Subject Advisors' reflections of the supervision of Grade 3 Mathematics CAPS implementation in Mpumalanga Province

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Declaration

I, Charlotte Myriam Moshala Galane, declare that this Thesis contains my own work. All sources that were used or quoted have been fully referenced. This study has not been previously accepted for any degree at any university and is not being currently considered for any other degree at any other university.

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Acknowledgements

Abstract

Despite the Department of Education's introduction of Curriculum and Assessment Policy Statement (CAPS) for implementation since 2012; underperformance and low attainment of South African learners in Mathematics across some Grades (Grade 3- 12) of schooling continue to be a matter concern for government. To support proper implementation and to monitor whether the intended curriculum is meeting its aims and objectives, government has put systems in place for this purpose. As one of their core duties, SAs are to supervise (monitor) and support curriculum implementation in all the subjects offered in all phases of schooling. This action research was aimed at exploring 8 Foundation Phase SAs reflections of their supervision of Grade 3 Mathematics CAPS implementation in Mpumalanga Province. Data was generated in two phases using reflective activities, one- on- one semi- structured interviews and focus group discussion. Guided data analysis, using the ten themes of the curricular spider web was used as a framework for analysis. Findings revealed that supervision alone does not have any developmental benefit to educators. The data analysis findings therefore indicate that a grounded rationale for supervision, backed by continuous critical reflections of SAs will be a very strong foundation for SAs to improve their supervision practice. The study also established that SAs are aware of the aims of the CAPS and also the aims and objectives of the foundation Phase Mathematics curriculum, but they cannot classify that these are objectives or outcomes as CAPS did not identify them as such. The main conclusions drawn from this research were that Curriculum aims and objectives should be clearly stated in simple understandable language in the CAPS documents. SAs also need to conscientise educators about curriculum aims and objectives, and also encourage them to set clear lesson outcomes which will help them to meet curriculum objectives and improve performance.

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Acronyms

ABET- Adult Basic education and Training

ACE - Advanced Certificate in Education

ACP - Alternative Certificate Programme

AET- Adult Education and Training

AMTE- Association of Mathematics Teachers

ASSM- Association of the State Supervision of Mathematics

B. Ed- Bachelor of Education

C2005- Curriculum 2005

CAPS- Curriculum and Assessment Policy Statement

DBE- Department of Basic Education

ECD- Early Childhood Development

FET- Further Education and Training

FP- Foundation Phase

HE- Higher Education

HOD- Head of Department

MA- Master of Education

NCS- National Curriculum Statement

NCSM- National Council of Supervision of Mathematics

NCTM- National Council of Teachers of Mathematics

PIRLS- Progress in International Reading literacy Study

RNCS- Revised National Curriculum statement

SA- Subject Advisor

SAQMEQ- Southern and Eastern Africa Consortium for Monitoring Educational quality

TIMMS- Trends in International Mathematics and Science Study

CHAPTER 1

OVERVIEW, CONTEXT AND OBJECTIVES

1.1 Introduction

From 1994 to date the intended national (macro) curriculum in South Africa has been under reform. It changed from Curriculum 2005 (C2005)/Revised National Curriculum Statement (RNCS)/National Curriculum Statement (NCS) (competence curriculum) to the Curriculum and Assessment Policy Statement (performance curriculum). This suggests that to date, two curriculum models (i.e. C2005 and CAPS) emerged. Therefore, it may be argued that there is a clear distinction between the two curricula because they both draw from Bernstein's (1975) approaches to curriculum, which are integrated (competence) (C2005) and collection (performance) (CAPS) curricula. These changes were done in pursuit of improving education and improving learners' performance. Despite the Department of Education's attempts to improve the quality of education in South Africa, performance of learners continues to deteriorate year by year.

It has also been noted that in South Africa the underachievement of learners not only occurs in national assessments; they also underachieve in assessment tasks that are set in schools, at provincial level and those that are set at international level The Southern and Eastern Africa Consortium for Monitoring Educational quality (SAQMEQ), Trends in International Mathematics and Science Study (TIMSS), and Progress in International Reading literacy Study (PIRLS). The Minister of Education and the Director General, when presenting the SAQMEQ report of 2010, confessed that learners are continuing to underperform with unacceptably low levels and quality of competencies in basic literacy and numeracy skills (Department of Education, 2010). The results of both national and international studies reveal quite clearly that South African schools are contributing to the failing results of a large number of children as they are unable to assist them to develop the skills they need to do basic mathematics (Department of Basic Education, 2012). For this study, I chose Grade 3 not only because it is an exit Grade in the Foundation Phase.

The schooling system of South Africa has three education bands. Firstly, the General Education and Training Band (GET) caters to learners from Grade R-9 and includes Early Childhood Development (ECD) and Adult Education and Training (AET) which was formerly called Adult Basic Education and Training (ABET). AET is not only concerned with teaching adults basic Literacy and Numeracy skills, but also training them in skills that

they need as a foundation. This is because most of them are already in workplaces and they use communication and perform other tasks related to their jobs (SouthAfrica.info, 2014). The second band is the Further Education and Training Band (FET) that caters to learners from Grade 10 - 12 and those in FET Colleges (NQF Level 4) which is equivalent to Grade 12. Lastly we have the Higher Education (HE) band which spanned Levels 5-8 on the National Qualification Framework (NQF) (Department of Basic Education, 2010).

This implies that for learners to be able to access quality education, they have to first go through the three bands. In two out of these three bands, in addition to classroom educators, there are SAs who are subject specialists per phase. In ECD the SAs support community-based early learning centres and pre-schools which are state subsidised and they also support and monitor Grade R's in pre-schools and those that are based in primary schools. In the Foundation Phase they supervise (monitor) and support curriculum implementation and support educators from Grade 1-3. The Foundation Phase SAs support educators in all the subjects offered in the Foundation Phase. In the Intermediate and Senior Phase they are subject specialists. There are SAs for languages and those for content subjects like mathematics, technology, and natural sciences.

The choice for Grade 3 is also because in the Foundation Phase, Grade 3 is used to measure whether the curriculum is achieving its goals and the correct content has been taught. This is done through the Annual National Assessment whereby Grades 3, 6 and 9 are used to enable whole system reporting (Department of Basic Education, 2014). Based on this challenge I felt that there is a need to conduct this type of study in order to explore SAs' reflections of the supervision of Grade 3 Mathematics Curriculum and Assessment Policy Statement (CAPS) implementation.

1.2 Title
Subject Advisors' reflections of the supervision of Grade 3 Mathematics Curriculum and Assessment Policy Statement (CAPS) implementation in Mpumalanga Province.

1.3 Focus and purpose of the study
The purpose of this study is to explore Subject Advisors' reflections of the supervision of Grade 3 Mathematics Curriculum and Assessment Policy Statement implementation. In

schools, educators implement curriculum practically in their classrooms to the learners. As frontline implementers, educators are the ones who directly implement the curriculum and are accountable for learners' performance. They are the ones who experience the successes and challenges of the Mathematics curriculum implementation process, if any. For accountability purposes, and to measure the impact of curriculum, their classroom practice is still supervised or monitored, though it is no longer called inspection but is rather known as monitoring and support. This is done through SAs, who are still viewed, in some instances, as inspectors whose main role is to find fault instead of providing support. SAs have been tasked with monitoring the implementation of curriculum at all levels of schooling. They are office-based educators who are, in most instances, called Curriculum Implementers (CIs) or Curriculum Advisors (CAs) because of the nature of their work. During the Apartheid era they were called school inspectors and with time their name changed and now they are popularly known as to SAs. The way SAs are still viewed leads to poor curriculum implementation because educators tend to shun the support the SAs are supposed to provide; which also lead to poor learner performance. This therefore highlights the need for reflective processes amongst educators.

1.4 Location of the study

The context into which this study took place was the Department of Education in Mpumalanga, Foundation Phase Curriculum section. The study targeted the four districts of Mpumalanga Province. The districts are Nkangala, Gert Sibande, Ehlanzeni and Bohlabela Districts. Mpumalanga is a diverse province with a total of 9 of the 11 official languages spoken in the province. These languages are SiSwati, IsiNdebele, Sepedi, Xitsonga, Setswana, Sesotho, IsiZulu, English and Afrikaans. In all the four districts the schools accommodate learners from different socio-economic backgrounds. Learners come from poor socio-economic, working class, and middle class backgrounds. Schools that are supervised include schools from rural areas, farm schools, township schools and former Model C schools. Within this context of the province, this study focused on SAs reflections of the supervision of Grade 3 Mathematics CAPS.

1.5 Rationale of the study

I have chosen to conduct this study for a number of reasons. Firstly, I have chosen this study because of personal interest. I have been a Foundation Phase teacher, teaching Grade 3, for quite some time and now I am a Foundation Phase SA. As a teacher, one of the subjects I

taught was Mathematics because it is a core subject in the Foundation Phase and if a learner does not achieve 40% or more in Mathematics they are will not progress to the next Grade. Currently I have been appointed as Mathematics SA in the Foundation Phase, but due to inadequate human resources in the Phase I also provide monitoring and support in other subjects offered in the Foundation Phase (i.e. Home Language, Additional Language and Life Skills). There is consensus in the literature that South African learners are continuing to underperform in Mathematics. This is posing some serious threats to the intended curriculum.

Secondly, this study was prompted by limited research on this phenomenon because most studies concentrate more on experiences of classroom-based educators, than on SAs (SAs), who are office-based educators, as a source of curriculum support.

Lastly, I chose Grade 3 because it is an exit Grade in the Foundation Phase and also because the Annual National Assessment uses Grades 3, 6 and 9 to enable system-wide reporting (Department of Basic Education, 2013). Based on this challenge I felt that there is a need to conduct a study of this nature in order to explore SAs' reflections of the supervision of Grade 3 Mathematics Curriculum and Assessment Policy Statement (CAPS) implementation.

I used reflections by SAs on their experiences because reflections are deemed important in education. According to Kabilan (2007, p. 684) "reflection is a subjective yet structured intellectual practice that can engage teachers' self-examination and enhance their understanding of teaching and learning in ways that are fresh, stimulating, and challenging". Dewey's (1933) view of reflection is that it is a special form of problem solving characterised by a scaffolding of experiences and events that should be viewed as an active and deliberate cognitive process. Khoza (2015a) conducted an interpretive case study on student teachers' reflections on their practices of Curriculum and Assessment Policy Statement. The findings of the study indicated that, when people are given the opportunity to reflect it encourages self-reflection, verbal reflection and written reflection (Schön, 1984) which promotes critical thinking. This suggests that when people reflect, they have an opportunity to engage in self-talk and it becomes important to have studies that give SAs a voice too, whereby they are also able to reflect on their practice of supervision of classroom educators on the intended curriculum implementation (CAPS). According to Nodoushan and Daftarifard (2011), reflection is a cyclical process which includes *in* action (in the midst of practice), *on* action (task takes place after action), and *for* action (desired outcome of both previous types of

reflection) thinking and reflection. Therefore, SAs were involved in reflection cycles that reflected on their own practice.

The results of this study may not only assist me in my journey as a SA, but may also help other SAs to reflect on their current practices and perhaps increase the level of support they are providing to teachers with regard to Grade 3 Mathematics. Teachers could also discover how best, with support from SAs of course, to improve their mathematical content knowledge and teaching methods in order to be as beneficial as possible to the learners. The results of the study may also assist the Department of Education, curriculum developers, policy makers and other stakeholders (involved in matters related to curriculum planning and development of Mathematics in the early Grades of schooling and education of young learners) to revise policies and perhaps fine tune the curriculum in a way that will benefit all learners.

1.6 Objectives of the study
The purpose of this study is to:

- ❖ To identify Subject Advisors' reflections of the supervision of Grade 3 Mathematics CAPS implementation.
- ❖ To explain the reasons why Subject Advisors reflect in a particular way.

1.7 Research questions
- ❖ What are the Subject Avisors' reflections of the supervision of Grade 3 Mathematics CAPS implementation?
- ❖ Why do Subject Advisors have particular reflections on Grade 3 Mathematics curriculum?

1.8 Research design and methodology
1.8.1 Research Paradigm
Critical paradigm was used for the purpose of this study. In critical paradigm it is acknowledged that in society there are issues of power and politics and its main aims are to transform or bring about some kind of social change (Elshafie, 2013 and Christiansen *et al.* 2010). Therefore, the critical paradigm was found to be the most suitable for this study because its aim is to explore the reflections of SAs on the implementation of Grade 3 Mathematics CAPS, with the intention of improving educators' pedagogical practices and learners' performance. This is consistent with Elshafie's (2013) assertion that the aim of

research in this paradigm is not to understand, but to improve the researched content. Based on evidence presented by the literature and in the national assessment results, international assessments i.e. SAQMEC there is growing concern that in South Africa, learners are not performing well as compared to their peers in other countries.

1.8.2   Research approach

As this is study falls under the critical paradigm, an action research was the most appropriate research approach for the study of this nature. According to Christiansen *et al.* (2010, p. 39) "An action research is done by particular people on their own work". It is concerned mainly with practice and gives the researcher a voice and changes the situation being researched and improves the standard of practice. In educational practices, according to Mills (2003), action research is guaranteed to have a comprehensive view of the context under study in order to improve practice or work conditions through using reflections as a common practice and adapting the work environment with effective changes, which is exactly the intention of this study.

Moreover this action research adopted a qualitative approach of research whereby I, as the researcher, besides the need to see transformation in my practice, I also believed there was a need to understand SAs' reflections on their work, within their natural setting. There is consensus in literature that the approach in qualitative research is used to understand people's life experiences, their circumstances, and give those meaning (Burns & Grove, 2003 and Hesse-Biber & Leavy, 2011). Researchers who use qualitative approach also have a particular way of asking questions and thinking thorough problems and meaning (Hesse-Biber & Leavy, 2011). Furthermore, these researchers investigate broadly stated questions and people, their experiences and their realities (Litchtman, 2011).

