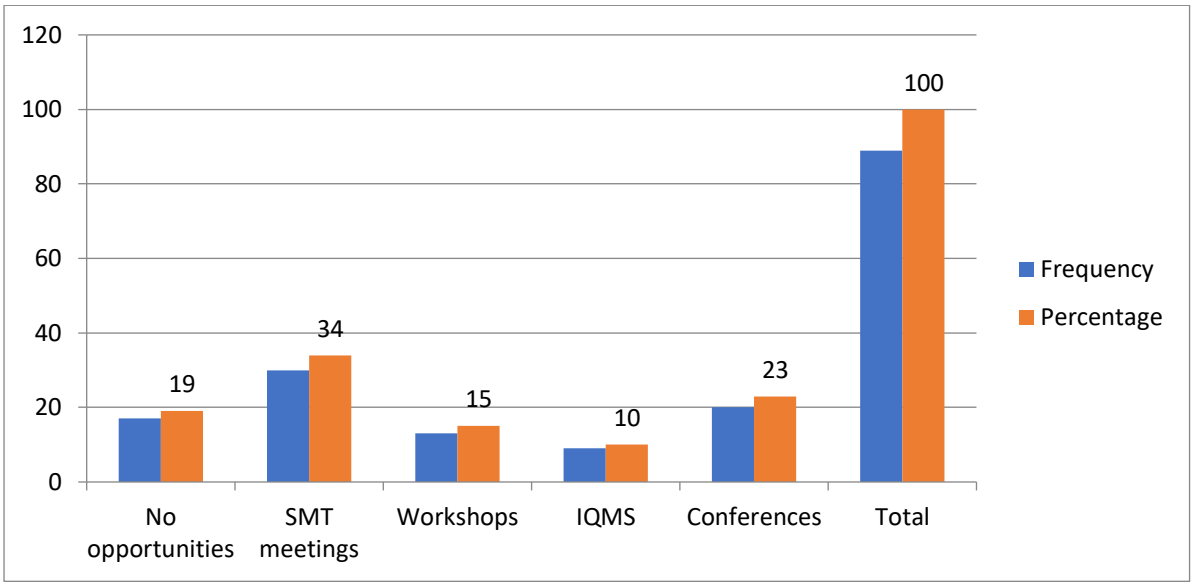


Figure 4.3: Opportunities created for HODs to learn more about the positions

Based on the data for the five categories coded by the researcher, most of the HODs reported that the SMT meetings provide them with opportunities to learn more about their instructional leadership duties, while about 10% of the participants have opportunities to empower themselves in their positions as HODs through the IQMS (see Figure 4.3).

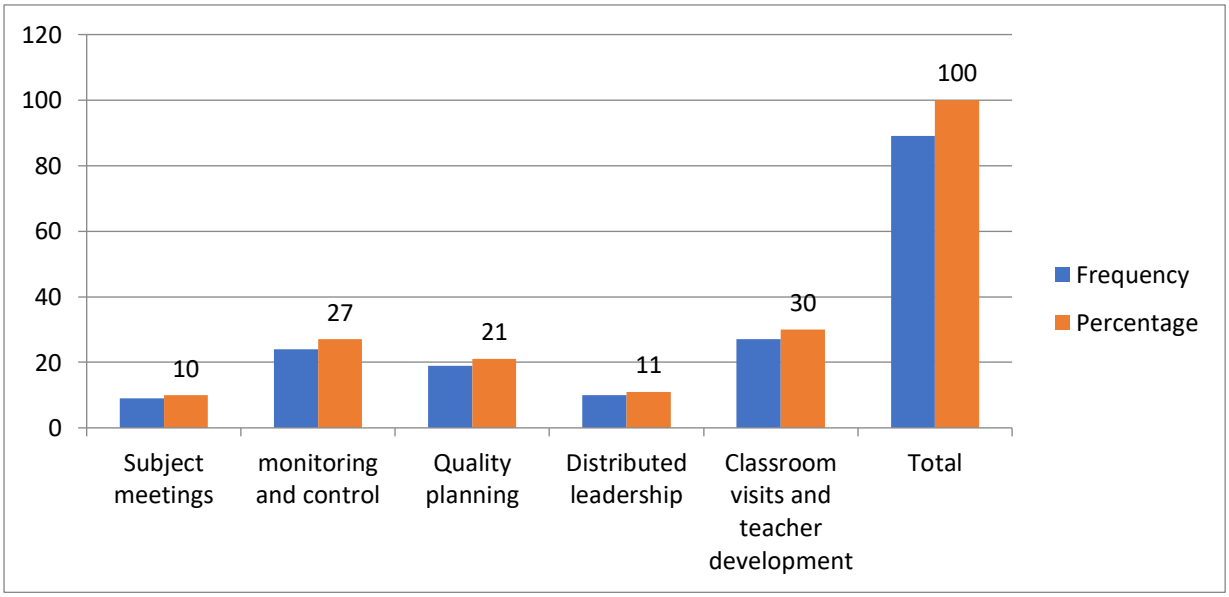


Figure 4.4: Ways HODs provide leadership for mathematics instruction

The leadership practice reported most often by HODs for curriculum support and instruction for mathematics are classroom visits and individual teacher development, and monitoring and control of learners' and teachers' work (30% and 27% respectively). The least-reported ways include distributed leadership and subject meetings (see Figure 4.4).

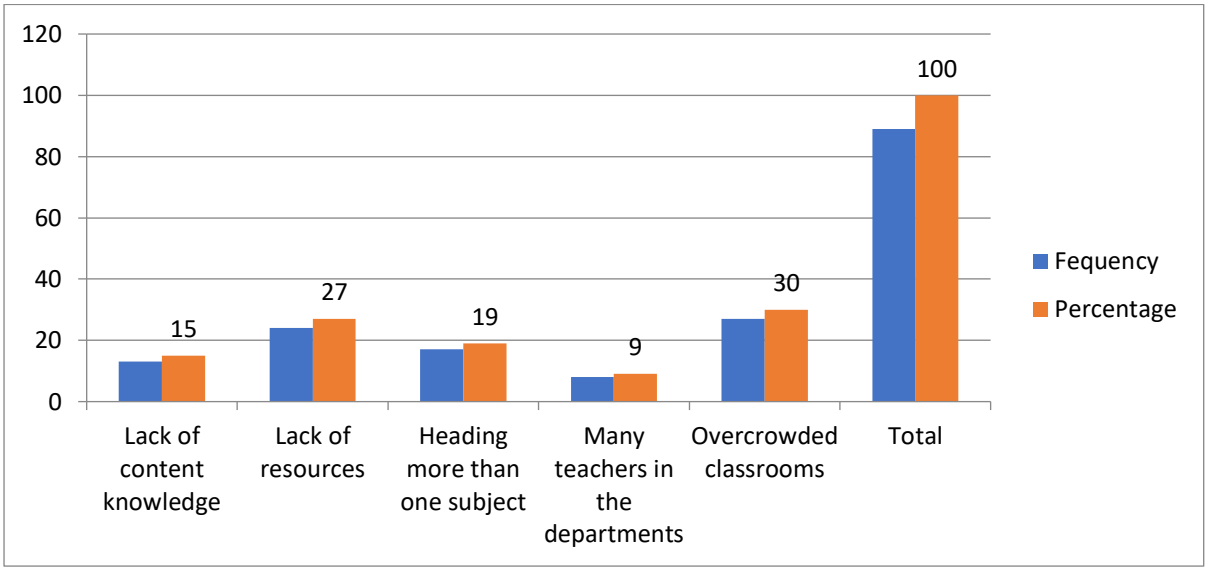


Figure 4.5: Challenges faced by HODs in leading mathematics instruction

The HODs reported the following challenges faced when giving support for the mathematics curriculum and instruction: lack of content knowledge by some of the HODs in the mathematics department, lack of resources to support teaching and learning for some of the concepts in mathematics, the workload for some of the HODs as a result of leading more than one subject in the departments, the numbers of teachers that exceed the leading capacity of HODs, and overcrowded classrooms.