1.9 Sampling

According to Burns and Grove (2003) and Christiansen *et al* (2010), sampling is a process of choosing a group of people, settings and actions or activities with which to conduct a study. These definitions suggest that the researcher does not conduct a study before deciding on their unit of analysis and population to include in a study. For the purpose of this study, purposive and convenience sampling were used. Parahoo (1997) maintains that purposive sampling is ―a method of sampling where the researcher deliberately chooses who to include in the study based on their ability to provide necessary data" (p.232). Therefore, for this

study, the eight Foundation Phase SAs who were participating in this study were conveniently sampled because they are knowledgeable about supervision and fit the criteria because they are supervising the Mathematics curriculum implementation in the Foundation Phase.

1.10   Research methods

This study used three data generation methods to generate data. They are reflective activities, one- on-one semi-structured interviews, and focus group discussion.

1.10.1.   Reflective Activity

According to Milam (2008), a reflective activity is a written activity that requests participants to complete a number of questions based on the study at hand. Therefore, reflective activity questions for this study were based around the issues of the curricular spider web, focusing specifically on SAs. The questions are as follows: Why are you supervising the implementation of Grade 3 Mathematics CAPS? Who are you supervising? Towards which goals are you supervising? What are you supervising? Where and when are you supervising? What resources are you using during supervision and how is your supervision being evaluated?

Of the eight SAs, two of them were given reflective activities in a form of hardcopies as they are stationed at my office premises. The rest of the SAs were emailed the reflective activities. It was anticipated beforehand that the reflective activity may be time consuming if they were to be completed during the supervision process in schools, or when we are together as, their authenticity may be compromised. Therefore, the activities were completed within their own time. After completing the reflective activities they emailed them back to me. After submission of the activities, I then arranged the interviews.

1.10.2.   One-on-one interviews

Christiansen *et al.* (2010, p.65) define an interview as ―a conversation between the researcher and the respondent… it is a structured conversation where the researcher has in mind particular information that he or she wants from the respondent, and has designed particular questions to be answered".

One-on-one semi-structured interview were found to be the most suitable for this study because it gave me an opportunity to follow a more flexible process as indicated by Henning

et al. (2009). Planning for the interview included securing a comfortable place to conduct the interviews and creating a list of questions related to the topic as based on the curricular spider web themes. This helped me to generate data in a systematic and focused manner as Henning *et al.* (2009) maintained. Interviews were conducted in a conducive environment at a lodge and the interviewees were very relaxed. At the start of each interview, I firstly explained the purpose and the procedure the interview would follow. Secondly, the participants were assured that anonymity would be maintained and lastly it was clearly explained that the interview will be recorded. I used a cell phone to record the interview and later transcribe the audio in order to analyse my data. The transcripts were helpful as it was not possible to write everything that the participants were saying during the interview session. Koshy (2005, p.93) correctly points out that the ―transcripts provide powerful evidence for presenting data and making conclusions", which is one of the strengths of interviews.

1.10.3. Focus group

Terre Blanche *et al.* (1999), Lodico *et al.* (2010) and De Vos *et al.* (2002) assert that a focus group is a type of interview that is formed by a group of between six to ten people who share similar types of experiences, have certain common characteristics and have common referent in relation to the topic under research or guided by the purpose of the study. The focus group for this study was planned with seven of the eight SAs who were the participants after the one-on-one interview sessions. We knew the venue of the interview in advance and confirmed that it was conducive. The eighth participant was called and informed about the arrangement. Like the interview, the focus group was also recorded and transcribed. The focus group also followed the four components of focus group as stipulated by Terre Blanche *et al.* (2006) which are procedure, interaction, content and recording.

I facilitated the focus group discussions and the questions were also framed around the curricular spider web concepts, but they were more open-ended and allowed flexibility in answering. As I was facilitating, I realised that it would be difficult to take full notes and this was going to be a challenge for me. To overcome this I requested that a colleague, who was not a participant in the study, take some notes for us and the participants agreed.

1.11 Data analysis

Data analysis is ―the process of bringing about order, structure and meaning to the mass of collected data" (De Vos *et al.* 2002, p. 339). There is consensus between Koshy (2005) and Christiansen *et al.* (2010) that a qualitative data analysis can be done through one of two

processes, inductive or deductive. According to Koshy (2005), qualitative data analysis has a particular strength for an action researcher because it focuses on events that occur naturally and in natural settings. For the purpose of this study I used guided data analysis, whereby both inductive and deductive data analysis processes were involved. Data was appropriately categorised during analysis according to the concepts of the curricular spider web and accommodated new categories that emerge from data.

1.12 Ethical considerations

According to Christiansen *et al.* (2010), considering ethical matters in research that involve human beings is very important. Furthermore, there are certain principles that the researcher has to follow when dealing with ethical issues. These principles are autonomy, non-maleficence and beneficence (Christiansen *et al.* 2010). Autonomy of all SAs participating in this study was respected. Participants were asked to voluntarily consent to participating in the study. I emailed each one of them a consent form and a letter. The letter outlined the purpose of the study and procedures to follow for data generation and storage. Furthermore, it was mentioned in the letter that there will be no limits of any benefits that they may receive as participants. Lastly, the letter explained how the voice recorder will be used during the interview. The participating SAs confirmed their participation by signing and submitting the consent forms. I also ensured that the study would not, in any way, harm the participants or expose them to any kind of danger by conducting the interviews and focus group in safe and conducive environment. Confidentiality was maintained by not revealing the real names of the participants. They were identified as SAs 1- 8 (SA1- SA8).

I sought permission to conduct the study from the Mpumalanga Department of Education via the provincial office's research section. Lastly, I sent my research proposal to the University of KwaZulu-Natal to defend it for this study. I then applied for ethical clearance through the university's research ethics office, and they sent me an ethical clearance certificate once the study was approved.

1.13 Trustworthiness

Trustworthiness is ―the truth value of a piece of research" Holloway and Wheeler (1996, p. 261). Streubert and Carpenter (1999, p. 61) add that ―trustworthiness of the research depends on the extent to which it delves into the participants' experiences apart from their theoretical knowledge". Trustworthiness involves the elements of credibility, dependability, conformability and transferability.

In qualitative research the researcher's ability to demonstrate that they had a prolonged engagement with the participants is called credibility (Guba & Lincoln, 1994). In addition, the researcher will also use different sources, different research methods and sometimes a number of researchers as evidence of continuous observation.

According to Guba and Lincoln (1994, p. 307), ―credibility in qualitative research is the ability of the researcher to demonstrate a prolonged period of engagement with participants, to provide evidence of persistent observation, and to triangulate by using different sources, different methods and sometimes multiple investigators". To achieve this, the reflective activities were analysed together with the participants for reflection purposes and the notes taken during the interview sessions and the tape recorder were also used to ensure credibility.

Creswell (2003) maintains that data may be said to be dependable if it can be established to what extent the same findings could be repeated if the same research instruments were replicated with similar respondents under similar conditions. For dependability I provided original evidence of data generated from the reflective activities and used direct quotations. Where necessary, the transcriptions of the recorded responses were also quoted.

Guba and Lincoln (1994) define conformability as the extent to which findings are free from bias. I ensured conformability by laying aside my preconceptions about the issue under research and by seeking more clarity from the participants themselves through reflective activities and interviews. There was a fear that I may not be able to conform as I am also a Subject Advisor, but I ensured conformity by requesting another person to assist during the note taking. Transferability refers to the possibility of applying the findings of the current study to a different setting as the original setting. (Guba & Lincoln, 1994). For the purpose of this study transferability was enhanced by organising the findings in such a way that people who are going to read this study will be able to relate them with their own experiences, and as such they might benefit and also reflect on their own practices for transformation purposes.

1.14 Anticipated limitations of the study

There were three anticipated limitations of this study. Firstly, time. The nature of our job as SAs is unpredictable and we have to meet specific targets every month. We also do not meet often as provincial SAs. To overcome this challenge I sent the reflective activities by email to the participants. There are scheduled times during the year when we meet for between two and four days as Provincial Foundation Phase SAs to carry out some of our planned activities and sectional meetings. Therefore time to conduct interviews was targeted during the times

when we were all meeting as Provincial Foundation Phase SAs at a common venue. . Prior to our meeting, the participants were informed about the interviews. The reflective activities were sent back to me via email and I printed them.

The second challenge was that, though we are from various districts, the participants were my colleagues. Therefore, it may have been possible that they end up providing fabricated or biased responses in fear of being undermined, which may tamper with validity and reliability of the research findings. To cross this hurdle, the participants were assured that their confidentiality and anonymity will be maintained at all times. I also indicated to them that as SAs they were reflecting on their own practice, and that I am also researching my own practice with the aim of transforming and improving the quality of implementation of the Mathematics CAPS in Grade 3.

1.15 Chapter overview

1.15.1. Chapter One

This chapter acquaints the reader with the background of the study at hand. It presents the title, focus, purpose, and its location. The chapter further highlights the rationale of the study and shows why there is a need to conduct the study of this nature; and its significance is also outlined. A brief explanation of the research approach, research methods, and how sampling was done were also shown. The chapter also presents a summary of how data will be analysed and the limitations of the study.

1.15.2. Chapter Two

The chapter presents the reader with a detailed review of the literature from studies related to reflections and curriculum presentations. Curriculum presentation focus mainly on intended, implemented and attained curriculum. It also looks into competence and performance curriculum. Finally the chapter presents the themes of the curricular spider web as the conceptual framework of the study.

1.15.3. Chapter Three

Chapter 3 will present and informing the reader about the research methodology adopted for this study. The research methodologies will help in achieving the purpose of the study. The chapter indicates that this study is an action research in the critical paradigm. It also presents three research methods that will be used i.e. reflective activities, interviews, and focus group discussions.

The chapter also presents the type of sampling used; purposive and convenience sampling of eight Foundation Phase SAs. Furthermore, the chapter presents how trustworthiness will be achieved using credibility, transferability, dependability and conformability. Guided analysis (inductive and deductive reasoning), ethical issues and the limitation of the study will also be presented.

1.15.4. Chapter Four

The chapter presents the analysis from the generated data and discusses the findings from the SAs' reflections. The presentation of data is done using the ten concepts of the curricular spider webs as themes. To ensure that the participants' voices are not lost, quotations will be used. SAs' reflections will be identified and presented based on each theme of the curricular spider web followed by an analysis and synthesis of the findings by aligning them to the three levels of reflections (technical, practical and critical).

1.15.5. Chapter Five

This chapter revisits the overall aims and objectives of the study and establishes whether they have been addressed in Chapter 4. The research findings are then summarised in relation to the purpose of the study and the specific questions. Conclusions will then be drawn and linked to the objectives of this research and recommendations are made. As implementing the recommendation may have some challenges, limitations will also be outlined.

Chapter summary

This chapter presented the background of the study and the research questions. This will assist in helping people who will be engaging with this study to understand why the study of this nature had to be conducted. Chapter Two presents the literature review. Chapter Three discusses the research design and methodology. Chapter Four discusses analysis and findings of the study and Chapter Five discusses conclusions and recommendations as based on the findings.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

Monitoring and support of curriculum implementation is a mechanism that the Department of Education uses to ensure that the intended curriculum is serving its purpose and achieving its goals. For this reason SAs, as one of their key roles, monitor and support curriculum implementation in all subjects including the Grade 3 Mathematics Curriculum and Assessment Policy Statement implementation. This research was prompted by limited research on this phenomenon because other studies concentrate more on the experiences of classroom-based educators, than on SAs who are office-based educators. Their experiences, whether positive or negative, are overlooked. This chapter will attempt to review some of the main evidence presented in literature that focuses on the objectives of this study; to identify SAs' reflections of the supervision of Grade 3 Mathematics CAPS implementation and to explain the reasons why SAs reflect in a particular way. According to Hart (2009), literature review is integral to the success of academic research and it ensures that the researcher's topic is researchable. Hart (2009) further postulates that the importance of reviewing literature is in that it helps the researcher to understand their topic in terms of what has already been done on, how it has been researched and what the key issues are.

Therefore, this chapter will start discussing reflections as a phenomenon for this study. Literature on curriculum will also be reviewed by focusing on the concepts of intended, implemented and attained curriculum. Curriculum change issues from the Apartheid era, from Christian National Education to the Current Curriculum and Assessment Policy Statement, will also be put under the spotlight under addressed through concepts such as competence and performance curriculum. Focus of these issues will be driven by themes raised during SAs' reflection of the supervision of Grade 3 Mathematics CAPS implementations and concepts emerging from literature will be explored using the curricular spider web as a conceptual framework. Lastly, to attempt to answer research questions of this study, studies related to why there is such a great need for SAs to reflect on the implementation of Grade 3 Mathematics CAPS will be engaged with.

2.2 Reflections

Reflections are deemed very important in education because, according to Gilbert (1994), education can viewed in two dimensions and can serve two purposes. Firstly, Gilbert it is of the technisist view, whereby it is regarded as the servant of the economy, and educators serve the role of technicians. Educators, according to Gilbert (1994), are said to have developed specifiable skills, which may have been acquired through their educator education or the workshops they attended. Through these skills, they can produce predetermined learning outcomes in students. Secondly, education is viewed as an agent of social change and in this view education is viewed as liberating, where educators are seen as innovative professionals whose competencies go beyond the classroom and the set outcomes and standards of the curriculum. This suggests that when educators engage in reflections they manifest different views, based on whether they are of the technisist view, which favours the technical aspects of teaching; or the liberating view, which ―favours the reflection on the moral, ethical, political and social factors" Killen (2007, p. 95).

According to Kabilan (2007, p. 684), "reflection is a subjective yet structured intellectual practice that can engage educators' self-examination and enhance their understanding of teaching and learning in ways that are fresh, stimulating, and challenging". According to Killen (2007, p. 98), "reflection is a form of enquiry through which educators can question their actions, the contexts in which they teach, and all the influences of on those actions". Based on the changing demands and responsibilities of their practice, educators need to continually reflect on their practices (Killen, 2007). On the other hand, Dewey's (1933) view on reflection is that it is a special form of problem solving characterised by scaffolding of experiences and events that should be viewed as an active and deliberate cognitive process. Hence, Killen (2007)'s assertion that reflection occurs when one looks back on specific issues, thinks about what happened and how it happened. This suggests that during a reflection process, issues are not just taken at face value; instead educators think critically about what they do, and why they do it. According to Mewborn (1999), reflection is not a natural state of mind; it is both a shared and individual experience which requires a great deal of introspection with some outside prompting and probing. Therefore, "it is generally accepted that the practice of reflection is deeply rooted in critical thinking and is connected to external realities; enfolded with the practitioner's inner feeling" (Kabilan, 2007, p. 683). According to Dewey (1933), through critical and reflective thinking, an educator or any

person can "transform a situation in which there is experienced obscurity, doubt, conflict, disturbance of some sort, into a situation that is clear, coherent, settled and harmonious" (pp. 100-101).

Khoza (2015a) conducted an interpretive case study with the aim of understanding student educators' reflections on their practices of the Curriculum and Assessment Policy Statement. The findings suggest that when people are given opportunity to reflect, it encourages ongoing self-reflection, verbal reflection, and written reflection (Schön, 1984) which in turn promotes critical thinking. Walker, Adamsky, Brower, and Hart (1992) correctly point out that a reflective educator will dedicate most of their time and effort to critically reviewing and analysing their both teaching and their students' performance. Killen (2007) concurs that when educators think about their past actions, their current situations and their future intentions, their teaching ceases to be routine and becomes reflective instead. Kreber and Cranton (2000) correctly point out that in an educational setting reflection needs to have its basis on educators' understanding of what constitutes effective teaching, and this should be used as a yardstick to compare the experiences and findings. This suggests that when people reflect, they have an opportunity to engage in self- talk to themselves about themselves and it becomes important to have studies that give SAs an opportunity to also reflect of their practice as they supervise the educators.

According to Nodoushan and Daftarifard (2011), reflection is not a linear process starting with processes at one point and ending with the results at the other end; rather, it is a cyclical process which includes *in* action (in the midst of practice), *on* action (task takes place after action), and *for* action (desired outcome of both previous types of reflection) thinking and reflection. Killan (2007) identified both reflection *in* action and reflection *on* action as processes or approaches that use the same activities. Reflection *in* action (Killan, 2007) adds; occurs when the educator simultaneously teaches and analyses their teaching i.e. what, why and how learners are learning. Sharing the same sentiments, Walker, Adamsky, Brower and Hart (1992) correctly pointed out that a reflective educator will devote more time and effort to a critical review and analysis of their teaching and their students' performance than their non-reflective counterparts. ―Through reflections on what we teach, how we teach and why we teach the way we do; we should test our assumptions about teaching and learning and look for audience to justify our approaches to teaching" (Kreber & Cranton, 2000, pp. 102-103). On the other hand, reflection *on* action occurs after the lesson has taken place.

However, Killan (2007) cautions that reflection *in* action requires a high level of skills on the side of the educator; because the educator needs to constantly replay moments of teaching and at the same time remain conscious of their teaching practice and impact. To reflect *in* action requires an educator who is, at the same time, able to frame problems; generate hypothesis; and test them. On the other hand, reflection *on* action is when the educator deliberately seeks to understand what had happened, and through this, shapes future action. Unlike reflection *in* action, reflection *on* action is a conscious activity whereby the educator choses the focus of his or her reflection and the frames that will be used to guide the reflection (Killen, 2007).

Notwithstanding Nodoushan and Daftarifard (2011) and Killen (2007) process of reflection, Van Manen (1977) and Zeichner and Liston (1987) identified three levels of reflections and the criteria of reflection respectively. The levels are: technical, practical and critical reflections, on the other hand, the criteria are the technical, educational and ethical criteria. Technical reflections, according to Van Manen (1977), occur when educators are concerned with the technical application of educational knowledge in the classroom, which will enable them to maintain order and achieve predetermined outcomes. Educators in this view do develop reflective skills, but only for the purpose of improving the application of research-based knowledge. One may assert that educators in the technical reflection's rationale for teaching are mainly because of societal reasons and educators who reflect from the technisist perspective do not actually benefit from their reflections as they do not contribute to change or improvement on their practice.

With the practical reflection, Van Manen (1977) maintains that educators are concerned with goals, connections between principles and practice, the assumptions that underlie their practice, and the value of their goals, which is more of a personal reason of teaching. On the critical level of reflection, Van Manen (1977) explains that educators are concerned with issues beyond the classroom. The educators' reflections, according to Van Manen (1977), are mainly informed by moral and social issues such as equity and emancipation. It may be argued that educators driven by critical reflection teach because of pedagogical reasons, with the aim of questioning and addressing some other challenging issues and bringing about change. As the study at hand has been driven by the challenge caused by the continuous underperformance of Grade 3 learners in Mathematics, through SAs' reflections on the supervision of Mathematics implementation may bring about change on this matter.

Therefore, the study at hand may be able to address how this reflection cycle revolves around supervision of the Grade 3 Mathematics curriculum.

2.3 Framing Curriculum

Curriculum, according to Van den Akker, de Boer, Kuiper, Letschert, Nieveen and Thijs (2009, p.9), is a "plan for learning" that is referred to in the curriculum document, which is the intended curriculum. This concerns policy makers and curriculum designers at the development and planning level. Bernstein, in Hoadley and Jansen (2012), defines curriculum as "entailing a set of principles in which some content of time are given a special status (and others not) and enter in either a closed or open relations to each other (p. 279)". Kelly (2009) also define curriculum as ―the totality of the experiences the pupil has as a result of the provision made" (p. 13). However, Pinar (2004, p. 36) defines it as a "plan of learning" when referring to the intended curriculum, and "plan of action" when referring to educators' experiences of the implemented curriculum. Van den Akker *et al.* (2009) have identified five levels into which they believe the curriculum is divided. These levels are the international (supra), national (macro), institutional (meso), micro (educator) and the nano (student). Furthermore, when looking at the identified levels, Van den Akker *et al.* (2009) state that curriculum can be represented in three forms, namely, curriculum as intended, curriculum as implemented and curriculum as attained. Khoza (2014), in an interpretive qualitative case study of six university lecturers from a university in South Africa, reflects on lecturers' views on their experiences in teaching post-graduate module as part of the Honours curriculum:

> ―The intended curriculum consists of ideal (vision/rationale) and formal/written (intentions as specified in documents) components. The implemented curriculum consists of perceived (curriculum as interpreted by educators) and operational (the actual process of teaching and learning or curriculum in action) components. The attained curriculum consists of experiential (learning experiences as perceived by students) and learned (resulting learning outcomes of students) components" (p. 27)

Crosswhite, Dossey, Cooney, Downs, Grouws, McKnight, Swafford and Weinzweig (1986), agree that the intended curriculum is reflected in curriculum policy documents, grade or course plans and overviews, and also in textbooks adopted for use either in institutions or schools. Fomunyam (2014, p. 127) adds that ―the intended curriculum also relates to the social dimension of schooling since students are part of the society". If curriculum is

understood in terms of being followed as prescribed, then one has to wonder why, according to Hoadley and Jansen (2012), various schools seem to teach different things and in different ways despite having the same prescribed curriculum. Learners also seem to learn different things in various classrooms.

The implemented curriculum focuses on the classroom level where the intended curriculum is put in practice by the educator. It is of utmost importance to understand because it provides a clear understanding and view of teaching and learning. It answers the question of why learners learn different things from what educators teach them. The implemented curriculum also emphasises the educators' roles as interpreters of curriculum (Hoadley & Jansen, 2012). The curriculum for Grade 3 Mathematics is reflected in the CAPS Mathematics Foundation Phase for educators to implement. According to Huntley (2009), curriculum as intended can take many forms when presented to educators for implementation because educators bring their own attitudes towards teaching and their teaching experiences in their classrooms. This enables them to implement curriculum in such a way that their learners' diverse needs are met (*ibid.)*. Hargreaves, in McDonough and Clarke (2002), agrees that educators do not merely or blindly deliver the curriculum. What learners learn and the end product of what they are taught is determined by the educators' development, definition and interpretation of curriculum. Their beliefs, what they think, and what they do in their classrooms, shapes the kind of learning their learners receive. This suggests that, the curriculum should be experienced at all these five levels and three forms mentioned above.

In South Arica, from 1994 to date, the intended national (macro) curriculum has been under reform. It changed from Curriculum 2005/RNCS/NCS (competence curriculum) to the currently implemented Curriculum and Assessment Policy Statement (performance curriculum). Before 1994, education under the Apartheid Christian National Education (CNE) and the Department of Education itself was racially divided, with nine examining bodies (Harley, Barasa, Bertram, Mattson & Pillay, 2000). Education policy decision making was highly centralised (Ramapersad, 2001, p. 287). According to Cross, Mungadi, and Rouhana (2002), the Apartheid government used stringiest measures to control the curriculum and its approach to policy was top-down. Hoadley and Jansen (2012) concur with Harley *et al.* (2000), Ramapersad (2001) and Cross *et al.* (2002) that curriculum was largely based on the core beliefs of the CNE characterised by authoritarian teaching and rote learning. Higher order thinking, especially for Black learners was not emphasised, drill and

practice were the order of the day. Educators were not autonomous; they were seen only as technicians and as implementers of the curriculum *(ibid).* This suggests that the curriculum was designed at the top by curriculum developers, without any inputs from educators, and imposed on them to implement at school level. Education in schools used a more educator-centred approach and educators were provided with schemes of work and the content that they would have to teach to the learners.

Hoadley and Jansen (2012) concur with the above statement by indicating in their brief summary of the Apartheid curriculum that the curriculum was developed by so called experts and imposed on educators and learners. They further indicated that content was often abstract and theoretical, which means learners could not relate what they were learning to their real world contexts. It was subject orientated, content-led, and based largely on question and answer methods, and individual writing by learners. Furthermore, for educators, everything was prescribed and they had to cover specified content in the time available. Learners, according to Hoadley and Jansen (2012), were perceived as passive receivers of knowledge and skills and were expected to master these skills with or without understanding (Hoadley & Jansen, 2012). Jansen (1998) points out that education was Eurocentric and it glorified European values and traditions and suppressed indigenous culture and the beliefs of other racial groups. Because of this, classroom content was tightly controlled through inspection to ensure conformity of educators. Selected texts were prescribed to be used in classrooms and deviation was considered an offence and insult to the state. This suggests that educators had no autonomy because they were made to believe that ―authors of curriculum textbooks possess valid knowledge and expertise which is reflected in their choice of topics, themes and principles" (Stoffels, 2008, p. 31). According to Apple (1992), most educators did not view these as an imposition, but rather as essential tools. It may be argued as true because in schools, even to this date, educators use a variety of texts supplied by publishers in the hope that they will assist them in their classroom practice. Apple (1992) cautioned that ―texts are part of a complex story of cultural politics; they can signify authority or freedom" (p. 10). Therefore, the roles of democratically minded educators are to critically reflect on types of practices they engage in, whether they are authoritative or democratic.

With the emergence of People's Education (PE) in the 1980s, it may be argued that it was evident that society was dissatisfied with the Apartheid education system. According to Hoadley and Jansen (2012), Blacks started to resist the Apartheid education. The People's

Education was rooted mainly on Freire's ideas of curriculum and reflected the interests of emancipation of those who were poor, politically disenfranchised or otherwise disadvantaged. The main aim of the People's Education was to empower learners and emancipate them from oppression of Apartheid. Furthermore, it was aimed at social reconstruction, by promoting a curriculum which was more learner-centred with content and which was to be integrated with learners' experiences of life and the democratic struggles of people. Their move was typical of a critical theory curriculum model. Critical theory in this context is defined as a ─generic or umbrella concept which captures a vast assembly of social and educational work deemed to be critical" (Jansen, 1998, p.130). The main aim of critical theory is to encourage enlightenment to the agents of knowledge, in this case, educators. It also emancipates and forces educators to reflect on current practices. In this case, role of educators in education policy decision making, including implementation, is deemed as critical. Jansen cautions that the curriculum is a political document, with a political vision. This is because it selects knowledge which should be formally and explicitly taught to students (official curriculum). Again, the curriculum teaches more than what is required to be taught (hidden curriculum). Schools also influence students by what they exclude from the curriculum (null curriculum) (Jansen, 1998).

In the context of South Africa, critical theory then, needed to interrogate educational practices happening under the umbrella of the Apartheid system. It needed to empower educators, learners, parents, school-based managers and policy bureaucrats in order to question the transformative tendencies of state policies for educational practice. This means that educators were given a platform to raise their concerns and question how other knowledge or practices ended up in policies that should be actively implemented by them without their involvement. From a distance, one may assert that PE has in some way served as a wake-up call for blacks and it put the Apartheid system under siege for a while. Though supported by Non-Governmental Organisations (NGOs), Educator organisations (Unions) and some tertiary institutions through collaborative efforts, the PE did not live up to its name. The initiatives taken never became part of the official curriculum and as a result the movement weakened and lost momentum (Hoadley & Jansen, 2012).

The new government was faced with a challenge of transforming the Apartheid education which was ─fragmented, racially polarised and profoundly unequal" (Harley *et al.*, 2000, p. 287). When reflecting on the Apartheid education, Botha (2002) agrees that the whole

education system was structured according to the dictates of the Apartheid system which meant that people of different race groups were provided for according to their racial identities. According to Botha (2002), there was a need to transform the education system in order to provide equity in terms of educational provision and to promote a more balanced view of the South African society. In the process of transformation, access to school, school governance, curriculum, and employment of educators (amongst others) have all gone through policy change. Comprehensive and ambitious education policies were put in place post-1994.

2.4   Competence and Performance curriculum

Based on the background of the Apartheid curriculum and the changes that were put in place by the new government, curriculum was completely reformed. To date, two curriculum models i.e. C2005 (OBE) and CAPS emerged, and it may be argued that there is a clear distinction between the two curricula because they both draw from Bernstein's approaches to curriculum which are integrated or competence (C2005) and collection or performance (CAPS) curricula.

2.4.1   Competence curriculum

In competence curriculum, according to Hoadley and Jansen (2012), the designers are interested in encouraging the learners' natural competencies to manifest. It draws upon what learners already know, not on what is imposed from the outside. According to Bernstein (1975), in Hoadley and Jansen (2012), in competence/integrated curriculum there are no fixed time periods. This suggests that there is a lot of flexibility with regard to time. The educators may, as they wish, switch to something different that draws the attention of learners at any particular point in time. Contents are not isolated from each other and they become part of a greater whole, and that whole is made explicit. Syllabus of a prescribed content is dependent on a general idea whereby that idea is also subject to change.