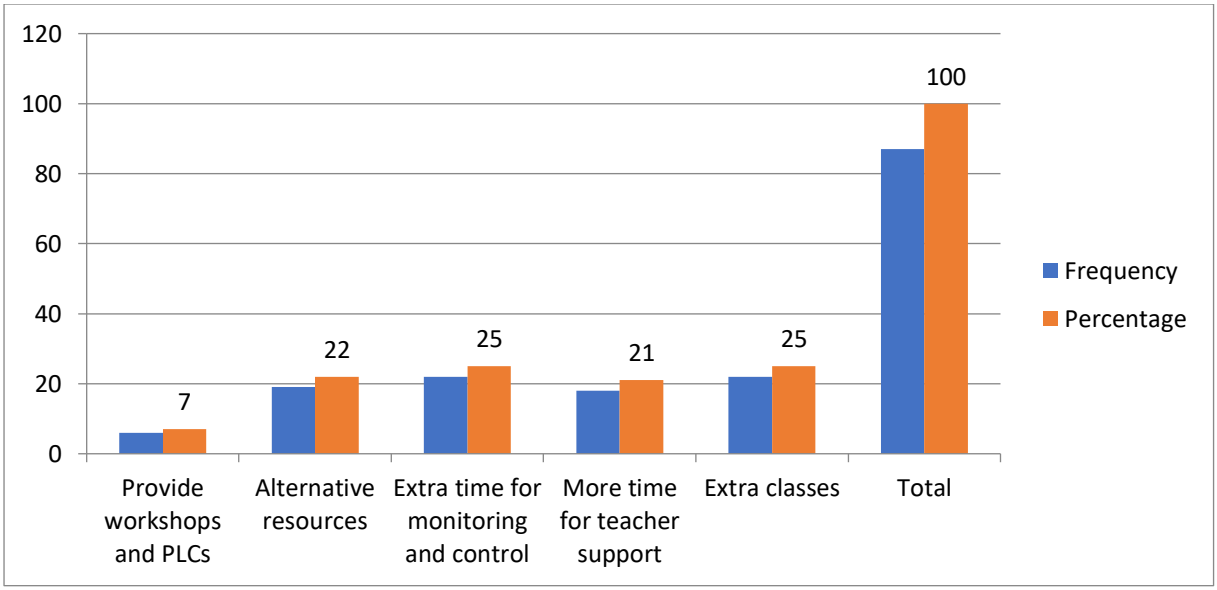


Figure 4.6: Ways HODs overcome the challenges they face

The HODs' responses on how they overcome the challenges they face in providing support to mathematics teachers were coded according to five categories (see Figure 4.6). The HODs indicated that they provide workshops for teachers, improvise with resources and other learning and teaching support materials, and allocate more time for monitoring and control of the teachers' and learners' work. They indicated that they spend more time in providing support for individual teachers, they are part of extra classes organised by teachers, and they also initiate this process themselves as instructional leaders. Most of the HODs (25%) reported that they provide extra time to allow for effective monitoring and control of teachers' and learners' work. Only 7% indicated that they provide workshops for teachers and they arrange for PLCs.

There were eight statements in the questionnaire designed for senior managers only (the principals and their deputy principals). These statements focus on collaborative work among the instructional leaders. The questions looked at the following overall influences, or a lack thereof, by the principals and deputy principals on mathematics curriculum support and instruction:

a. Specific contributions that principals and deputy principals make to develop mathematics teachers.
b. Type of preparation of HODs before executing their leadership duties.
c. Type of professional development received by HODs and teachers.
d. Type of development the HODs and teachers currently need.

e. Roles of HODs as subject leaders.
f. How the HODs provide leadership for mathematics instruction.
g. Challenges faced by the HODs in providing leadership for mathematics instruction.
h. How HODs respond to these challenges.

Table 4.11: Principals' and deputy principals' contributions to the professional development of mathematics teachers

Principals' and deputy principals' overall contributions	**Principals (N = 89)**		**Deputy principals (N = 87)**	
	F	**%**	**F**	**%**
SMT meetings	8	9.0	7	8.0
Workshops	20	22.5	13	14.9
IQMS	11	12.4	8	9.2
Conferences	22	24.7	28	32.2
Distributed leadership	28	31.5	31	35.6

The researcher coded the responses of the principals and deputy principals into five categories, as shown in Table 4.11. The deputy principals reported a higher percentage (35.6%) on distributing leadership to teachers and HODs for mathematics than principals (31.5%). The deputy principals also reported a higher percentage (32.2%) on the issue of attending mathematics conferences and encouraging teachers to be part of these conferences arranged by the Department of Education and non-government organisations (NGOs). A number of principals, 20 out of the 89 principals surveyed, indicated that they use workshops to develop mathematics teachers. Both principals and deputy principals reported little use of school meetings (SMT meetings) as a means for developing mathematics teachers.

Table 4.12: Preparation of HODs before executing leadership duties

Preparation of HODs	Principals (N = 89)		Deputy principals (N = 87)	
	F	%	F	%
No preparation	16	18.0	26	29.9
SMT meetings	33	37.1	26	29.9
Workshops	13	14.6	9	10.3
IQMS	6	6.7	10	11.5
Conferences	21	23.6	16	18.4

The principals' and deputy principals' responses on the preparation of HODs are documented in Table 4.12. Most of the principals (37.1%) make use of school management meetings to prepare HODs to execute their task of managing teachers. A number of the deputy principals (26 out of 87 surveyed) indicated that there is no preparation or workshops done for HODs before executing their leadership duties. Both principals and deputy principals reported IQMS least often as one of the preparations considered for HODs to improve their leadership skills so that they can support teachers.

Table 4.13: Professional development received by HODs and teachers

Professional development of HODs and teachers	Principals (N = 89)		Deputy principals (N = 87)	
	F	%	F	%
SMT meetings	18	20.2	12	13.8
Workshops	36	40.4	30	34.5
IQMS	6	6.7	13	14.9
Conferences	7	7.9	9	10.3
Distributed leadership	22	24.7	23	26.4

According to the principals' and deputy principals' responses, the kind of professional development received by HODs and teachers includes developmental SMT meetings, attending content-based workshops, IQMS implementation, attending conferences, and shared leadership among instructional leaders and teachers (see Table 4.13). Most principals (40.4%) and deputy principals (34.4%) mentioned that the HODs and teachers are developed professionally through content-based workshops arranged by

the Department of Education. Few instructional leaders indicated that IQMS and attending conferences are ways to develop HODs and teachers professionally.

Table 4.14: The type of development HODs and teachers currently need

Development HODs and teachers currently need	Principals (N = 89)		Deputy principals (N = 87)	
	F	%	F	%
No development	11	12.4	8	9.2
Professional development	28	31.5	27	31.0
PLC meetings	17	19.1	17	19.5
Mathematics conferences	11	12.4	12	13.8
Professional qualifications	22	24.7	23	26.4

12.4% of the principals and 9.2% of the deputies believe that their HODs do not need any development. Most principals (31.5%) and deputy principals (31.0%) reported that HODs currently need professional development. These instructional leaders surveyed also indicated that the HODs need to further their professional qualifications, possibly to improve on the lack of content and curriculum knowledge. The principals (19.1%) and deputy principals (19.5%) mentioned that the HODs need to engage in PLCs to empower themselves. According to instructional leaders' responses, the HODs and mathematics teachers also need to attend conferences.

Table 4.15: Roles of HODs as subject leaders

HOD roles as subject leaders	Principals (N = 89)		Deputy principals (N = 87)	
	F	%	F	%
Teaching and learning	13	14.6	8	9.2
Support teachers with instruction	28	31.5	21	24.1
Monitoring and control	16	18.0	28	32.2
Provide feedback	9	10.1	12	13.8
Teacher development	23	25.8	18	20.7

The principals and deputy principals mentioned that the roles of HODs are teaching and learning, supporting teachers with teaching and learning processes, monitoring

and control of teachers' and learners' work, providing feedback after monitoring and control, and providing professional development for teachers.

Most principals (31.5%) believe that it is the duty of the HODs to support mathematics teachers in the instructional processes. More principals (25.8%) than deputies (20.7%) reported that teacher development is a key role for HODs. Most of the deputy principals (32.2%) indicated that the HODs are responsible for monitoring and control of the teachers' and learners' daily activities. Both principals and deputy principals reported teaching and learning and providing feedback as key roles for HODs least often (see Table 4.15).

Table 4.16: How HODs provide leadership for mathematics instruction

How HODs provide leadership for mathematics instruction	Principals (N = 89)		Deputy principals (N = 87)	
	F	%	F	%
Teaching and learning	5	5.6	7	8.0
Support teachers with instruction	30	33.7	27	31.0
Monitoring and control	22	24.7	26	29.9
Provide feedback	9	10.1	9	10.3
Teacher development	23	25.8	18	20.7

The principals and deputy principals highlighted five key responsibilities of HODs in providing leadership for mathematics instruction. As shown in the Table 4.16 above, the following were reported the most often by these instructional leaders: supporting teachers in the teaching and learning processes, monitoring and control of the departmental work, and teacher development. The principals reported the highest percentage (33.7%) for teacher support as a responsibility of HODs in providing subject leadership, while deputy principals reported the highest percentage (29.9%) for monitoring and control. Few instructional leaders stated that teaching and learning and providing feedback are part of HODs' practices in providing leadership for mathematics instruction (see Table 4.16).