Competence or integrated curriculum which is Curriculum 2005 (C2005) was introduced in South Africa in 1998. C2005 was modelled on Outcomes Based Education (OBE). An outcomes-based approach, according to Botha (2002), focuses everything in an educational system (teaching, activities, assessment, etc.) around what is important and worthy for learners to enable them to successfully achieve at the end of their learning experience. In C2005 a number of issues that were addressed in the People's Education were directly

addressed and this made radical changes in how teaching and learning is expected to happen (Hoadley & Jansen, 2012). According to Jansen (2004), OBE took centre stage and within a limited period of time it attracted enormous attention from national and international organisations alike, including educators, curriculum specialists, curriculum developers and trade unions. "At first glance, there appeared to be sound reasons for a curriculum policy modelled on OBE", (Jansen, 2004, p. 2). However, Cross *et al.* (2002) observed that "Curriculum 2005 represents an example of a bureaucratic-driven process of curriculum" (p. 182). Bureaucratic approach, according to Carl (1995), places particular stress on documentation (close attention is given to regulation and administrative questions; official documents serve as guidelines for formulation). This approach can hinder creative curriculum and promote centralised, rather than decentralised decision making" (Carl, 1995, p.49).

C2005 did not live up to its new celebrated name, which was linked to democracy in the once Apartheid infested country. It failed dismally because it was overloaded with terminology that educators did not only understand, and could also not explain to learners. The lack of content specification in the curriculum also added to educators' frustrations in that there was no clear guidance for them as to what learning outcomes were to be achieved in each grade which was evidence enough of why there was no measure or standard of progression (Hoadley & Jansen, 2012). Curriculum was then revised to Revised National Curriculum Statement, but problems persisted, especially the specification of knowledge in the curriculum (Hoadley & Jansen, 2012). Despite efforts to take educators on board, they still remained unclear of what to teach. For this reason, the NCs also failed because of what Cross *et al.* (2002) calls a ―Lack of policy experience on the part of the ANC government-in-waiting" (p. 174). Despite being ridiculed and failing in South Africa, and facing some enactment hiccups in other countries like Australia, New Zealand, United States of America and the United Kingdom; a relatively successful track record of successful implementation of OBE has been identified in those countries (Botha, 2002). However, the continued criticism in South Africa led to the introduction of the Curriculum and Assessment Policy Statement (CAPS).

2.4.2 Performance curriculum

In 2011, THE C2005 curriculum was amended to CAPS and disseminated for implementation from 2012. Contrary to C2005, CAPS is more specific and indicates what content to be taught, and how to teach and when to teach it, which is typical of Tyler's (1959)

approach to curriculum. The Minister of Basic Education, Ms Angie Motshekga, clearly explained that this curriculum builds on the previous curriculum, which is C2005; however, she added that CAPS is a combination of RNCS Grade R- 9 and NCS Grade 10-12 with the aim to ̶provide clearer specification of what is to be taught and learnt on a term by term basis" (DBE, 2011, CAPS Foreword page). From a critical lens, CAPS can be compared to the Apartheid educational system because they have some common similar features. Unlike C2005, knowledge in CAPS is evaluated according to international standards, as based on research facts. What learners need to learn is clearly laid down in curriculum documents. It is content- and educator-centred, and assessment is subject-specific.

In collection/performance curriculum the process of learning and teaching is controlled by the educator. It is more subject-orientated and characterised by high levels of understanding. Based on Hoadley and Jansen's (2012) evaluation, performance curriculum is more specific about what is to be taught and in what order it is to be taught. The content and educator-centred learning takes place in an environment organised for learning of formal school knowledge. Based on Bernstein's (1975) submission, in collection type curriculum content is of high status and clearly bounded and separated from each other (Hoadley & Jansen, 2012). Furthermore, learners have to master specifically selected contents in order to satisfy some external criteria e.g. public examination. This suggests that subjects are independent from each other and they are assessed individually. One may reflect back to C2005 where Mathematics was called Mathematical Literacy, Mathematics and Mathematical Science and in Grade 3 and the rest of the Foundation Phase it was called Numeracy. In CAPS it is called Mathematics from Grade R to 12, focusing on Mathematics content specified for each grade. In addition, Mathematical Literacy is also a stand-alone subject which learners can choose to do as a subject from Grade 10. This may be supported with the fact that currently, in Grade 3 as an exit Foundation Phase class, there is a trend focusing mainly on the Annual National Assessments (ANA) Mathematics and Language content. More emphasis is put on what has been set previously, neglecting other content areas and other subjects that are not assessed nationally. Educators purposefully teach the ANA, not the focused CAPS Grade 3 Mathematics content. This is done in an attempt to improve learners' performance and may be misleading because the results that are reflected in the ANA report are not a true reflection of actual learners' performance.

The table below gives a clear distinction between competence (integrated) and performance (collection) curricula based on, but not limited to, some of the common identifying curriculum issues that need to be dealt with in implementing the curriculum (which van den Akker *et al.* (2009) called the curricular spider web).

	Competence (Integrated) Curriculum	Performance (Collection) Curriculum
Process	• Enacted	• Implemented
Learner	• Controls what, how and when and which content is to be taught • Learners learn in a different way	• Has limited control on what, how, when and which content is to be taught • Assumes that not all learners can learn at all levels and excludes some learners
Educator (role)	• Facilitates learning • Control is personally negotiated	• Directly teaches the learners role and the sole source of knowledge • Control is hierarchical, the educator decides
Pedagogy	• Focus on learners • A move toward a common pedagogy and a common practice of teaching	• Focus on subject to be taught • Reveals differences rather that commonalities
Knowledge	• Subjects are integrated • Various content becomes part of a greater whole and each content is made explicit • Syllabus of a given content is subordinate to a general idea	• Subjects clearly demarcated from each other • The fundamental concept does not reduce the overall independence of the separate content

	• Strong links to learner experience and everyday knowledge • Emphasises ways of knowing rather than states of knowledge • Shared cooperative educational task • Weaken hierarchy as educators as educators may enter into a social relationship with each other	• Syllabus is controlled by the educator and those who evaluate it • No link between formal school knowledge and everyday knowledge • Knowledge is sacred • Hierarchy is evident in staff like with learners
Assessment	• General competence area • Common examining style • Focuses on what the leaner knows and can do • Educator shares the task of evaluation with the learner	• Specific performance criteria • Permits differences in forms of examining • Focuses on what the learner has left out (absences) • Educators performs the task of assessment
Learning sites	• Anywhere • No fixed periods	• Clearly marked learning sites • All time periods firmly fixed

Table 1: Comparisons of the competence approach and the performance approach to curriculum (Hoadley & Jansen, 2012).

The above table compares the competence and performance curriculum in terms of key curriculum aspects. Competence curriculum is enacted, whereas performance curriculum is implemented. It is a learner-centred approach and performance curriculum has limited control on what they learn. The educator plays the role of facilitator in competence curriculum, whereas in performance curriculum they teach and control is hierarchical. In competence curriculum subjects are integrated, and learners' experiences are linked to everyday knowledge which is contrary to performance curriculum where each and every subject stands alone and focuses on school knowledge. Assessment in competence curriculum focuses on what the learner knows (presents) and in performance curriculum focus is on what the

learners has not mastered (absences). Teaching and learning in competence curriculum can happen anywhere and there is no fixed time for activities. However, in performance curriculum, learning takes place in formal learning sites and all content has an allocated, fixed, time. Based on the differences of the two curriculum models, it suggests that they would have a different appeal for different people, like Tyler (1959) and Stenhouse (1975).

With their apparent differences, the competence and performance curricular are based on two different curriculum frameworks, Tyler's (1959) technical/ product or instrumental approach and Stenhouse's (1975) process approach. According to Thjis and van den Akker (2009), the instrumental approach has a framework which comprises four components. Firstly, what are the objectives that education should aim for? Secondly, what are the learning experiences that will be suitable in obtaining these objectives? From there, the organisation of these learning objectives also matter, and lastly the evaluation of whether the learning objectives have been achieved is taken into account. In a curriculum based on instrumental approach, the objectives, curriculum content, and methods to be used are clearly outlined in a sequential manner (Thjis & van den Akker, 2009). This, according to Tyler, suggests that the energy and effort invested in curriculum planning cannot just be implemented in a haphazard manner without a coherent plan on what, how, when and where the whole process will be carried out (Thjis & van den Akker, 2009). This approach, according to Thijs and van den Akker (2009), draws its strength in simplicity and emphasises the rationale and goal directed approach. However its shortcomings are its emphasis on the attainment of predetermined objectives, little flexibility and focusing on factual, empirically found data (school knowledge).

Contrary to Tyler's (1959) approach is Stenhouse's (1975) process approach (integrated/ competence). According to Hoadley and Jansen (2012), the process approach is also called by some writers as the critical, contextualised or action reflection approach to curriculum. When compared to Tyler (1959), Stenhouse (1975) has contrasting values with regard to curriculum in that educators are seen as mediators of learning and as participants in curriculum making. Learners relate learning to their own surrounding and experiences. Stenhouse (1975) maintains that curriculum should serve as a guide, not a prescription with pre-specified objectives. This guide, according to him, should be validated or tested according to each educator's particular context.

Unlike in C2005, where it was assumed that learning could take place anywhere, in CAPS teaching and learning takes place in a specific environment, i.e. classroom (Hoadley & Jansen, 2012). This suggests that for educators to be able to implement the Mathematics Grade 3 CAPS successfully they need a high level of training and for training to be effected, challenging developmental and implementation areas should be identified, if any, through reflections. Similarly to all other subjects in the CAPS, the Foundation Phase Mathematics Curriculum is prescribed nationally (macro level) and a standardised policy for Mathematics is rolled out to provinces and supplied to schools (meso). In schools, educators (micro) implement it practically in their classrooms to the learners (nano). As frontline implementers, educators are the ones who directly implement the curriculum and are accountable for learners' performance. They are the ones who experience the successes and challenges of the Mathematics curriculum implementation process, if any. For accountability purposes, and to measure the impact of curriculum, their classroom practice is still supervised or monitored, though it is no longer called inspection but is rather known as monitoring and support. This is done through SAs, who are still viewed, in some instances, as inspectors whose main role is to find fault instead of providing support. The way SAs are still viewed leads to poor curriculum implementation because educators tend to shun the support the SAs are supposed to provide; which also lead to poor learner performance. This therefore highlights the need for reflective processes amongst educators.

2.5 Concepts emerging from literature

Studies that are conducted (Kreber & Cranton, 2000, Killen, 2007 & Khoza, 2015a) around educators' reflections on curriculum implementation matters indicate that there are common identifying curriculum issues that need to be covered. These are the rationale (why are they supervising?), goals and aims (towards which goals are they supervising?), content (what are they supervising?), supervision activities (how are they supervising?), SAs' role (how are they facilitating the supervision?), materials and resources (with what are they supervising?), accessibility (who are they supervising?), location (where are they supervising?), time (when are they supervising?) and assessment (how is their supervision evaluated). Van den Akker *et al. (*2009) and Berkvens, van den Akker & Brugman (2014) call these components of curriculum a curricular spider web, as presented below.
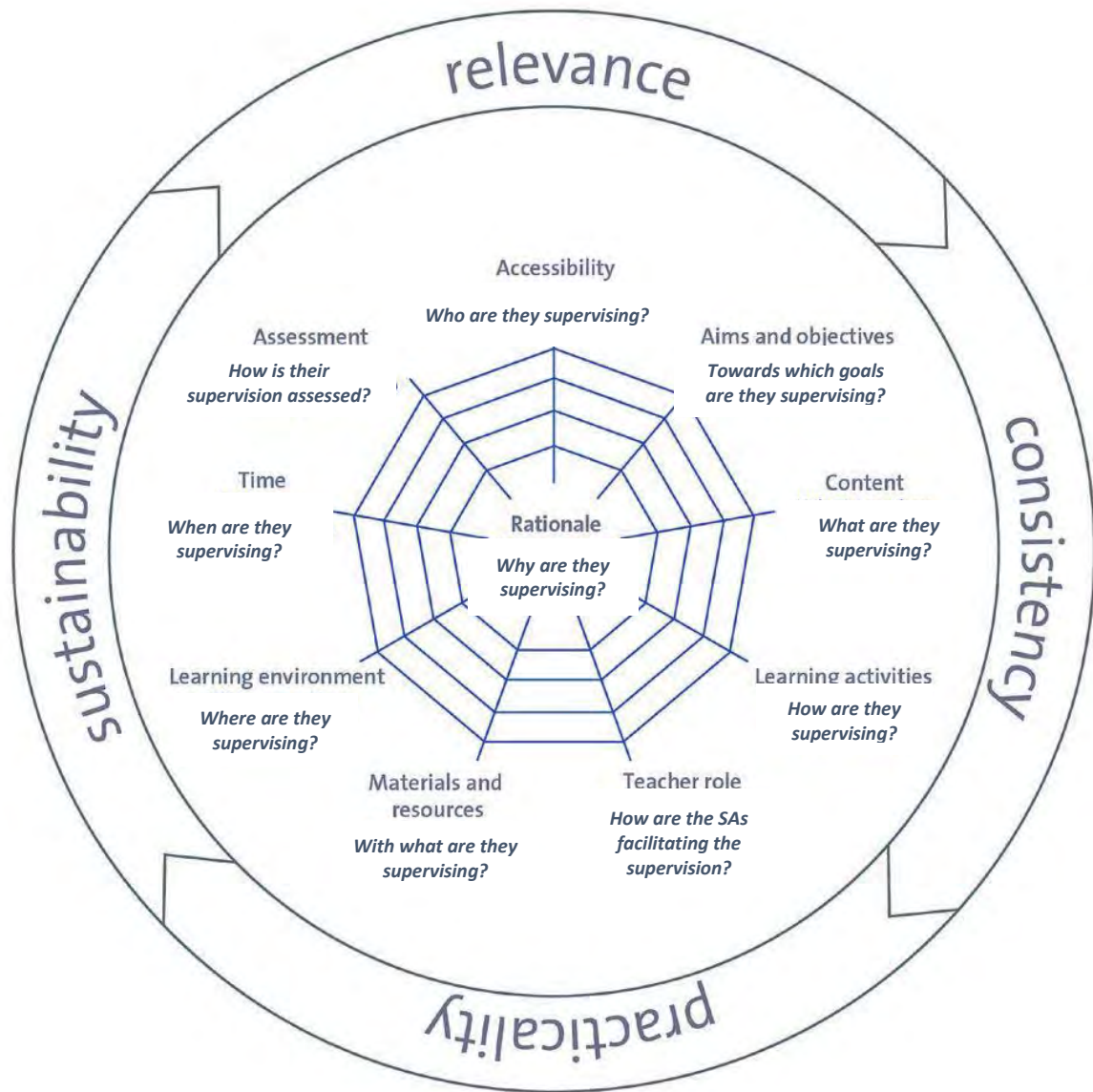
Figure 1: Curricular Spider Web framework for educators' reflection (Redrawn from Berkvens, van den Akker and Brugman 2014, p.8)

Fowler and Poetter (2004) conducted an interpretive case study to deeply explore the French approach to teaching of elementary mathematics. The study used Stigler and Hiebert (1997)'s questions to analyse classroom pedagogy (Fowler & Poetter, 2004) as one of their frameworks to guide their analysis. These questions were: what kind of mathematics is taught in a lesson (content)? How are the mathematical concepts presented to students and how is the lesson organised (learning activities)? What are the students expected to do in a mathematics lesson (aims and objectives) and lastly; What is the educator's role in a mathematics lesson?

Khoza (2015), in an interpretive case study, which intended to explore the use of e-learning resources in teaching and learning a basic research course at Bachelor of Honours level, identified these curriculum components as learning signals and defines them as the basic components or foundational issues of teaching and learning. Of the original spider web components by Van den Akker *et al.* (2009*)*, Berkvens, van den Akker & Brugman (2014) added another component in their study on addressing the quality challenge. This component is *accessibility*, meaning 'who is learning', in terms of learners. If we focus our study on educators it can therefore be adapted to 'who is teaching?' As the purpose of this study is for SAs' reflections on curriculum supervision, the teaching will be replaced by supervision. All these concepts/components are controlled by the *rationale*, which is at the centre of the web.

Issues that emerge from literature are framed around the curricular spider web; which will form a conceptual framework of this study. A conceptual framework, according to Christiansen *et al.* (2010, p. 118), is ─the set of ideas or concepts that guide the research". For the purpose of this study I consider the curricular spider web conceptual framework relevant in that in schools it is not only about teaching Mathematics, but also about the extent of support the SAs provide to educators. The overall supervision process is based on their content knowledge, what resources are available, towards which goals are they supervising, how is their supervision being evaluated, and when and how are they supervising. Vaughn (2002) further elaborates that conceptual framework allows the researcher to move beyond the descriptions of *what* to explanations of *why* and *how*. It also serves as a reference point for the discussion of literature, methodology and results. As this study is based on reflections of participants involved in curriculum implementation, focusing on Grade 3 Mathematics, this suggests that it is vital to use curricular spider web in this study because it incorporates components that relate directly to curriculum implementation. The following table gives a clear picture of its relevance in the study.

Table 2: SAs' reflections of the supervision of Grade 3 Mathematics CAPS implementation.

Concepts	Questions
Concept 1: Rationale	**Why are you supervising Grade 3 Mathematics CAPS implementation?**
Concept 2: Accessibility	**Who are you supervising?**
Concept 3: Goals	**Towards which goals are you supervising**

	the Grade 3 Mathematics CAPS implementation?
Concept 4: Content	**What are you supervising Grade 3 Mathematics implementation?**
Concept 5: Resources	**With what are you supervising?**
Concept 6: Supervision and support activities	**How are you supervising the implementation of Grade 3 Mathematics CAPS?**
Concept 7: Subject Advisor role	**How are you facilitating the supervision of Mathematics?**
Concept 8: Location and time	**Where and when are you supervising?**
Concept 7: Assessment	**How is your supervision assessed/ evaluated?**

Van den Akker (2003) warns that successful curriculum development is clustered by a challenge of creating a balance and consistency between the various components of a curriculum. Furthermore, on the spider web, every chain is as strong as its weakest link, hence the reason he says it is vulnerable. This implies that curricular spider web concepts are going to frame the literature of this study; however they are driven by reasons for and of teaching/supervising Mathematics in Grade 3. In order to evaluate these issues, Berkvens *et al.* (2014) has identified three concepts which frame why educators are teaching. They are pedagogical, content and societal reasons.

2.5.1. Reasons for and of teaching/supervising Grade 3 Mathematics (Rationale)

The numerous studies conducted around why educators teach indicate that they teach for various reasons. According to Jansen (2004), when designing policy, policy makers already have the envisaged educator in mind. However, this changes when the educator is alone in the classroom. What they actually teach (implemented curriculum) is based on how they identify themselves. Jansen (2004) describes this as educator identities. Firstly, how educators identify themselves are due to professional basis. This is whereby the educator teaches what they teach based on their profession. Professional reasons incorporates, how much the educator knows about the content of a particular subject, and up to what level they

have trained for the subject in question. Preparation and formal qualifications that the educator possess related to the subject also play a role in professional reasons for teaching. Secondly, the educators' identities are based on societal reasons, which, according to Jansen (2004), can also be of political benefit; this includes their need to please learners, keep up with demands from parents and meet the pressures from the department. Lastly, they teach for personal reasons; which occurs when educators understand and act according to their value commitments. Therefore, this may justify why educators teach a particular subject.

In a case study conducted by Khoza (2015) on student educators reflections on their practices of Curriculum and Assessment Policy Statement, the findings indicated that most educators' reasons for teaching were based on the requirements of CAPS (policy images), not on personal basis. The study was interpretive in nature and data was generated using project analysis (reflections) and semi-structured interviews for the twenty participants included in the study. The study concluded that educators do not have what it takes to implement the curriculum, as a result they work like technicians. Technicians are given a manual to follow when they fix something without applying their experiences and educators are also given curriculum policy to follow when implementing curriculum, hence the need for continuous reflection on their practice. In Grade 3, educators teach Mathematics because it is a compulsory subject (policy images) and it is a prerequisite that a learner must be competent (with at least a level 3 achievement, which is a mark between 40 and 49%) in order to progress to Grade 4 (DBE, 2011a). Mathematics is also taught because it is viewed internationally as a ―necessary competency for critical citizenship" (Adler, Ball, Krainer, Lailin & Novotna, 2005, p. 360). Fowler and Poetter (2004) also agree that mathematics should be taught in the early years of schooling because it lays a foundation for what follow in later years of studying mathematics (pedagogical).

> ―In order to be able to effectively participate in and contribute to the world in which we live requires that individuals must know ―basic mathematics", (*societal reasons*). The Numeracy Programme in the Foundation Phase is *therefore* critical to developing both a sense of what mathematics is and what it means to do mathematics" (Numeracy Handbook for Foundation Phase Teachers: Grades R–3, DBE, 2012, p.1).

Jita and Vandeyar (2006), using life history research, examined the construction of two South African elementary school educators' mathematics identities. Data was generated using classroom observations, in-depth interviews, and an analysis of key documents (learner

transcripts, educator workbooks, marking schemes, diagnostic tools, etc.). The findings of the study indicated that their knowledge and beliefs about mathematics, mathematics teaching, and mathematics learning were shaped significantly by their previous experiences as students and early experiences. Furthermore, findings from one of the participants in the study suggested that "professionally, her preparation for teaching mathematics was by her own admission very lacklustre. The educator's confidence and capacity as a mathematics learner herself is very low" (p.49).

Nachlieli, Herbst and Gonzalez (2009), conducted a study which reported on an investigation of how educators of geometry perceived an episode of instruction presented to them as a case of engaging students in improving. The findings were that "Mathematics educators work under a certain obligation that tie them to the subject and students they teach" (p. 340). Based on Literature, Nachlieli *et al.* (2009) further argue that educators' actions in their classes are explained in two perspectives i.e. actions as a case of complex cognition in context depending on individual goals, beliefs and knowledge. The second perspective is based on instructional obligations among educators, students and subject matter. Most educators do not teach because for professional reasons, instead the studies above suggest they teach for personal and societal reasons. Hence, Fowler and Poetter (2004)'s assertion that firstly, educators need to cover the curriculum as it is an obligation and they need to conform. Secondly, inspectors inspect to evaluate and ensure that the teaching of mathematics in schools is in line with the requirements and standards of the national curriculum thereby ensuring that all learners receive education as is their legal right (Fowler and Poetter, 2004). As a limitation, this suggests that educators just teach, mostly, for compliance. However, reason for teaching can also be directed by aims and objectives.

2.5.2. With whom/ who and where are you supervising? (Accessibility and Location)

SAs have been tasked with monitoring the implementation of curriculum at all levels of schooling. They are office-based educators who are, in most instances, called Curriculum Implementers (CIs) or Curriculum Advisors (CAs) because of the nature of their work. During the Apartheid era they were called school inspectors and with time their name changed and now they are popularly known as to SAs. Mr Soobrayan, the Director General of the Department of Basic Education, in the National Council of Provinces: Education and Recreation meeting held on the 10th of August 2010 on Department of Basic Education

Curriculum Action Plan 2014, explained that SAs were supposed to be experts and knowledgeable in their fields. Therefore, for one to be a Subject Advisor they are required to be "subject specialist in their field, demonstrating both depth of content knowledge as well as its pedagogy" (DBE, 2011, p. 41). They have to specialise in a particular education band or phase, and in a particular subject or cluster of subjects, e.g. social sciences, languages, Foundation Phase, etc. According to Berkvens *et al.* (2014), access to education depends on a number of aspects, for example: from the physical (is it easy for those who are involved in the teaching and learning process to reach a school?) and financial (is the education affordable?), to the cultural (is what the learners are taught socially acceptable?). Therefore to fulfill their legal and political obligation to provide education for all, Berkvens *et al.* (2014) suggests that governments must work to ensure these aspects do not block access to education. Furthermore, it may also be added that government should provide adequate human resources, i.e. educators.

Schools in South Africa are categorised according to a poverty index, referred to as a quintile, where a quintile of 1 would indicate ―poverty‖, and a quintile of 5 would indicate ―affluence‖ in the parent community (DBE, 2014, p. 89). Mostly quintiles 1 to 3 schools are located in rural schools, whereas the quintile 4 and 5 schools are former White (Model-C) schools. Using ANA 2014 as a benchmark for analysing learners performance based on their socio-economic backgrounds, the Grade 3 learners‘ performance in Mathematics indicated that pass percentage rate of learners from quintile 1 schools was at 52.5%, quintile 2 at 52.9%, quintile 3 at 53.9%, quintile 4 at 58.0% and quintile 5 at 68.9% (DBE, 2014). Msila (2014) pointed out that equity; access and success in schools are influenced by the socio-economic status of the learners‘ families. Schools that are not performing according to the set benchmarks are deemed dysfunctional, and according to Msila (2014) many dysfunctional schools are situated in the townships and rural areas whilst functional schools are situated in former White areas. Learners who attend the so called dysfunctional schools are from families where parents are usually unemployed, unskilled and black. Their schools have no prospects of succeeding given the prevailing circumstances. Moreover, these schools are different from the suburban former White schools that serve middle class families. Bayat, Louw and Rena (2014) concur that besides poor management and leadership within school systems, ―the socio-economic backgrounds of the students and parents also contribute significantly to this underperformance‖ (p. 184). Msila (2014) correctly points out that in spite of asserting that poverty is the main cause in demotivating the poor children‘s future, it should however be

noted that other role players in education are unable to serve children from poor backgrounds. Amongst these role players are parents, educators and districts. The inability of stakeholders to provide the required support causes schools to be more dysfunctional and end up fuelling the malaise for poor families Msila (2014).

2.5.3.   Goals of supervision

In South Africa and some countries, monitoring and support of curriculum implementation and the overall functioning and management of schools is a norm and has been for years. Inspection may be used for quality assurance or to monitor curriculum implementation. Ololube and Major (2010) positively separated these as school inspection and educational supervision and he maintains that they are as old as human existence and are not destructive in nature. According to de Wolf & Jansen (2007), "in general, inspectorates of Education exist in order to control the quality level of schools and (public) education" (p. 381). The term monitoring and support is commonly used for South African the context, in other countries like Nigeria, Uganda and England to name a few; they still refer to it as supervision or inspection (Ololube, 2014; Wanzare, 2002 & Wilcox, 2000). Similarly most authors in the literature reviewed still use the terms inspection and supervision as based on their contexts. For the purpose of this study I will continue using supervision of curriculum for South African context, and monitoring, support, and inspection (or whichever terms are used) for this purpose by authors from reviewed literature.

Wanzare (2002) conducted a study that examined some of the problems that make school inspection difficult in Kenyan schools. In the study, Wanzare (2002) identified the purpose of inspection as dominant strategies used by authorities to monitor and improve the performance of education system in schools, with the aim of improving the standards of education. Information was sourced using and including, but not limited to, Kenyan media (including newspapers, magazines and articles on school inspection, educational journals, seminar papers and other forms of academic literature). This study informs us that, inspection of schools in Kenya is a function of the Ministry of Education. However, the study cautions that inspection in Kenyan schools takes place under a hierarchical, highly bureaucratic, and authoritarian education system.

De Wolf and Jansen (2007) maintain that inspection occurs in order to manage the quality of education. They further point out that is assists schools in compliance with legislation. In agreement, Macharia and Kiruma (2014) in their study which investigated the effectiveness of school inspection, revealed that government use school inspections to ensure accountability, quality of education and continuous improvement of service delivery in schools. The findings revealed that inspection in its nature does not facilitate staff development in schools. Secondly, it lacks the evaluative component on educator practice and does not provide adequate feedback after the inspection. Findings from Macharia and Kiruma (2014) are consistent with the above study. It revealed that, "inspection…was weak in facilitating staff development is secondary schools because the process lacked adequate feedback in post inspection follow-up" (p. 1). The authors recommend that inspectors should be trained to acquire relevant skills needed for them to be competent. What is needed is for educators to change their mind-sets and attitude towards inspectors in order to enable them to perform their roles as outlined. Based on the above studies, it suggests that supervision is not aimed at discrediting schools or educators, but rather to control quality and standards; and also to measure or determine whether the curriculum aims and objectives are achieved or not.