Table 4.17: Challenges faced by HODs in providing leadership for mathematics instruction

Challenges faced by HODs	Principals (N = 89)		Deputy principals (N = 87)	
	F	%	F	%
Inadequate content knowledge	14	15.7	13	14.9
Inadequate resources	30	33.7	30	34.5
Heading more than one subject	27	30.3	23	26.4
Many teachers in the departments	4	4.5	1	1.1
Overcrowded classrooms	14	15.7	20	23.0

The principals and deputy principals both indicated that the following challenges are faced by HODs most often in performing their duties:

1. Lack of content knowledge by some of the HODs;
2. Lack of mathematics resources to enhance teaching and learning;
3. Heading more than one subject in the departments;
4. Workload of HODs because of many teachers in the department; and
5. Overcrowding in the classrooms.

Both principals (33.7%) and deputy principals (34.5%) reported the highest percentage on the lack of teaching and learning resources as a barrier in providing support for mathematics instruction and curriculum, followed by heading more than one subject. Few principals and deputy principals indicated that a high number of teachers per department is a challenge experienced by HODs in doing their work (see Table 4.17).

Table 4.18: How HODs respond to challenges

How HODs respond to challenges	Principals (N = 89)		Deputy principals (N = 87)	
	F	%	F	%
Provide workshops and PLCs	8	9.0	7	8.0
Alternative resources	12	13.5	27	31.0
Extra time for monitoring and control	27	30.3	26	29.9
More time for teacher support	23	25.8	9	10.3
Extra classes	19	21.3	18	20.7

The principals and deputy principals reported that the HODs practice the following in responding to the challenges they face in doing their duties: some HODs provide content-based workshops for teachers and they are part of PLCs; they improvise by providing alternative resources to support teaching and learning; they schedule more time for monitoring and control of their departmental work; they schedule more time for individual teacher support; and they encourage teachers to create extra classes and may take part in these classes.

4.4 SMT'S INFLUENCES AND CHALLENGES (SIC)

This part of the study sought to understand the influence of HODs, deputy principals, and principals in supporting mathematics teaching and learning and the challenges inherent in it. The discussion is arranged around three major themes, namely, professional development, leadership of mathematics teaching and learning, and challenges.

4.4.1 Professional development

The HODs, deputy principals, and principals who participated in the study identified professional development as one factor that has enabled them to support the teaching and learning of mathematical concepts.

The researcher made efforts to elicit responses on the kind of professional development the SMTs receive. Jita and Ndlalane (2009: 61) claim that it is difficult for scholars to study the notion of teachers' professional knowledge, which is related to teachers' professional development empirically, because it is usually tacit, contextual, and difficult to verbalise. In view of these difficulties, the HODs, deputy principals, and principals were given the opportunity to write about their opinions regarding the professional development they received as SMTs freely. This approach enabled the SMTs to contextualise and verbalise the kinds of professional development they received.

An HOD who was not teaching the subject mentioned 'Attending professional workshops organised by the Department of Education (circuit managers)' (H1). In the statement, this HOD suggested that the professional development provided for SMTs'

is institutional in nature. It is unclear from the statement whether other stakeholders in the education sector have provided professional development of any type for SMTs.

However, another HOD, who has taught mathematics for six years, provided information on other sources of professional development by stating that 'The principal organises developmental workshops for newly appointed teachers and SMT members regularly' (H2).

In this statement, the HOD was able to show that the task of professional development of SMTs was not only institutional but school-based as well. This type of principal-led professional development attests to Spillane, Diamond and Jita (2003: 536) claim that leadership for instruction involves many people, such as those in formal leadership positions, and people with informal responsibilities. It is evident from this quote that school principals are able to identify the professional development needs of the teachers and members of the SMT in their respective schools.

Another HOD, who taught mathematics for ten years but is no longer teaching, stated that they 'Attended departmental workshops and cluster meetings about management and leadership' (H3). In this statement, the benefits of teacher clusters are evident. Scholars such as Jita and Mokhele (2014: 4), and Lieberman (1999) concur that the structure of professional development described by this HOD is usually created informally through regular meetings among teachers or formally via institutional relationships, disclosure, and interchange. The structures described in this quote are effective platforms for teachers to receive support for teaching and learning mathematics at the senior phase. Jita and Mokhele (2014: 7) affirm that teacher collaboration, instructional guidance, and teacher leadership are process benefits of the structures for professional development described by this HOD.

4.4.2 Leadership of mathematics teaching and learning

An interesting point in this study is the leadership of mathematics teaching and learning that is observable in the roles of the SMTs in supporting mathematics teaching and learning. Spillane et al. (2003: 536) define school leadership as the identification, acquisition, allocation, coordination, and use of the social, material, and cultural resources necessary to establish the conditions for the possibility of innovation

in teaching and learning. This definition underscores the roles of members of the SMT who participated in this study in supporting mathematics teaching and learning in their various schools. In projecting the leadership role provided by SMTs, an HOD who was exhilarated by the study wrote, 'Yes, it helps me to know how to handle and work with other people. I held demonstration lessons to develop teachers on how to deal with mathematic problems' (H4).

The interesting points that emerged from the narrative of this HOD are, first, the responsibility she took as an HOD which enabled her to develop mutual relationships with her colleagues. Second, she undertook an informal 'train the trainer' programme at her school to equip teachers with skills for solving mathematical problems. The approach adopted by this HOD to provide leadership for mathematics teachers in grades 7 to 9 in her school closely aligns with scholars who examine structures that promote the emergence of teacher leadership development (see Huberman, 2001; Jita & Mokhele, 2014). Jita and Mokhele (2014: 4) presented the Huberman (2001) model which involves the teaching staff in common or different schools in a common grade level or discipline managing teaching networks that enabled the teachers to communicate, share knowledge, and observe one another in the classroom to foster the development of the various aspects of their teaching expertise.

4.4.3 Challenges

An important aspect of SMTs' support for mathematics teaching and learning that is seen in current research is the challenges emerging in teaching mathematics. While the narratives of the SMTs draw attention to the professional development and leadership of mathematics teaching and learning benefits that are inherent in the support they provide, there are also challenges. In describing the challenges inherent in mathematics teaching and learning, a teacher wrote, 'Teachers are doing their best to teach children, but learners have negative attitudes to calculations and lack motivation' (H5).

Another teacher, who was an HOD, recollected the challenges and stated, 'Some teachers do not control and mark learners' activities. Other teachers are left behind the pacesetter' (H6).

The narratives of these teachers (H5 and H6) brought to the fore the necessity of building the capacity of SMTs to enable them to support mathematics teaching and

learning effectively in their respective schools. From the statement of the first teacher (H5), the challenge she experienced in the course of providing support to mathematics teachers emanated from students, while the other HOD's challenge in providing support was teacher related.

The statements of these HODs (H5 and H6) give insights into the factors that could still confound SMTs after providing the necessary support to mathematics teachers. The statement of the first teacher implies that there could be professionally developed teachers whose success in any mathematics lesson could be derailed by the negative attitudes of learners to mathematical calculations.

As mentioned in the previous section, one of the HODs (H4) stated

'Yes, It helps me to know how to handle and work with other people. I held demonstration lessons to develop teachers on how to deal with mathematic[s] problems' (H4).

A cursory look at the statement of this teacher (H4) would create an impression of adequate leadership of mathematics teaching and learning in her school of practice. However, if we critically analyse the statement in the light of the information provided by the teachers (H5 and H6) on challenges confronting them in providing support for mathematics teaching and learning, it is evident that demonstration lessons are inadequate to change students' negative attitudes to mathematical calculations, and teachers not marking the weekly activities. Yet again, the need for SMTs to cross-pollinate ideas for adequate support of mathematics teaching and learning is evident.

In explaining how the challenges were addressed, one of the HODs stated, 'I organise a meeting of mathematics teachers to give them a feedback after each controlling and monitoring of teachers' work' (H6). In addressing the perceived challenges, another HOD stated, 'I expose teachers and learners to mathematics competition[s].'

The ability of these HODs to address the perceived challenges shows the benefits inherent in the support provided by SMTs in mathematics teaching and learning at the senior phase.

4.5 CHAPTER SUMMARY

This chapter analysed the statistical data collected for this research and presented the findings with the aid of tables and graphs. Descriptive explanations of the results were supplied for each graph. The analysis of the data was performed quantitatively for closed-ended questions and qualitatively where coding was applied for open-ended questions to enable analysis of the frequencies. The question items were dealt with according to the response statistics for each item. A descriptive analysis involving means and SD scores was conducted applied to investigate the overall perceptions, knowledge, beliefs and practical support of the principals, deputy principals and HODs for mathematics instruction and curriculum delivery. Inferential statistics (ANOVA tests) were deployed to test the significance level of the results.