2.5.3.1.   Aims and objectives

According to the University of Technology Sydney (undated); Kennedy, Hyland and Ryan (2006); and Wilson (2014**),** aims are general statements that provide educational intent for a particular subject and they are usually written from an educator's point of view. On the other hand, objectives, according to Wilson (2014) and Kennedy *et al.* (2006), are specific statements of educational/teaching intention to describe either general or specific outcomes. Put another way, University of Technology Sydney (undated) explain them as statements that are more specific and concrete and outline what students are expected to learn. However, Kennedy *et al.* (2006) identified a challenge of using objectives as that they are sometimes used by educators as teaching intentions and at other times they are used in terms of expected learning. This, according to Kennedy *et al.* (2006) causes confusion as to whether objectives belong to an educator-centred or a learner-centred approach. Khoza (2013, p. 3) clarifies the matter by indicating that:

> ⸺if facilitators want an effective approach for presentation they should
> use the educator-centred approach (behaviourism), if they want to
> measure any chunk of content to be given to students they should use
> the content-centred approach (cognitivism) and if they want

contextualized learning activities they should use the learner-centred approach (constructivism)".

According to Khoza (2015), aims and objectives are created according to the facilitator's intentions rather than learners' intentions. For James (1999) there is no perfect formula for developing aims and objectives, and a subject specific approach should be employed to develop them. This implies that in order for educators to achieve the desired outcomes of their teaching and learning, they should be in a position to set clear objectives that are achievable, based on the aims of the subject or curriculum. In a study conducted by Khoza (2015) on student educators' reflection on their practices of CAPS, the findings indicated that most participants were not aware of the difference between aims, objectives and outcomes. They concluded that CAPS does not have subject aims. CAPS outline the general curriculum aims and specific aims and skills which accommodate all the subjects across the curriculum. These aims are designed "to ensure that children acquire and apply knowledge and skills in ways that are meaningful to their own lives… in this regard, the curriculum knowledge [is] in local contexts, while being sensible to global realities" (DBEa, 2011, p. 4). For mathematics, there are specific aims, followed by essential mathematical skills the leaner needs to develop. According to Khoza (2015), CAPS presented aims as curriculum aims, objectives as specific aims and outcomes as examples of the skills involved. This suggests that for effective teaching and learning to take place, educators need to be able to understand and process curriculum/subject learning outcomes as laid out by CAPS.

The Mathematics CAPS is clear about the aims of the mathematics curriculum; this may pose a challenge because educators may be unable to interpret them and as such as they are not clearly indicated as aims and outcomes. This is unlike other countries, like Ireland, whereby Primary School Mathematics aims and objectives are outlined. For example, in a guideline for Primary Mathematics for learners with mild general disabilities, the aims and objectives of primary school curriculum are outlined. This suggests that there are aims and objectives that cater for secondary schools. Berkvens *et al.* (2014) correctly points out that aims and objectives can guide decisions on the content of subjects with part of the curriculum content being common and some content only considering local differences which will call for curriculum differentiation. This suggests that what is to be taught (content) is determined by aims and objectives and will also include when that content will be taught. Being well versed

with the content makes it easier for SAs to know what and when they should supervise in a Grade 3 mathematics classroom.

2.5.4. Content and Time

According to Hoadley and Jansen (2012), the prescribed curriculum sets out what its designers intend should be taught. This implies that the subject content that educators teach in the classroom is not created from a vacuum but is rather clearly prescribed. McDonough and Clarke (2002) conducted a case study with the main objective of gaining insights into the practices of effective educators of mathematics in years one and two of schooling. Six educators took part in the study and they were selected particularly because their students displayed improved and impressive growth in understanding of Mathematics. McDonough and Clarke (2002) identified the mathematics strands (content areas) of the primary mathematics curriculum which are: Number, Measurement and Space. The Number strand involves counting, place value, addition and subtraction strategies, and multiplication and division strategies. Measurement covers length, mass and time, and the Space strand entails properties of shapes, visualisation and orientation.

Bulut (2007), in a qualitative case study with the purpose of analysing the newly developed elementary school mathematics curriculum in Turkey, mentioned the four learning areas for the mathematics curriculum as identified by the Board of Education (2005) which in CAPS we call content areas. These are Numbers, Geometry, Measurement, and Data learning areas. In the Numbers learning area, learners develop the ability of using numbers and digits, the estimation and operation abilities through understanding the four basic mathematics operations, associating the fractions, percentages and the decimal fractions. Students are also able to determine the relations within patterns and that they apply this information to problem situations. Fowler and Poetter (2004) conducted a case study research with the aim of exploring in depth the French approach to teaching Mathematics. The study was qualitative in nature and employed research methods that included interviews, classroom observations and documents from 13 French primary schools. In their study, Fowler and Poetter (2004) indicated that the content of French elementary mathematics curriculum is divided into three distinct areas of focus; numbers and arithmetic, geometry and measurement. According to Fowler and Poetter (2004) these areas are all to be taught through problem-solving activities. Furthermore, when learners work with numbers they should master a number range of up to 1000, including decimals, and they should also have mastered addition, subtraction and

multiplication techniques appropriate to their level. The French Ministry of National Education (1995), in Fowler and Poetter (2004, p. 298), further clarify that in other areas, learners —.. learn about the organization of space; learn to recognize a few simple geometric figures; gain skills in locating points in space and in constructing and reproducing geometric figures; and begin to master measurements of length and weight".

In another case study, whereby the focus was on learners, Munn (2006) set out to explore young children's experience of the British primary maths curriculum, illustrating data from a longitudinal study of early maths concepts for 5 to 8 year olds. In this study, Munn (2006) agrees that in the Scottish P3 curriculum learners are required to learn about multiplication, including times tables and division. As part of the study, the fact that learners in the study were given activities of counting, naming numbers words, counting backwards, etc. suggests that this is some of the mathematical content areas taught in Scotland. Content (DBE, 2011a) refers to the mathematical areas in which learners are expected to develop numeracy skills. The five curriculum outcome areas, which in Mathematics Foundation CAPS are identified as content areas, were identified from the Kenya maths curriculum (Government of Kenya, 2002) as: Number concepts and operations, Patterns and algebra, Measurements, Geometry and Basic statistics.

According to the CAPS Mathematics Foundation Phase (DBEa, 2011), the Mathematical content that needs to be taught to learners are Number, operation and relationships; Patterns, functions and algebra; Space and shape, Measurement and Data handling. The Number, Operations and Relationships content area encompasses a number of topics and some strategies that need to be used when performing calculations. These topics are: counting objects; counting forwards and backwards; number symbols and number names; describe, compare and order numbers; place value; problem solving techniques; addition and subtraction; repeated addition leading to multiplication; sharing leading to fractions; money; division, mental mathematics and fractions. In Patterns, Function and Algebra learners are taught geometric and number patterns. For Space and Shape positions, orientation, views, 3-D objects and 2-D shapes are the main focus. The Measurement content area involves time, length, mass, capacity, perimeter and area; and the use of standard and non-standard units of measurement. Lastly, Data handling, whereby learners learn how to collect and organise data, represent data and analyse and represent it.

Furthermore, each content area is weighted and allocated a specific time for teaching and learning. For Grade 3 Mathematics total teaching and learning time is seven hours per week (420 minutes), of which 120 minutes is allocated to Number, Operations and Relationships; whereas Patterns, Function and Algebra; Space and Shape and Measurement are allocated 80 minutes each. Data Handling is allocated 60 minutes. Furthermore, for each content topic, e.g. Number, operations and relationships (Money), there are concepts and focused skills that need to be developed for each term. However, there seems to be a lot of contradiction on the weighting, time allocation and balancing of the total number of lessons in CAPS with total number of activities in the DBE Workbooks. See the table below, focusing on content of Term 3:

Total time allocation for Grade 3 mathematics per week is 7 Hours

Content Area	Weightin	Suggested number of lessons for Term 3	Number of activities per content area in the DBE Workbook per term	Time allocation per content area per week
Numbers, Operations and Relationships	58%	All topics of Numbers, Operations and Relationships **(19)**	22	**120 minutes**
Patterns, Functions and Algebra	10%	Number Patterns **(3)**	5	**80 minutes**
		Geometric Patterns**(1)**		
Space and Shape	13%	3-D shapes **(2)**	1	**80 minutes**
		2- D shapes **(3)**	1	
		Position, orientation and views **(3)**	1	
		Symmetry		
Measurement	14%	Time **(3)**	1	**80 minutes**
		Length **(2)**	1	
		Mass		
		Capacity/ volume		

		Perimeter **(1)**		
		Area		
Data Handling	5%	Whole data cycle **(3)**	1	**60 minutes**
		Sections of data cycle		
Total				**420 Minutes (7 hours per week)**

Table 3: Grade 3 content focus, weighting and time allocation

If, as CAPS indicates: ―On average, three or more Mathematics lessons each week should focus on Number, Operations and Relationship. Then remaining time is spilt among the other content areas" (DBE, 2011a p. 37), then we are looking at a 1hr 24 minute lesson each day, which is converted to 1hr 30 minutes in schools due to difficulty allocating the 1hr 24 minutes on the time table. If we take 3 days to teach Number, Operations and Relationships, then we have 2 days to teach other content areas which suggest that some content areas may not be taught every week. On the contrary, the very same Mathematics CAPS indicates time allocation for each content area per week. The above means that the Mathematics content and time allocation for each content area are not consistent and practical, therefore they cannot be sustained.

On the positive side, there are also some teaching guidelines which guide the educators as to how they can unpack particular content, with suggested activities. This can be viewed as a positive aspect for CAPS Mathematics as it helps in guiding, especially novice, educators who do not know what is to be taught and have no or little idea as to how it should be taught. However, for Grade 3 Mathematics there is no evidence that they understand the content or have in-depth knowledge because learners are continuing to underperform in national and provincially set assessments. In agreement, the findings of a study conducted by Jansen (2009) about organising knowledge for the classroom, suggested that "Foundation Phase educators lacked content knowledge to teach Mathematics and knew very little about phonics in Literacy" (Jansen, 2009, p. 100). It may therefore be asserted that educators are experiencing different challenges resulting from the quality of teacher training, in-service training or support they receive. Perhaps the issue of time allocation may be aggravating the problem too.

In a study conducted by Khoza (2015a), the findings suggested that most of the participants were aware and understood the content that they are supposed to cover for the subject they teach. In addition the participants were able to interpret the content and the time given to each of the topics. They reflected that the content and time given to the content was the strength of the CAPS as they all understood these issues (content and time). There was also consensus that the time given to the content is relevant and they fully support it (Khoza, 2015a). It may therefore be argued that educators are aware of what they are expected to teach in terms of the CAPS Mathematics Grade 3 content. Therefore, based on the reviewed literature, it may be argued that the content of the Grade 3 mathematics CAPS is relevant as it covers all basic aspects of a typical Mathematics curriculum content as compared to other countries and can be sustained if adequate support is provided to educators. To date the issue of consistency may not be validated as this is only the third year of implementation. One may assert that the curriculum content is sustainable because other countries have sustained the very same content for years. Furthermore, even with the enactment of C2005, the very same content was used, though a different approach was employed. The content is also practical in a sense that the curriculum content is user friendly for educators. In evaluating the mathematical content in CAPS it may be concluded that can be sustained when adequate support is provided to educators by SAs.

It is therefore through supervision by SAs that educators are exposed to a wealth of curriculum support; however it is not explicitly clear as to why learners are not doing well. Should the issue of lack of adequate content knowledge be the cause of underperformance of learners? Adler, Ball, Krainer, Lailin and Novotna (2005) argue that many practicing educators have not done some of the Mathematics content that they are supposed to teach. If they did it, they might have not learned it in ways that enable them to teach it in current circumstances. Kelly (1999) concurs by adding that educators face challenges because they are not always sure of what content they should teach or the order to follow when introducing concepts. Sometimes they find it to be not specific enough, or that the curriculum is too rigid and does not allow educators to be autonomous. This suggests that to teach Mathematics successfully and for learners to achieve desired outcomes, educators need to understand the Mathematics content that they are supposed to teach and they also need to see how ideas connect across the fields and to everyday life. Understanding these connections offers educators the basis of their pedagogical content knowledge which will make it easy for them

to access some of the information and suggestions on mathematics teaching and be able to enrich their learners (Shulman, 1987). The term ‗pedagogy' is used by scholars and teacher educators to incorporate classroom practice, the educator's knowledge and beliefs about the subject, and the learning and teaching that underpin it (Shulman, 1987). Huntley (2009) agrees that the teaching of Mathematics requires an educator who is well qualified to teach Mathematics. This will be an educator who is conversant with mathematical content and who is skilled at using a variety of pedagogical strategies that inspire learners to learn mathematics.

Adler *et al. (*2005), in their report on mathematics educator education, cautions that having content knowledge in the subject is no guarantee that an educator is a good educator. This sentiment is shared by Kahan, Cooper and Bethea (2003) who correctly point out that "content in a subject does not suffice good teaching" (p. 226) and that content knowledge may affect the goals and objectives of their lesson plans. Adler *et al.* (2005) therefore recommended that to reach the goal of mathematics proficiency, educators need to be supported. That particular support is provided by SAs or inspectors on the particular content that educators are teaching. Therefore, this study may come in handy for this purpose because through reflections, SAs will be able to identify their strengths and weaknesses in mathematics curriculum supervision and support, and jointly create a professional development plan for improvement. While focusing on the issue of improvement with regard to content knowledge, intended curriculum is important because what is learned throughout the country is standardised and helps all educators to teach knowledge that is regarded nationally as essential for learning. Despite the standardisation of curriculum content Hoadley and Jansen (2012) caution that what is to be taught as curricular content is never neutral. Reason of this may be because of the resources used, teaching and learning activities, and the environment in which teaching and learning is taking place.