CHAPTER FIVE

DISCUSSION OF THE FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

5.1 INTRODUCTION

In chapter four, findings from the survey were presented. This chapter discusses the implication of the findings and makes recommendations based on the findings. The objective of chapter five is to round off the study by reflecting on what it has been able to achieve. The reflection is based on the research questions that were pursued in the study. The main research question was:

> To what extent do SMTs provide informal and/or formal curriculum advice, and how do they develop teachers professionally to ensure continuous support for mathematics instruction in the senior phase?

To explore the primary question in-depth, the following sub-questions were considered:

- What are the SMT leaders' (principals, deputy principals and HODs) perceptions, knowledge, and beliefs about support for mathematics curriculum and instruction in the senior phase?
- Will there be any significant difference in the perceptions of SMT leaders' (principals, deputy principals and HODs) about support for the mathematics curriculum and instruction in the senior phase?
- How do the SMTs (principals, deputy principals and HODs) practically support the mathematics curriculum and instruction at the senior phase, if at all?
- How can the influence, or lack thereof, of SMTs on the mathematics curriculum and instruction be explained?

5.2 SUMMARY OF THE STUDY

The present study was designed to investigate the role of SMTs in supporting instructional processes in mathematics, mainly in the senior phase. As mentioned in the previous section, there were three sub-questions researched and the objectives of the study arose from these. Firstly, the researcher investigated the perceptions, knowledge and beliefs of the principals, deputy principals and HODs who participated

in the study in providing support for mathematics instruction and curriculum. The researcher further investigated the influence of SMTs on mathematics teaching and learning in the senior phase. Finally, the study sought to explain the influence and extent of support from SMTs for mathematics instructional processes or the lack thereof. The data were collected by means of a self-administered questionnaire given to members of the SMTs (principals, deputy principals and HODs) at schools in the Thabo Mofutsanyana District of the Free State Province.

For the purpose of the research, a quantitative approach (questionnaires) was used. The population of this study comprised of all the principals, deputy principal(s), and heads of departments at selected schools. I adopted post-positivist paradigm and the quantitative appropriate research method was chosen because of its ability to transform data collected to answer the first and second research questions for current study (Creswell, 2009). Creswell (2009) also points out that the post positivist lens is considered more effective on quantitative approach.

The questionnaire items obtained data from the instructional leaders and mathematics teachers with regard to their biographical information, perceptions, knowledge and beliefs on instructional leadership, SMTs' knowledge about support for mathematics curriculum, the practical support for mathematics curriculum and instruction, and the SMTs' overall influences and challenges in providing support for mathematics instruction and curriculum. There were five questions for principals, five for deputy principals, and five for HODs for each category intended to address the research questions.

Kaur, Stoltzfus, and Yellapu (2018), are of the view that by means of descriptive statistics, data is organised and summarised to promote an understanding of the data trends. Descriptive statistics, such as means and standard deviations (SDs) were used to determine the perceptions, knowledge and beliefs of the members of the SMT's about the support for mathematics curriculum and instructional processes. This descriptive method also enabled the researcher to determine how principals, deputy principals and HODs offer practical support to mathematics teachers. Furthermore, frequencies and percentages were used to analyse the open-ended questions and

determine the overall influence, or lack thereof, of the members of the SMT in providing support for mathematics instruction. A summary of the findings is presented below.

5.2.1 ANOVA test of the SMTs' perceptions on support for mathematics curriculum and instruction

In reply to sub-question one, the results showed no significant differences between instructional leaders' (principals, deputy principals and HODs) perceptions reported. The ANOVA test showed no significance ($F_{(2.262)}$ = 142, p = 0.868), having a value more than the 0.05 level of significance. With respect to the SMTs, their views showed no differences. This implies that the principals, deputy principals and HODs have the same views on support for the mathematics curriculum and instruction.

5.2.2 ANOVA test of the SMTs' knowledge about support for the mathematics curriculum and instruction

The ANOVA test result was significant at ($F_{(2.262)}$ = 790, p = 0.009), which is less than the 0.05 level of significance. The principals, deputy principals and HODs, as instructional leaders, have different knowledge of curriculum support and instruction. As a result, the members of the SMTs have different responsibilities and their knowledge for mathematics curriculum and instruction varies.

5.2.3 ANOVA test of the SMTs' beliefs about support for the mathematics curriculum and instruction

The ANOVA was not significant ($F_{(2.262)}$ = 088, p = 0.916), having a value more than the 0.05 level of significance. This indicates that the principals, deputy principals and HODs have the same beliefs on support for mathematics curriculum support and instruction.

5.2.4 Principals, deputy principals and HODs' practical support for the mathematics curriculum and instruction

The ANOVA was not significant ($F_{(2.262)}$ = 113, p = 0.894), having a value more than the 0.05 level of significance. This indicates that the SMTs provide the same support for the mathematics curriculum and instruction.

5.2.5 HODs' overall influences and challenges

The mathematics teaching experience of HODs has a great influence on how they provide support for the curriculum delivery and classroom instructional processes. Most of the HODs (86.5%) had more than five years of teaching and managerial experience. The kind of professional development HODs receive as subject leaders has an influence on the way they perceive teachers, their knowledge of the curriculum, and their beliefs about support for mathematics instruction. Some of the HODs receive no preparation or development on how to manage their departments or how to provide support for instruction, while most HODs receive development through SMT meetings arranged at schools.

In the current study, most of the HODs reported that the school-based SMT meetings provide them with opportunities to learn more about their instructional leadership duties and how they can assist teachers with teaching and learning of mathematics in the classrooms. The HODs indicated that they also ensure effective monitoring and control of the teachers' work and learners' tasks, as stipulated in the departmental policy, to support teaching and learning. They ensure quality planning of all mathematics activities, they ensure that they share or distribute instructional leadership among the teachers and use classroom visits to provide assistance where teachers experience instructional challenges.

The HODs mentioned the following aspects as the challenges they face in providing support for mathematics curriculum and instruction:

1. Lack of content knowledge by some of the HODs and teachers in the mathematics department. From their biographic information, some of the HODs in the senior phases have no mathematics teaching experience, and they did not take mathematics as one of their major subjects in high school or at tertiary level.
2. Lack of resources to support teaching and learning for some of the concepts in mathematics. The lack of mathematics teaching and learning support materials was mentioned by some of the HODs as a challenge in ensuring that the teaching and learning quality is

maintained. This is a result of lack of mathematics laboratories in some senior phase schools in the district.

3. The workload of some HODs is high because they head more than one subject in the department.
4. The number of teachers exceeds the leadership capacity of HODs.
5. Overcrowded classrooms.

Although HODs experience these challenges in providing support for mathematics instruction and curriculum delivery, they find ways to overcome or respond to the challenges. They reported the following as ways to deal with the challenges as instructional leaders:

1. Provide workshops and professional development for teachers and allow them to attend conferences.
2. Improvise with resources and other learning and teaching support materials where there is a need for alternative resources.
3. Allocate more time for monitoring and control of the teachers' and learners' work.
4. Spend more time providing support for individual teachers.
5. Extra classes are organised by teachers and instructional leaders.

5.2.6 Principals' and deputy principals' overall influences and challenges

Most of the principals and deputy principals reported that they attend mathematics conferences and encourage teachers and HODs to be part of conferences arranged by the Department of Education and NGOs. These instructional leaders indicated that workshops are a major contribution to developing mathematics teachers and HODs.

Unlike the HODs' responses, both principals and deputy principals reported SMT meetings as the least often contributing factor to developing mathematics teachers. Some of the principals believe that school management meetings can prepare HODs to execute their tasks of managing teachers. Most of the deputy principals indicated that there is no preparation or workshops done for HODs before executing their leadership duties. Both principals and deputy principals reported IQMS least often as one of the means to improve HODs' leadership.

The principals' and deputy principals' reactions on the kind of professional development received by HODs and teachers include developmental SMT meetings, attending content-based workshops, IQMS implementation, attending conferences, and shared leadership among instructional leaders and teachers. Most principals (40.4%) and deputy principals (34.4%) mentioned that the HODs and teachers are developed professionally through content-based workshops arranged by the Department of Education. The principals (19.1%) and deputy principals (19.5%) also indicated that the HODs need to engage in PLCs to empower themselves. According to these instructional leaders, the HODs and mathematics teachers need to attend conferences.

The principals and deputy principals mentioned the roles of HODs as teaching and learning, supporting teachers with teaching and learning processes, monitoring and control of teachers' and learners' work, providing feedback after monitoring and control, and providing professional development for teachers. Most principals and deputies believe that it is the duty of the HODs to support mathematics teachers with instructional processes. They also indicated that teacher development is a key role of HODs.

The principals and deputy principals indicated the following challenges faced by HODs in performing their duties:

1. Lack of content knowledge by some of the HODs.
2. Lack of mathematics resources to enhance teaching and learning.
3. Heading more than one subject in their department.
4. The workload of HODs because of many teachers in the department.
5. Overcrowding in the classrooms.

Both principals and deputy principals believe that the lack of teaching and learning resources is a challenge in providing support for the mathematics instruction and curriculum.

Most of the principals and deputy principals agreed that some of the HODs provide content-based workshops for teachers, they are part of PLCs, and they improvise by bringing in alternative resources to support teaching and learning. They schedule more

time for monitoring and control of their departmental work to overcome the challenges they face in providing support for mathematics instruction and curriculum delivery.

5.3 DISCUSSION OF THE FINDINGS

This study examined the role of SMTs (principals, deputy principals and HODs) in supporting mathematics instruction and curriculum delivery to improve mathematics performance in 89 senior phase schools offering grade 7, 8 and 9 in the Thabo-Mofutsanyana District of the Free State. The study investigated the roles that these instructional leaders play in providing informal and formal curriculum advice to mathematics teachers, their perceptions, knowledge and beliefs on the kind of support they should provide to teachers, their practical support and influences, and finally their challenges in providing support. The data collected from the surveys were analysed using the SPSS Version 25.

5.3.1. Discussion on the SMT's perceptions on the support for mathematics curriculum and instruction

To answer the first question, the ANOVA test was used to analyse the data on instructional leaders' perceptions, knowledge, and beliefs about the support for mathematics instruction and curriculum. The standard alpha level of 0.05 was applied to make judgments about the statistical significance of the findings. The findings from the ANOVA analysis (shown in Table 4.4 above) confirm that there are no significant differences between the instructional leaders' (principals, deputy principals and HODs) perceptions.

A one-way ANOVA test was conducted to evaluate whether there are significant differences between the SMTs' perceptions on the five sub-scales included in the questionnaire. The ANOVA was not significant ($F_{(2.262)} = 142$, $p = 0.868$), having a value greater than the 0.05 level of significance. With respect to the SMTs, their views showed no differences overall. They have the same views generally on support for the mathematics curriculum and instruction. The findings of this study confirm the findings of Palmer et al. (2014), in which the authors concluded that instructional leaders' perceptions provide a consistent and accurate source of information, the teachers perceive that the school leaders have a major role to play in this regard, and their support in the instructional processes improves performance in mathematics.

In this study, the principals reported the highest mean on perceptions for mathematics performance (M = 3.65) as compared to the other sub-scales, which confirms that the principals view the support for mathematics instruction as their responsibility. According to Palmer et al. (2014), instructional leaders are accountable for the directional guidance of instructional improvement, despite contextual situations. The findings from this study reinforce the idea that instructional leadership always plays a key role in improving school performance and, as such, has rightly assumed predominance in education policy agendas on many levels.

The results from this study about the SMT leaders' perceptions of the support for mathematics and instruction are confirmed by similar results in the study by Orphanos and Orr (2014)who found that the more positive the perceptions of the instructional leaders about the support for mathematics instruction, the greater the teachers' job satisfaction and perceived collaboration.

5.3.2. Discussion on the SMT's knowledge about the support for the mathematics curriculum and instruction

According to Palmer et al. (2014), higher instructional quality, as a function of leadership, appears to significantly correlate to higher pass rates, while insufficient knowledge about the support for instruction and curriculum results leads to lower student performance in mathematics. For this study, a one-way ANOVA test conducted to evaluate the differences between the SMTs' knowledge for the five sub-scales was significant at ($F_{(2.262)}$ = 790, p = 0.009), which is less than the 0.05 level of significance. With respect to the principals, deputy principals and HODs as instructional leaders, their knowledge of curriculum support and instruction differs for mathematics.

5.3.3. Discussion on the SMT's beliefs about support for the mathematics curriculum and instruction

The results of the study showed that there were no significant differences between instructional leaders' (principals, deputy principals and HODs) beliefs, as reported in their questionnaire responses (see Table 4.8). A one-way ANOVA test was conducted to check whether there were significant differences between the SMTs' beliefs for the

five sub-scales addressing beliefs as a theme in investigating the instructional leaders' views on support for instructional processes in mathematics. The ANOVA was not significant ($F_{(2.262)}$ = 088, p = 0.916), having a value more than the 0.05 level of significance. This indicates that the SMTs have the same beliefs on support for the mathematics curriculum and instruction.

5.3.4. Discussion on the SMTs' practical support for the mathematics curriculum and instruction

As described in the previous chapter (see Table 4.9), the principals reported the lowest mean on the moderation of mathematics tasks before they are given to learners and on communicating on mathematics issues with senior managers. This indicates that the principals have the least involvement in practical issues related to mathematics support for teaching and learning. Teacher evaluation or monitoring and control can be implemented without any focused support in the form of professional development. The principal is responsible to ensure proper monitoring of teachers' work to promote effective teaching and learning. The other members of the SMTs also believe in supporting curriculum delivery to enhance mathematics results.

Julianne and Campell (2017) found that instructional leaders focus on their roles beyond the classroom. Supporting professional growth or learning for teachers by influencing policy or decision making improves mathematics results. Thus the practical support of principals, deputy principals and HODs is crucial in empowering teachers in leadership roles.

5.3.5. Discussion on the HODs' overall influences and challenges for mathematics curriculum support and instruction

The HODs reported the following challenges in giving support for the mathematics curriculum and instruction: lack of content knowledge by some of the HODs in the mathematics departments, lack of resources to support teaching and learning for some of the concepts in mathematics, the workload for some of the HODs is high as a result of leading more than one subject in the department, the numbers of teachers exceeds the leadership capacity of HODs, and overcrowded classrooms. The workload of an HOD is very heavy. They are not only occupied with management tasks, they are teaching and must mark the exercises of learners as well. Solving problems raised by

parents is another challenge for them which they cannot ignore (Ghavifekr et al., 2014).

The lack administrative support, such as resources, and the high workload for HODs was confirmed by Ghavifekr et al. (2014) in their study. They found that the lack of support from the administrative departments brings issues and challenges for the school management. It affects the smooth running of the school management and the schools' performance.

Although the HODs are facing challenges, they reported ways to overcome the challenges in providing support and guidance for mathematics teachers. The HODs indicated that they provide workshops for teachers, they improvise with resources and learning and teaching support materials, and they allocate more time for monitoring and control of the teachers' and learners' work. They indicated that they spend more time in providing support for individual teachers, they are part of extra classes organised by teachers, and are also initiating this process as instructional leaders. Most of the HODs reported that they provide extra time to allow for effective monitoring and control of teachers' and learners' work. The lowest number of HODs (7%) indicated that they provide workshops for teachers and they also arrange PLCs.

Lack of resources to support teaching and learning for some of the concepts in mathematics was identified as a challenge in this present study for HODs and teachers to accomplish their duties. Ghavifekr et al. (2014) also found that financial issues are another challenging part of enhancing teaching and learning at Chinese primary schools. They confirmed that most of the Chinese primary schools need to organise fund-raising campaigns to upgrade their buildings, school facilities and computer software to enhance teaching and learning. In the current study, some of the HODs reported that the teachers hold extra classes to overcome the lack of resources and overcrowded classrooms, while Ghavifekr et al. (2014) in their study found the opposite. They found that some of the teachers refuse to work overtime or bring learners out for competitions on weekends. This is also another challenge for the HODs in allocating human resources wisely.

This study found that the workload for some of the teachers and HODs, as a result of leading more than one subject in their department, is a big challenge for the HODs, the number of teachers exceeds the leadership capacity of HODs, and classrooms are

overcrowded. In their study, Ghavifekr et al. (2014) also found that the HODs face difficulties in arranging teachers' tasks when there are not enough teachers to teach certain subjects.

5.3.6 Discussion on the principals' and deputy principals' overall influences and challenges for the mathematics curriculum support and instruction

To answer the third question of the study on the principals' and deputy principals' overall influences and challenges, most of these participants reported that the HODs currently need professional development. These instructional leaders surveyed also indicated that the HODs lack content and curriculum knowledge and need their professional qualifications upgraded. The principals and deputy principals mentioned that the HODs need to engage in PLCs to empower themselves. According to the instructional leaders' responses, the HODs and mathematics teachers also need to attend conferences.

The principals and deputy principals have a major influence on the overall functioning of the schools and instructional processes. This is supported by Orphanos and Orr (2014) in their findings showing that principals' leadership practices have an indirect influence on teacher support and curriculum delivery.

5.4 RECOMMENDATIONS

The following recommendations are deemed necessary for improved achievement in the SMTs' support for mathematics instruction and curriculum in the senior phase:

1. Since more instructional support is needed from the school management for effective teaching and learning of mathematics, future research could focus on the individual instructional leaders' roles in providing support for mathematics instruction.
2. Since this study was related to the roles of the SMTs in providing support for mathematics instruction in Thabo-Mofutsanyana District senior schools in the Free State, future research could be conducted in other provinces so that comparisons can be done.
3. This study indicates that principals have the least involvement in practical issues related to mathematics support for teaching and learning. Therefore, the

researcher recommends that principals be invited to or accompany mathematics teachers in content-based workshops.