2.5.5. Resources used during supervision and teaching

Resources
According to Khoza (2013), a resource is anything that communicates learning. It can be a person or a *thing* and Berkvens *et al.* (2014) state that there is no definite measure of telling whether teaching and learning resources are sufficient. Khoza (2013) classified them

according to hardware (any tool/ machine/ object used in education), software (any material used in conjunction with tools to carry/display information) and ideological-ware (things that we cannot see and touch in education such as theories, policies, teaching and learning methods and others). According to the Commonwealth of Learning (2000), teaching and learning cannot take place without sufficient resource materials and furthermore, the curriculum cannot be successfully implemented without procurement of relevant resources. It is a basic requirement that all schools must have adequate curriculum resources that support teaching and learning (KwaZulu-Natal Department of Education, 2013) because teaching and learning resources are essential to the effective running of the system and can be in the form of printed material (worksheets, number cards, charts, etc.) or as equipment (abacus, dienes blocks, counters, measuring equipment, etc.). Mupa (2012) argues that schools need to be supplied with adequate resources to ensure successful and full implementation of the intended curriculum. These resources include, but are not limited to textbooks, teaching aids, and stationery, which are needed for educators and learners to play their roles satisfactorily in the curriculum implementation process. According to Mupa (2012), the government also needs to provide schools with physical facilities (such as classrooms, laboratories, workshops, libraries and sports fields) in order to create an environment in which implementation can take place and the resources needed as identified by Mupa (2012) are similar to the needs in South Africa. ―The availability and quality of resource, materials and the availability of appropriate facilities have a great influence on curriculum implementation" (COL, 2000 in Mupa, 2012, p 158).

In their paper on Addressing the Quality Challenge: Reflections on the Post-2015 UNESCO Education Agenda, Berkvens *et al.* (2014, p. 18) correctly points out that "learning should take place through interesting activities carried out in inspiring environments that provide adequate teaching and learning materials". Brown and Gordon (2009) concur with this statement by indicating that when classrooms are well resourced with interesting and age appropriate teaching and learning resources, the outcomes are that learners will learn better than those that learn from under-resourced classrooms. According to Coleman (2003), teachers need to be capacitated on how to effectively utilise the available resources and this will ensure successful curriculum implementation. Labane (2009, p. 16) concurs that availability, management and monitoring of resources are the pillars of effective curriculum implementation. Gojack (2014) in the final NCTM president's message, with the theme ‗A Reflection of 25 Years in Mathematics Teaching‗, mentioned the accomplishments and

challenges of the past twenty five years. On resources she enunciated that the quality of resources for teaching mathematics has improved. On an on-going basis, curricular materials that are aligned with standards and apply what we know from cognitive science continue to be developed and updated. Technology is said to also be taking a centre stage and its use in mathematics teaching has increased the importance of student reasoning and opportunities to make sense of mathematics. However, Linda (2014) warns that educators need to make informed decisions about the teaching resources they choose because availability of resources on the internet does not guarantee quality. Educators and students should thoughtfully consider when and how to use technology. Publishers, on the other hand, must make a broad effort to provide educators with the best possible resources for teaching. Linda (2014) argues that educators must be able to recognise and demand high-quality textbooks and resources which in their opinion do meet the curriculum requirements. This suggests that resources that are used for effective teaching and learning should be suitable for a particular learning environment, which is in turn suitable and conducive for people who are benefitting from them. These people can be educators or learners. However, contrary to Berkvens *et al.* (2014) and Brown and Gordon's (2009) assertion, we still witness many learners receiving their education under unacceptable learning environments with no or minimal resources available at their disposal. Overcrowding also, in South African classrooms, is still a much too common challenge.

In CAPS Mathematics for Foundation Phase, there are recommended classroom resources (hardware) to be utilised across the Phase. Furthermore, the Department of Education has provided all learners with the workbooks that are to be used as primary resources to support teaching and learning. Berkvens *et al.* (2014) noted with concern that ―full-colour textbooks that also serve as workbooks can only be used once and are too expensive for many nations" (p. 19). It should be noted that this may pose many challenges due to various contexts, misunderstandings and limited resources as this may lead to the educator's inability to implement the curriculum as intended. This may also affect how they deliver learning in the classroom contexts with regard to the types of activities they choose. SAs, during supervision, expect to find these resources in educators' classrooms and there must be evidence that they are effectively utilised. During supervision, SAs also have their own specific resources that they need to be able to use to move from school A to school B in order to record the findings and assess the level of support needed. However it has been noted with concern that SAs do not have access to basic resources that they need to monitor and support

curriculum. Mr Soobrayan, Director General of Department of Basic Education, in the National Council of Provinces: Education and Recreation meeting held on the 10th of August 2010 on Department of Basic Education Curriculum Action Plan 2014 acknowledged that SAs do not have adequate resources and committed that the Department of Education would make sure that all SAs had the necessary tools to do their work.

The Department of Basic Education has developed a national instrument to monitor curriculum coverage in schools. According to the Department of Basic Education (2013, p. 9), "this instrument is a management tool, used by curriculum officials during school support visits, to track progress in the completion of syllabus". The said reporting relies mainly on the number of schools visited per month, the findings during school visits and the type of support provided; which will reflect in the monthly report, accompanied by evidence in the form of monitoring tools provided by the department of education. Following suite, the KwaZulu-Natal Department of Education (2013), in its curriculum management strategy, concluded that for effective teaching and learning to take place strong curriculum management and leadership is required. It acknowledged that all stakeholders must work collaboratively to achieve this goal. Some of the identified actions to be taken related to curriculum were that SAs must visit schools and provide guidance and mentorship in their fields of specialisation. Furthermore, they should provide effective non-threatening monitoring and curriculum support.

Similarly, the Eastern Cape Department of Education outlined the purpose of school support in its provincial curriculum guidelines on on-site school support. School visits by curriculum personnel, firstly serve the purpose of providing support to educators for continuous growth; and secondly, they help to identify successes and challenges in curriculum implementation. Lastly, the school visits are conducted to ensure high quality school-based curriculum development that will result in high quality teaching and learning. Hopefully other strategies by other provinces have been put in place to ensure appropriate monitoring and support of curriculum implementation. It is evident that the Department of Education endeavours to deliver quality education and meet the aims and objectives of the national curriculum, by ensuring that systems are in place to support educators. The question now is whether these strategies work or not and whether they meet the desired outcomes?

2.5.6. Supervision and teaching activities

What educators teach is prescribed, but how they teach depends on the individual educator. Protheroe (2007) indicated that there are on-going concerns from policy makers, educators, parents and organisations involved in matters of education on what and how learners are learning Mathematics. These concerns, challenge educators to ensure that their teaching should focus on developing children's interest in Mathematics. There may be suggested activities in the subject policy document, but the educator's ability to deliver these activities is another story. For instance for Mathematics Grade 3, CAPS specifies teaching guidelines, with suggested activities and questions that may be asked during the activities. In support of this statement, in Khoza's (2015a) study on student educators' reflections on their practices of CAPS, most educators ―indicated that they had to use the educator-centred approach in order to finish their syllabus which is presented to them by their subjects' CAPS documents". In another study by Jansen (2009) it was revealed that educators preferred to use traditional teaching methods based on an educator-centred approach.

Protheroe (2007), in an article that outlined what the National Council of Mathematics recommends as good Maths instruction, correctly pointed out that the teaching and learning activities for young learners i.e. Grades 1 and 2 ―…should be provided in such a way that helps them to understand patterns and measurement; and develop a solid understanding of the numeration system" (p. 52). Taking them further to Grade 3, the activities should encourage learners to develop and investigate solutions to everyday problems. These activities, according to Protheroe (2007), should focus on relationships of the processes of addition and multiplication, and of subtraction and division. Learners should also be exposed to multiplicative reasoning, equivalence and a variety of methods for computation. In the same study by Protheroe (2007), the implementation of Ireland's Curriculum in Primary Schools was evaluated through inspection. The findings of the inspection regarding mathematics implementation were that, early mathematics activities focussed on the six strands of their mathematics curriculum and active learning tasks were organised in such a way that allowed the pupils to classify, match, compare and order objects in a structured way, and this practice was particularly commended.

In a collaborative action research study conducted by Mohd Meerah, Halim, Rahman, Abdullah, Hassan and Ismael (2010, p. 55) it was reported that ―educators were unaware of alternative approaches, and had no confidence in using inquiry-based teaching methods in

their classroom practices". The study used focus group discussion of six mathematics and science educators and one lecturer. Peat (2009, p. 105) concurred that ─South African educators in rural schools were struggling to use multiple teaching strategies that demand creativity in Arts and Culture, as they were not commonly exposed to them". Research in the Foundation Phase showed that ─...learners were also not ready to pursue more challenging activities" (Jansen, 2009, p. 138). This suggests that educators' autonomy on designing their own teaching and learning activities that employ learner-centred approaches are very limited. According to Eurydice (2008) educators implement their own precise methods, which are revealed in how they organise their day-to-day work in such a way that it accommodate a diversity of learners in their classrooms and at the same time addresses their learners' individual needs. It should however also be noted that CAPS is, in a way, promoting this as the curriculum is currently content-based and more educator than learner-centred.

The Mathematics CAPS Foundation Phase (DBE,2011a) document acknowledges that in the early grades of schooling, learners should be exposed to mathematical experiences or activities that give the many opportunities to do, talk and record their mathematical thinking. As outlined in Mathematics CAPS Foundation Phase, there are whole class learning activities which include mental mathematics, consolidation of concepts, and classroom management whereby the educator uses time to allocate independent activities to learners. During these activities the educator is the one leading them and giving instructions. From whole class activities, the educator then engages in educator-led small group focused activities whereby it is recommended that the educator teaches only a small group of leaners at a time. During these small group activities learners do the counting, number concept development, oral and practical problem solving, developing calculating strategies, written recording, patterns, space and shape, measurement and data handling. These activities should be well planned for by the educator and should be done orally and practically. When planning the activities, the educator also needs to take cognisance of learners with barriers to learning Mathematics. They have to ensure that they adapt the activities to the needs of the learners without compromising the skills and needs to be addressed (DBE, 2011a).

It this way, researchers suggest that elementary mathematics professionals who support educators of mathematics, SAs in our case, must build capacity of educators by strengthening their understanding of mathematics content and assisting them to develop more effective instruction and assessment (AMTE, 2010). Ololube and Major (2014) agree that, as methods

of teaching are an important part of effective classroom instruction, supervisors are therefore responsible for ensuring educators know these methods and apply them in their day-to-day teaching and learning activities. This study may help SAs, through reflective activities, to extend their support to educators in such a way that educators can adapt their classroom curriculum to suit the needs of their learners. They can use teaching methods that accommodate a diversity of learners and prepare learning experiences that learners can relate to. They can do all of these without deviating from the curriculum content. The educator can also adapt their curriculum to accommodate learners who experience barriers to learning and give them attention based on their pace of learning.

2.5.7.   Subject Advisor (SA) roles

Based on various literature (OSD, 2008, Dilotsotlhe, 1999 and Fowler & Poetter, 2004 and the requirements of the Department of Basic Education, SAs serve two major roles i.e. to monitor (supervise) curriculum implementation and to provide support to educators with regard to curriculum coverage and the challenges that they may be facing during the implementation process. The roles of SAs and the purpose of supervision and support cannot be separated as one cannot exist without the other. Below, these roles will be discussed in reference to literature from different viewpoints, addressing both supervision and curriculum support.

2.5.7.1.   Supervision

Unlike classroom based educators, some of the SAs core responsibilities as outlined in the Occupational Specific Dispensation (OSD) (2008, p. 65). SAs are to provide curriculum support to educators in schools in areas of specialisation. They also provide curriculum management support to Education Specialist, who are also known as Heads of Departments (HODs) in schools, and to manage support rendered to schools in areas of specialisation. This is done through workshops that are specifically designed for them (HODs). Furthermore they have to ensure that curriculum management complies with applicable legislations and regulations as prescribed and also to ensure that curriculum delivery is promoted in proper manner according to established policies. To develop systems for monitoring and recording progress made by learners, towards achievement of targets set. SAs also support initiatives to improve numeracy, literacy and information technology as well as access to the wider curriculum. For Mathematics CAPS there are programmes like JICA and Maths Centre in place that are used to improve learners' performance. They are also tasked with facilitating

curriculum development at institution/District/Provincial/National level. In France, according Fowler and Poetter (2004), inspectors are given the opportunity to review the country's formal mathematics curriculum for learners from Grades K- 5. Again, inspectors, after administration of the national evaluation at the beginning of Grade 3 and 6, identify gaps and those who are in charge of in-service training are guided by test results on where their support for educators needs to be better focused. Similarly in South Africa, SAs are included in developing the national assessments and after they have been administered, they moderate and analyse the results, and identify gaps. Henceforth a diagnostic report is compiled and recommendations are made as to how the SAs are going to scale up their support as based on the national, provincial and district improvement plans.

According to the DBE (2011b, p. 41,)

> "the position of Subject Advisor exists to ensure that for every subject there is specialist capacity to monitor and support the implementation of the curriculum in the relevant subject; provide and or source relevant teaching and learning material to improve performance in the subject; ensure that educators have all the requisite curriculum and assessment documents for the subject; support educators in effectively delivering the curriculum in the classroom; support educators in strengthening their content knowledge; moderate school based assessment, including Annual National Assessment and support educators in organising relevant/related co-curricular activities".

> Similarly to South Africa, in his study on examining the problems that frustrate inspection of schools in Kenya, Wanzare (2002, p. 213) identified the following as core responsibilities of the inspectorate:

>> "to supervise the implementation of school curriculum; to help diagnose problems and shortcomings in the implementation of the curriculum; to monitor and improve teaching and learning in schools; to maintain and improve educational standards in Kenyan schools and colleges and gather necessary information and report to the ministry".

The same applies to Nigeria whereby Ololube and Major (2014, p. 94), in their paper on the impact of school inspection and educational supervision on educators, also identified some of the reasons of school inspection as to:

"Acquire an overview of the quality of education, ensure minimum standards, offer purposeful and constructive advice, supervise the implementation of curriculum, identify discipline problems, monitor and improve teaching and learning and to stimulate and provide guidance…".