5.5 CONCLUSION

The results of this research and the literature review indicate that the SMTs play a key role in supporting mathematics teachers. School leaders have a strong influence on their teachers and the working conditions in their schools, through which they can also contribute to student learning. Further opportunities to empower instructional leaders are necessary to enable them to give more support for mathematics teachers to explore additional topics and concepts in their mathematics instruction and curriculum to enhance their classroom performance.

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APPENDICES

APPENDIX 3.1: REQUEST FOR PERMISSION TO CONDUCT RESEARCH FROM THE PROVINCE

506 N Bluegumbosch
Phuthaditjhaba
9869
14-July-2017

THE FREE STATE DEPARTMENT OF EDUCATION

REQUEST FOR PERMISSION TO CONDUCT RESEARCH

I hereby request permission to conduct research with teachers in your school.

My name is Ntsabeng Albertina Mosala, and I am presently studying for a Masters degree with the University of the Free State. As part of my Masters programme, I am required to conduct research on an aspect of interest with a view to making a contribution to our knowledge and understanding of the issue under study. The title of my research project is:

The role of school management teams in supporting mathematics teaching and learning in the senior phase

The purpose of the study is to understand the role of SMTs in supporting instructional processes in mathematics, mainly in the senior phase. The study has the potential to benefit teachers who are teaching mathematics with understanding the role of the SMTs in their instructional processes. It also has the potential to benefit the members of the SMTs with the understanding of how teachers perceive their instructional leadership as well as the support in terms of the challenges that teachers face in the subjects. Policy makers may benefit from the study by gaining understanding about how teachers perceive their SMTs knowledge and instructional leadership competence.

The study will use a questionnaire as a research instrument which will take approximately 10-15 minutes of your time.

Yours Sincerely

_____

Mosala N.A

APPENDIX 3.2: REQUEST FOR PERMISSION TO CONDUCT RESEARCH FROM THE DISTRICT

506 N Bluegumbosch
Phuthaditjhaba
9869

14-July-2017

District Director

Thabo Mofutsanyana Education District

Private Bag x 810

Witsieshoek

9870

REQUEST FOR PERMISSION TO CONDUCT THE RESEARCH

Dear Sir/Madam

I hereby request permission to conduct research with SMTs in the selected Senior Phase Schools within the district. My name is ***Mosala Ntsabeng Albertina***, and I am presently studying Master's degree with the University of the Free State. As part of my Masters programme, I am required to conduct the research on an aspect of interest with a view to making a contribution to our knowledge and understanding of the issue under study. The title of my research study is:

The role of school management teams in supporting mathematics teaching and learning in the senior phase

The study will involve questionnaire with Principals, Deputies and HODs which is expected to last for 15 minutes of which teaching time will not be disturbed.

I undertake to observe confidentiality and to protect participants from physical and/or psychological harm. No names of the schools and/or persons shall be used in any reports of the research. All participants will be asked to participate voluntarily in the study and may withdraw at any time should they so wish. Upon completion of the study, I undertake to provide the Ministry of Education and Training with a copy of the research report and to share my findings with the SMTs in the schools if necessary.

If you need any further information and/or have suggestions to do, do not hesitate to contact me directly on email: ntshabeng@webmail.co.za or Cell: +27 737109153 and/or my supervisor Professor Loyiso Jita at jitalc@ufs.ac.za or call +27 51 401 7522.

Yours Sincerely

_____

Mosala N.A

APPENDIX 3.3: REQUEST FOR PERMISSION TO CONDUCT RESEARCH FROM THE PRINCIPALS

506 N Bluegumbosch

Phuthaditjhaba
9869

14-July-2017

The Principal

XXX School

REQUEST FOR PERMISSION TO CONDUCT RESEARCH

Dear Sir/Madam

I hereby request permission to conduct research with the School Management Team (SMT) in your school.

My name is Ntsabeng Albertina Mosala, and I am presently studying for a Masters degree with the University of the Free State. As part of my Masters programme, I am required to conduct research on an aspect of interest with a view to making a contribution to our knowledge and understanding of the issue under study. The title of my research project is:

The role of school management teams in supporting mathematics teaching and learning in the senior phase

The purpose of the study is to understand the role of SMTs in supporting instructional processes in mathematics, mainly in the senior phase. The study has the potential to benefit teachers who are teaching mathematics with the understanding the role of the SMTs in their instructional processes. It also has the potential to benefit the members of the SMTs with the understanding of how teachers perceive their instructional leadership as well as the support in terms of the challenges that teachers face in the subjects. Policy makers may benefit from the study by gaining understanding about how teachers perceive their SMTs knowledge and instructional leadership competence.

The participants will purposely involve: The Principal, the Deputy Principal and the Head of the department for Mathematics. The study will use a questionnaire as a research instrument which will approximately last for 10-15 minutes of which teaching time will not be disturbed. I undertake to observe confidentiality and to protect participants from physical and/or psychological harm. No names of the schools and/or persons shall be used in any reports of the research. All participants will be asked to participate voluntarily in the study and may withdraw at any time should they so wish.

Upon completion of the study, I undertake to provide the Ministry of Education and Training with a copy of the research report and to share my findings with the SMTs in the schools if necessary.

If you need any further information and/or have suggestions to do, do not hesitate to contact me directly on email: ntshabeng@webmail.co.za or Cell: +27 737109153 and/or my supervisor Professor Loyiso Jita at jitalc@ufs.ac.za or call +27 51 401 7522.

Yours Sincerely_____

Mosala N.A

APPENDIX 3.4: REQUEST FOR PERMISSION TO CONDUCT RESEARCH FROM THE PRINCIPALS

506 N Bluegumbosch
Phuthaditjhaba
9869

14-July-2017

The Principal

XXX School

INVITATION TO PARTICIPATE IN A RESEARCH STUDY

Dear Sir/Madam

I hereby request your permission to participate in a research study as the Principal and a member of the School Management Team.

My name is Ntsabeng Albertina Mosala, and I am presently studying for a Masters degree with the University of the Free State. As part of my Masters programme, I am required to conduct research on an aspect of interest with a view to making a contribution to our knowledge and understanding of the issue under study. The title of my research project is:

The role of school management teams in supporting mathematics teaching and learning in the senior phase

The purpose of the study is to understand the role of SMTs in supporting instructional processes in mathematics, mainly in the senior phase. The study has the potential to benefit teachers who are teaching mathematics with the understanding the role of the SMTs in their instructional processes. It also has the potential to benefit the members of the SMTs with the understanding of how teachers perceive their instructional leadership as well as the support in terms of the challenges that teachers face in the subjects. Policy makers may benefit from the study by gaining understanding about how teachers perceive their SMTs knowledge and instructional leadership competence.

The study will use a questionnaire as a research instrument which will take approximately 10-15 minutes of your time. I undertake to observe confidentiality and to protect participants from physical and/or psychological harm. No names of the schools and/or persons shall be used in any reports of the research. All participants will be asked to participate voluntarily in the study and may withdraw at any time should they so wish.

Upon completion of the study, I undertake to provide the Ministry of Education and Training with a copy of the research report and to share my findings with the SMTs in the schools if necessary.If you need any further information and/or have suggestions to do, do not hesitate to contact me directly on email: ntshabeng@webmail.co.za or Cell: +27 737109153 and/or my supervisor Professor Loyiso Jita at jitalc@ufs.ac.za or call +27 51 401 7522.

Yours Sincerely

_____

Mosala N.A

APPENDIX 3.5: REQUEST FOR PERMISSION TO CONDUCT RESEARCH FROM THE DEPUTY PRINCIPALS

506 N Bluegumbosch
Phuthaditjhaba
9869

14-July-2017

The Deputy Principal

XXX School

INVITATION TO PARTICIPATE IN A RESEARCH STUDY

Dear Sir/Madam

I hereby request your permission to participate in a research as the Deputy Principal and a member of the School Management Team.

My name is Ntsabeng Albertina Mosala, and I am presently studying for a Masters degree with the University of the Free State. As part of my Masters programme, I am required to conduct research on an aspect of interest with a view to making a contribution to our knowledge and understanding of the issue under study. The title of my research project is:

The role of school management teams in supporting mathematics teaching and learning in the senior phase

The study will use a questionnaire as a research instrument which will take approximately 10-15 minutes of your time.

I undertake to observe confidentiality and to protect participants from physical and/or psychological harm. No names of the schools and/or persons shall be used in any reports of the research. All participants will be asked to participate voluntarily in the study and may withdraw at any time should they so wish.

Upon completion of the study, I undertake to provide the Ministry of Education and Training with a copy of the research report and to share my findings with the SMTs in the schools if necessary.

If you need any further information and/or have suggestions to do, do not hesitate to contact me directly on email: ntshabeng@webmail.co.za or Cell: +27 737109153 and/or my supervisor Professor Loyiso Jita at jitalc@ufs.ac.za or call +27 51 401 7522.

Yours Sincerely

_____

Mosala N.A

APPENDIX 3.6: REQUEST FOR PERMISSION TO CONDUCT RESEARCH FROM THE HODS

506 N Bluegumbosch
Phuthaditjhaba
9869

14-July-2017

The Head of Department

XXX School

INVITATION TO PARTICIPATE IN A RESEARCH STUDY

Dear Sir/Madam

I hereby request your permission to participate in a research study as the Head of the Department for Mathematics and a member of the School Management Team.

My name is Ntsabeng Albertina Mosala, and I am presently studying for a Masters degree with the University of the Free State. As part of my Masters programme, I am required to conduct research on an aspect of interest with a view to making a contribution to our knowledge and understanding of the issue under study. The title of my research project is:

The role of school management teams in supporting mathematics teaching and learning in the senior phase

The purpose of the study is to understand the role of SMTs in supporting instructional processes in mathematics, mainly in the senior phase. The study has the potential to benefit teachers who are teaching mathematics with the understanding the role of the SMTs in their instructional processes. It also has the potential to benefit the members of the SMTs with the understanding of how teachers perceive their instructional leadership as well as the support in terms of the challenges that teachers face in the subjects. Policy makers may benefit from the study by gaining understanding about how teachers perceive their SMTs knowledge and instructional leadership competence.

The study will use a questionnaire as a research instrument which will take approximately 10-15 minutes of your time.

I undertake to observe confidentiality and to protect participants from physical and/or psychological harm. No names of the schools and/or persons shall be used in any reports of the research. All participants will be asked to participate voluntarily in the study and may withdraw at any time should they so wish. Upon completion of the study, I undertake to provide the Ministry of Education and Training with a copy of the research report and to share my findings with the SMTs in the schools if necessary.

If you need any further information and/or have suggestions to do, do not hesitate to contact me directly on email: ntshabeng@webmail.co.za or Cell: +27 737109153 and/or my supervisor Professor Loyiso Jita at jitalc@ufs.ac.za or call +27 51 401 7522.

Yours Sincerely

_____

Mosala N.A

APPENDIX 3.7: CONSENT TO PARTICIPATE IN THIS STUDY

I, _____ (participant name), confirm that the person asking my consent to take part in this research has told me about the nature, procedure, potential benefits and anticipated inconvenience of participation.

I have read (or had explained to me) and understood the study as explained in the information sheet. I have sufficient opportunity to ask questions and am prepared to participate in the study. I understand that my participation is voluntary and that I am free to withdraw at any time without penalty (if applicable). I am aware that the findings of this study will be anonymously processed into a research report, journal publications and/or conference proceedings.

I agree to the recording of the survey in the form of questionnaire.

I have received a signed copy of the informed consent agreement.

Full Name of Participant: _____

Signature of Participant: _____ Date: _____

Full Name of Researcher: **Mosala Ntsabeng Albertina**

Signature of Researcher: **Mosala N.A** Date: _____

APPENDIX 3.8: SMTS QUESTIONNAIRE

QUESTIONNAIRE ON THE ROLE OF SCHOOL MANAGEMENT TEAMS (SMTS) IN SUPPORTING MATHEMATICS TEACHING AND LEARNING IN THE SENIOR PHASE (GRADE 7 TO 9)

By completing this questionnaire, I agree to participate in this study based on the fact that confidentiality of all my responses provided below considered. I also understand that I may benefit through the impact of this research by providing my knowledge on instructional leadership in respect to duties as part of the SMT. Thus, to obtain reliable, scientific Information it is necessary that I answer the questions as honestly as I can.

SECTION A: Biographical information (BI)

This questionnaire aims at collecting background information from you pertaining to instructional leadership at senior phase level. Just circle appropriate number to suits your response.

1. **Gender**

Male	**1**
Female	**2**

2. **Age**

20 to 30 years	**1**
30 to 39 years	**2**
40 to 49 years	**3**
50 to 59 years	**4**
60 years and above	**5**

3. **Highest qualification**

Teacher's Certificate	**1**
Teacher's Diploma	**2**
First Degree (e.g. B.A, B.Ed., B.Sc., B.Com etc.)	**3**
Post-graduate Diploma or Certificate	**4**
Post-graduate degree Honours	**5**
Post-graduate degree Masters or PhD	**6**
Other (specify): _____	**7**

4. Rank

POSITION	TICK (X)
Principal	**1**
Deputy principal	**2**
HOD	**3**

5. Major Subjects

Mathematics	1
Languages	2
Natural Sciences	3
Social Sciences	4
Economic and Management Science	5

6. Experience as for the current position

0 to 5 years	**1**
6 to 10 years	**2**
11 to 15 years	**3**
16 to 20 years	**4**
Above 20 years	**5**

7. Teaching experience prior to current position

0 to 5 years	**1**
6 to 10 years	**2**
11 to 15 years	**3**
16 to 20 years	**4**
Above 20 years	**5**

8. Number of teachers in your subject department/school

1 to 3	**1**
4 to 6	**2**
7 to 9	**3**
10 and above	**4**

9. Location of your school

Farm school	**1**
Township school	**2**
School in town	**3**

SECTION B: Perceptions, knowledge and beliefs on instructional leadership (PKBIL)

The following statements are designed to pursue the SMTs leaders' perceptions, knowledge and beliefs about mathematics curriculum and instruction in the senior phase. For each statement, circle the category that best suit your agreement or disagreement according to the following Likert scale:

5= Strongly Agree

4= Agree

3= Uncertain

2= Disagree

1= Strongly Disagree

B.1 SMTs' perceptions about support for mathematics curriculum

To be completed by HODs

HODs' perceptions (HP)	SA	A	U	D	SD
10. Mathematics curriculum support and performance is my responsibility as the subject leader	5	4	3	2	1
12. I view myself as a person responsible for career opportunities for teachers in my department	5	4	3	2	1
13. I perceive distributed leadership as a key to mathematics instruction.	5	4	3	2	1
14. Professional Development is observed as a factor to support teachers	5	4	3	2	1
15. The instructional leader projects himself or herself as a role model in providing guidance	5	4	3	2	1

To be completed by Deputy Principals

Deputy Principals' perceptions (DPP)	SA	A	U	D	SD
11. Mathematics curriculum support and performance is my responsibility as the subject leader	5	4	3	2	1
16. I view myself as a person responsible for career opportunities for teachers in my department	5	4	3	2	1
17. I perceive distributed leadership as a key to mathematics instruction.	5	4	3	2	1
18. Professional Development is observed as a factor to support teachers	5	4	3	2	1
19. The instructional leader projects himself or herself as a role model in providing guidance	5	4	3	2	1

To be completed by Principals

Principals' perceptions (PP)	SA	A	U	D	SD
12. Mathematics curriculum support and performance is my responsibility as the subject leader	5	4	3	2	1
20. I view myself as a person responsible for career opportunities for teachers in my department	5	4	3	2	1
21. I perceive distributed leadership as a key to mathematics instruction.	5	4	3	2	1
22. Professional Development is observed as a factor to support teachers	5	4	3	2	1
23. The instructional leader projects himself or herself as a role model in providing guidance	5	4	3	2	1

B.2 SMTs' knowledge about support for mathematics curriculum

To be completed by HODs

HODs' Knowledge (HK)	SA	A	U	D	SD
24. I am always confident about mathematics content knowledge.	5	4	3	2	1
25. I manage to advise mathematics teachers about better teaching approaches.	5	4	3	2	1
26. I assist teachers in arranging extra classes after school and I am always part of those classes.	5	4	3	2	1
27. I always ensure that quality teaching and learning is maintained.	5	4	3	2	1
28. Regularly monitor teachers' work, support and develop teachers.	5	4	3	2	1

To be completed by Deputy Principals

Deputy Principals' Knowledge (DPK)	SA	A	U	D	SD
29. I am always confident about mathematics content knowledge.	5	4	3	2	1
30. I manage to advise mathematics teachers about better teaching approaches.	5	4	3	2	1
31. I assist teachers in arranging extra classes after school and I am always part of those classes.	5	4	3	2	1
32. I always ensure that quality teaching and learning is maintained.	5	4	3	2	1
33. Regularly monitor teachers' work, support and develop teachers.	5	4	3	2	1

To be completed by Principals

Principals' Knowledge (PK)	SA	A	U	D	SD
34. I am always confident about mathematics content knowledge.	5	4	3	2	1
35. I manage to advise mathematics teachers about better teaching approaches.	5	4	3	2	1
36. I assist teachers in arranging extra classes after school and I am always part of those classes.	5	4	3	2	1
37. I always ensure that quality teaching and learning is maintained.	5	4	3	2	1
38. Regularly monitor teachers' work, support and develop teachers.	5	4	3	2	1

B.3 SMTs' beliefs about support for mathematics curriculum

To be completed by HODs

HODs' beliefs (HB)	SA	A	U	D	SD
39. I believe that the sound relationship with teachers influence their performance.	5	4	3	2	1
40. I believe that a creation of co-responsibility among Mathematics teachers can improve learner performance.	5	4	3	2	1
41. As a manager I believe that it is my responsibility to provide resources to teachers.	5	4	3	2	1
42. The HODs should create positive environment to improve learner performance in Mathematics.	5	4	3	2	1
43. It is my responsibility as the HOD to arrange relevant programs to enhance learner academic performance.	5	4	3	2	1

To be completed by Deputy Principals

Deputy Principals' beliefs (DPB)	SA	A	U	D	SD
44. I believe that the sound relationship with teachers and their HODs influence their performance.	5	4	3	2	1
45. I believe that a creation of co-responsibility among Mathematics teachers and HODs can improve learner performance.	5	4	3	2	1
46. As a manager I believe that it is my responsibility to provide resources to HOD and teachers.	5	4	3	2	1
47. I should create positive environment to improve learner performance in Mathematics.	5	4	3	2	1
48. It is my responsibility as the Deputy Principal to arrange relevant programs to enhance learner academic performance.	5	4	3	2	1

To be completed by Principals

Principals' beliefs (PB)	SA	A	U	D	SD
49. I believe that the sound relationship with the SMT and teachers influence the school performance in all subjects.	5	4	3	2	1
50. I believe that a creation of co-responsibility and share instructional leadership among SMTs and teachers and can improve learner performance.	5	4	3	2	1
51. As a manager I believe that it is my responsibility to provide resources to HOD and teachers.	5	4	3	2	1
52. I should create positive environment to improve learner performance in Mathematics.	5	4	3	2	1
53. It is my responsibility as the Principal to arrange relevant programs to enhance learner academic performance.	5	4	3	2	1

SECTION C: Practical Support for Mathematics Curriculum and Instruction (PSMCI)

The following statements are intended to understand the school leaders' practical support and role on mathematics curriculum and instruction. For each statement, circle the category that best suit your agreement or disagreement according to the following Likert scale:

5= Strongly Agree

4= Agree

3= Uncertain

2= Disagree

1= Strongly Disagree

To be completed by HODs

HODs' practical support (HPS)	SA	A	D	SD	U
54. I have departmental year plan and always stick to it.	5	4	3	2	1
55. The staff development programs are included in the year plan.	5	4	3	2	1
56. Mathematics tasks are always moderated before given to learners.	5	4	3	2	1
57. Mathematics curriculum is monitored effectively.	5	4	3	2	1
58. I communicate mathematics issues with senior management as planned.	5	4	3	2	1

To be completed by Deputy Principals

Deputy Principals' practical support (HPS)	SA	A	D	SD	U
59. I am directly involved in mathematics curriculum related issues.	5	4	3	2	1
60. The staff development programs are included in the year plan.	5	4	3	2	1
61. Mathematics tasks are always moderated before given to learners.	5	4	3	2	1
62. Mathematics curriculum is monitored effectively.	5	4	3	2	1
63. I communicate mathematics issues with teachers, HODs and Principal as planned.	5	4	3	2	1

To be completed by Principals

Principals' practical support (HPS)	SA	A	D	SD	U
64. I am directly involved in mathematics curriculum related issues.	5	4	3	2	1
65. The staff development programs are included in the year plan.	5	4	3	2	1
66. Mathematics tasks are always moderated before given to learners.	5	4	3	2	1
67. Mathematics curriculum is monitored effectively.	5	4	3	2	1
68. I communicate mathematics issues with the SMT and teachers involved management as planned.	5	4	3	2	1

SECTION D: SMT's Influences and challenges (SIC)

The following statements are intended to understand the HODs' overall influence or lack by the HODs on mathematics curriculum and instruction.

69. How long have you been teaching mathematics?

_____

70. What kind of professional development have you received as the HOD?

_____
_____

71. Have you looked for any opportunity to learn about being the HOD?

_____
_____

72. What do you do to provide leadership for mathematics teaching?

_____
_____

73. What are the challenges you face in leading teaching and learning of Mathematics?

_____
_____

74. How do you address challenges you have identified?

_____
_____

The following statements are intended to understand the Principals and Deputy Principals' overall influence or lack by the senior leaders on mathematics curriculum and instruction.

75. With reference to your position, what specific contribution do you make to develop mathematics teachers?

_____
_____
_____

76. What preparations have your HODs for mathematics received before they occupied their positions?

_____
_____
_____

77. What kind of professional development have your HODs received on their job?

_____
_____
_____

78. What kind of development do you think your HODs need at present?

_____
_____

79. What are the roles and responsibilities of HODs as leaders of Mathematics teaching?

_____
_____

80. What do your HODs do to provide leadership for the teaching of mathematics?

_____
_____

81. What would you say are the challenges your HODs face in providing leadership for mathematics teaching?

_____
_____

82. What your HODs do to respond to the challenges you have identified?

_____
_____

APPENDIX 3.9: ETHICS CLEARANCE LETTER FROM RIMS

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA
UFS·UV
EDUCATION
OPVOEDKUNDE

Faculty of Education

21-Aug-2017

Dear **Miss Ntsabeng Mosala**

Ethics Clearance: **The role of school management teams in supporting mathematics teaching and learning in the senior phase**

Principal Investigator: **Miss Ntsabeng Mosala**

Department: **School of Mathematics Natural Sciences and Technology Education (Bloemfontein Campus)**

APPLICATION APPROVED

With reference to you application for ethical clearance with the Faculty of Education, I am pleased to inform you on behalf of the Ethics Board of the faculty that you have been granted ethical clearance for your research.

Your ethical clearance number, to be used in all correspondence is: **UFS-HSD2017/0997**

This ethical clearance number is valid for research conducted for one year from issuance. Should you require more time to complete this research, please apply for an extension.

We request that any changes that may take place during the course of your research project be submitted to the ethics office to ensure we are kept up to date with your progress and any ethical implications that may arise.

Thank you for submitting this proposal for ethical clearance and we wish you every success with your research. Yours faithfully

Prof. MM Mokhele

Chairperson: Ethics Committee

Education Ethics Committee
Office of the Dean: Education
T: +27 (0)51 401 9683| F: +27 (0)86 546 1113 | E: NkoaneMM@ufs.ac.za
Winkie Direko Building | P.O. Box/Posbus 339 | Bloemfontein 9300 | South Africa
www.ufs.ac.za

APPENDIX 3.10: APPROVAL TO CONDUCT RESEARCH IN THE FREE STATE DEPARTMENT OF EDUCATION

Enquiries: BM Kitching
Department of Education, Free State Province
Ref: Research Permission: NA Mosala
Tel. 051 404 9283 / 9221 / 082 454 1519
Email: berthakitching@gmail.com and B.Kitching@edu.fs.gov.za

NA Mosala
566 N, Bluegumbosch
PHUTHADITJHABA, 9869
073 710 9153

Dear Ms Mosala

APPROVAL TO CONDUCT RESEARCH IN THE FREE STATE DEPARTMENT OF EDUCATION

1. This letter serves as an acknowledgement of receipt of your request to conduct research in the Free State Department of Education.

   Research Topic: The role of school management teams in supporting Mathematics teaching and learning in the senior phase.

   Schools: Schools: Thabo Mofutsanyana District: 89 schools.

   Target Population: Principals, Deputy Principals, and Heads of Departments: Mathematics from the 89 schools in Thabo Mofutsanyana District.

   Period of research: From the date of signature of this letter until 30 September 2018. Please note the department does not allow any research to be conducted during the fourth term (quarter) of the academic year nor during normal school hours.

2 Should you fall behind your schedule by three months to complete your research project in the approved period, you will need to apply for an extension.

3. The approval is subject to the following conditions.

   3.1 The collection of data should not interfere with the normal tuition time or teaching process.

   3.2 A bound copy of the research document or a CD, should be submitted to the Free State Department of Education, Room 319, 3rd Floor, Old CNA Building, Charlotte Maxeke Street, Bloemfontein.

   3.3 You will be expected, on completion of your research study to make a presentation to the relevant stakeholders in the Department.

   3.4 The ethics documents must be adheared to during your study in our department.

4. Please note that costs relating to all the conditions mentioned above are your own responsibility.