In her study on the role and functions of the physical science Subject Advisor in the North West province, Dilotsotlhe (1999, p. 305) identified one study in her literature review which dates back from 1978. Hence Ololube and Major (2014)'s assertion that school inspection and educational supervision is as old as human existence. The said study was conducted in the USA whereby in two national surveys, participants, who included educators, administrators and other professionals; were asked to identify the roles of inspectors, and they positively identified seven key roles. Firstly, they exist to provide instruction by assisting in the: development of instructional materials; implementation of curriculum changes; encouragement of student involvement in extracurricular programs; and review and refinement of methods of instruction. Secondly, they ensure that the educators are involved in: curriculum development; evaluation of new methods and materials; communication of significant new developments and of the status, accomplishments, and needs of the science programme. Then they also play a role in staff development by: initiating in-service programmes; coordinating with other school personnel; communication of opportunities for staff development; research into curriculum; determining long-range programme objectives. They also initiate opportunities for educators to: exchange and advocate for cooperative teaching; disseminate information on funding; coordinate educators' ideas on the design or remodeling of facilities; develop proposals for new instructional projects. Another role is that of management, whereby inspectors: make requisition of supplies; and coordinate information about laws, liabilities of district policies, safety regulations, financial status, and budgets. The sixth role is that of an assessor in that they: analyse test results; maintain data on student achievement; examine teaching objectives based on test results; and assist educators in self-evaluation. Lastly, they assist in: assignments; equalisation of teaching loads; resolution of conflicts; and staff selection (Dilotsotlhe, 1999).

Similarly, a joint position paper (by the Association of Mathematics Teacher Educators, the Association of State Supervisors of Mathematics (ASSM), the National Council of Supervisors of Mathematics (NCSM) and the National Council of Educators of Mathematics (NCTM) (2010)) discussing the role of elementary mathematics specialists (in our case, SAs)

in teaching and learning describes the importance of Elementary Mathematics Specialists. They serve the purpose of assisting educators in building their mathematical and pedagogical knowledge and they are also crucial in ensuring the attainment of high quality school mathematics programmes through the knowledge, capacity and the skills they build on educators. The EMS professionals are also vested with the responsibility of developing the curriculum, assessment, and policy. These responsibilities, according to NCTM (2010), need to be carried out by EMS professionals who have:

> deep and broad understanding of mathematical contend, solid knowledge of elementary context, expertise in using and helping others use effective instructional and assessment practices that are informed by knowledge of mathematical learning trajectories, knowledge and skills for working with adult learners (educators) and leadership skills necessary to influence and support educational efforts to improve the teaching and learning of mathematics" (p. 1).

It is evident that the roles of SAs in South Africa and elsewhere are predetermined. They do not perform their duties out of nowhere or in a vacuum. Based on the above roles as laid out by various international studies, one may come to the conclusion that the main targeted objective of curriculum support, monitoring or supervision and inspections, is curriculum implementation. This suggests that the roles of SAs should not be undermined. Despite this, some educators and principals still have a misconception that SAs, as inspectors or monitors, are given too much authority. They view monitoring and support more as an imposition than a level ground tool for development, which results in them rejecting new ideas and changes (Ololube and Major, 2014). As most of them have been in the teaching profession for quite some time, they still have vivid memories of the Apartheid era inspection because inspection has always been part of teaching. Inspection then was authoritative and included a combination of panel inspections of schools and subject assessments. These autocratic controls of schools were used to monitor and enforce state policy with respect to the curriculum and administration of public schools (Jansen, 2004).

According to Jansen (2004) then, there was only one Black circuit inspector who was reporting and supervised by a White circuit one. His core responsibility was:

"to ensure that the teaching and learning confirmed strictly with the content specifications of the Apartheid syllabuses; more broadly, though, these inspectors (responsible for a group of schools in a demarcated *circuit*) had the task of ensuring compliance with Apartheid in all aspects of school functioning— from governance and administration, to curriculum and assessment" (Jansen, 2004, p. 2)

Similarly, in Nigeria, supervision was an attempt by the colonial administration to establish a form of control over the development and growth of schools (Kolawole, 2012). According to Kolawole (2012), these inspections are regulated by the National Policy on Education to ensure quality control. The above statement suggests that even the inspectors themselves were not autonomous with regard to their responsibilities. The word 'strictly' and 'control' suggest that there was no room for deviation from what authorities prescribed, for whatever reason. Like educators, the inspectors were equally affected. Despite this, they continued to be rejected and ridiculed for performing their duties as prescribed. Because of this continued rejection, "Inspectors visiting Black township schools would, invariably, be confronted with hostility and, in several cases, driven away or attacked" (Jansen, 2004, p. 53). This, according to Jansen (2004), led to authorities withdrawing from professional lives of educators and punitive measures were applied with many educators ultimately being expelled. It was only after the release of Mandela in 1990 that protests erupted and SAs/inspectors were targeted and they were refused entry on school premises (Jansen, 2004). This continued until 1994 when the African National Congress came into power.

This suggests that it was a daunting experience for the SAs/inspectors then as it is now. The reason for my assertion is that presently, when you get to a school as a Subject Advisor, you are greeted with an attitude that silently, but obviously says "what do you want now?". Sometimes you are even asked why you did not secure an appointment. Firstly, school-based educators tend to forget that SAs, like them, are educators, and are also under the employ of the department of education. Secondly, they are regulated by the national policies that regulate them as educators (Ololube and Major, 2014). Like them they have no autonomy and their roles are predetermined by authorities. Lastly, this undermines the whole purpose of supervision and supporting curriculum implementation. They have a huge responsibility of ensuring that curriculum implementation in schools is implemented according to policy and meet the set standards. From my experience as a SA, notwithstanding the successes or challenges they face every day, the Department of Education relies heavily on the reports

submitted by the SAs to determine whether schools are performing up to the required standards and whether the curriculum goals are being met. Based on the reviewed literature on the roles of SAs, there is consensus that advisor, inspectors or supervisors elsewhere and in South Africa exist for the purpose mostly related to curriculum implementation matters. However the gap is that none of the studies reveal how the SAs measure their performance and get the opportunity to reflect. Merely supervising and supporting educators does not mean that all is always well. They may, along the way, have challenges as identified in this study, and therefore will need to reflect on their practices in order to ensure success in their roles. As their roles have been explicitly outlined, it is of great importance to note that for successful supervision to take place the SAs cannot work in isolation. Team work is also very important and it is proper to find out who forms part of the supervision and support team.

2.5.8. Assessment

Assessment in the teaching and learning system and in the day to day activities is a norm, regardless of its purpose at that point in time. There is consensus in literature that assessment serves as a measure of learning, can improve learning, be used to gather evidence on learning, provide feedback to learners, and can be used to evaluate the system and provide feedback for both the intended and enacted curriculum (Jansen, 2012 & Taras, 2005). Jansen (2012) and Taras (2005) define assessment as ―a judgement which can be justified according to specific weighted set goals, yielding either comparative or numerical ratings". Hoadley and Jansen (2012) regard assessment as a measurement of learning which can be used in different ways to gain information of what learners know and can do. McIntosh (1997), in a paper that discussed formative assessments in Mathematics, extracted the definition of assessments from the National Council of Educators of Mathematics as, ―the process of gathering evidence about a student's knowledge of, ability to use, and disposition toward, mathematics and of making inferences from that evidence for a variety of purposes" (p.92). Earl and Katz (2006) define assessment as a mechanism for making decisions about future teaching and learning programmes and for providing information to parents about their children's learning.

According to the (DBE, 2011a, p. 485) assessment is a ―continuous planned process of identifying, gathering and interpreting information about the performance of learners, using various forms of assessment". Assessment as part of teaching and learning should, as much as possible, accentuate the chances for success, guidance, feedback, re-instruction, encouragement and continuous improvement. It is also clearly stated in the Foundation Phase

Mathematics CAPS (DBE, 2011a, p. 485) that assessment, to enhance the learning experiences and yield its intended use, ‒should be both informal (Assessment for Learning) and formal (Assessment of Learning). In both cases, regular feedback should be provided to learners to enhance the learning experience". For these reasons, it may be argued that assessment, in any form, is a must in the teaching and learning process as there is considerable evidence that assessment is a powerful process for enhancing learning and improves learner achievements (Earl & Katz, 2006).

Broadfoot and Black (2004, p. 19) agree that there is ‒penetration of assessment in its various guises into almost every aspect of human endeavour". This is mandatory, and like teaching and learning, assessment cannot be conducted in isolation. According to Earl and Katz (2003), assessment is not a singular thing, purpose is everything and the purpose, whether formative or summative should provide regular feedback to learners in order to enhance the learning experience. In the teaching and learning situation, there has always being differing opinions from researchers and educators on the purpose of assessment and its significance in the teaching and learning context. Harlen and James (2005, p.207) maintains that, ‒All assessment in the context of education involves making decisions about what is relevant evidence for a particular purpose". Central to this confusion are the two controversial types of assessment; summative and formative assessment, which can also be classified as assessment *for* learning and assessment *of* learning. In the background we also have assessment *as* learning. Earl and Katz (2006) also agree that assessment can be used in three ways, either as assessment for learning, assessment of learning and as assessment as learning.

Assessment

Assessment for Learning	Assessment of Learning	Assessment as Learning
Not required to record	Recorded	Reflective
Used to improve learning	Used for promotion / Certification	used to improve practice

Table 4: Assessment table

2.5.8.1.   Assessment for learning (formative assessment)

Formative assessment, according to Ojugo, Ugboh, Onochie, Eboka, Yerokum and Iyawa (2013), refers to a process of providing feedback to learners with the aim of improving learning, and also as a range of formal and informal assessment procedures used by educators to modify the learning process so as to improve learner attainment. Formative assessment is about knowing and being able to use various strategies to identify and develop learners' skills and ideas. Formative assessment is essentially regarded as feedback to the educator and learners about their understanding and to assist the educator to plan for future activities. It is also about being able to recognise the point reached by learners in the learning process. Because it occurs throughout the learning process, Earl and Katz (2006) correctly point out that assessment for learning is used by educators to investigative and find out as much as they can about what their learners know and are able to do, and what misunderstandings, ideas, or challenges they might be having in their learning journey. Assessment, according to Earl and Katz (2006, p. 29), ―provides the basis for providing descriptive feedback for students and deciding on groupings, instructional strategies, and resources". Through formative assessment, it is argued, positive achievement of learners are recognised and discussed and the appropriate next step planned.

Ojugo *et al.* (2013) conducted a study which investigated the interaction effects of formative assessment/ testing and attitudinal types as they affect student's achievement in Mathematics. Purposive sampling was used to select 120 students as participants, using a quasi-experimental design. All the participants in the experimental group were taught ―graphical solution of quadratic equation' over a period of five weeks. The findings revealed that all the experimental groups exposed to formative testing relatively performed better than the no-formative testing formative group. The study concluded that formative testing is an important evaluation technique that adds quality to the national education if it meets its requirement of being functional, usable and effective. This is consistent with Harlen and James's (2005) assertion that formative assessment serves the purpose of knowing about pupils existing ideas and skills, and recognising the point reached in learning and development. This will guide the educator as to which steps to take to improve further leaning. In a periodical issue of *Equals: Mathematics and Special Educational Needs,* with the topic *Formative Assessments in Mathematics*; William (1999) indicates that they published a review of about 250 studies with Paul Black. The review was carried out in a period of over 10 years focusing on the effectiveness of formative assessment in raising standards achievement. The findings

concluded that when formative assessment is used effectively in classrooms, it significantly increased students' learning enough to raise levels of performance in Mathematics. The review also discovered that formative assessments is also beneficial for low achieving learners and seems to be the most promising way to reduce the unacceptable wide variation in attainment in Mathematics (William, 1999).

Panayiotis and James (2013) conducted an interpretive qualitative case study with the aim of exploring formative assessments as implemented in primary classrooms in Cyprus and develop a framework for analysing and understanding formative assessment processes. Data was collected through classroom observations, semi-structured interviews, and document analysis. Thereafter data was analysed through a comparative method reached by 5 processes of formative assessment. These are: communication of expectancies and success criteria; elicitation and collection of information; elicitation and collection of information; interpretation of information; proving feedback and taking action/regulation of learning. Four educators with varying teaching experiences of between 8 and 18 years were sampled. The findings indicated that educators were positive about their use of formative assessment but were unclear of what constituted formative assessment and their role in it. However, they were unable to describe what they do in their classroom which counts as formative and summative assessment. They acknowledged that it is an important element that can be used to promote effective teaching and learning. It has also been noted that educators have difficulties in implementing formative assessments effectively because the studies assume that educators' formative assessments do not represent a well-defined set of assessment practices. Another finding indicated that assessment was highly educator centred. Educators used a variety of practices to collect information on student attainment. Some formative assessments were more common than others.

The study recommended that educators should be provided with training and support to enable them to use assessment in a genuinely formative way. Harlen and James (2005) hypothesise that the educators' critical role in assessment for learning is to monitor the quality of what they taught, what the learners have learned during teaching, and to develop a number of strategies that will enable them to close the gaps between actual implementation and the objectives they are aiming for. In agreement, Ramapersad as cited in Harlen and James (2005) states that the importance of formative assessment is to provide feedback both to the educators and learners understanding of what has been taught in order to determine the

way forward. Furthermore, Harlen and James (2005) also agree that formative assessment, in its nature, is part of teaching as learning with understanding depends upon it. It is conducted by the educators and is always concerned with where, in terms of content and skills, learners are in their learning.

In Ojuko *et al.'s* (2013) study, they cited Nicol and McFarlane-Dick who noted seven principles of formative assessment. Firstly, it clarifies what good performance is with set goals, goals and set standards. Secondly, it facilitates the development of self-assessment in learning. Then, it provides high quality information to students about their learning. It also encourages educators and peer dialogue around learning. Again, it provides opportunities to close the gap between the current and desired performance and lastly, it provides information that can aid educators to shape their teaching and learning. Based on the studies above, it may be argued that assessment of learning is an integral part in Mathematics curriculum implantation, as a teaching and learning strategy, and also as a means of giving educators an opportunity to reflect on their teaching and modify or improve their practice. This may be more so possible because it is conducted continuously as part of the leaning process.

Grade 3 Mathematics CAPS is consistent with the body of literature presented above with regard to the use, the importance, and the role of the educator in using formative assessment. In CAPS it is regarded as assessment for learning or informal or daily assessment.

> ―It is a daily monitoring of learners' progress. This is done through observations, discussions, practical demonstrations, informal classroom interactions, etc. It should not be seen as separate from learning activities taking place in the classroom. Informal assessment enables the educator to monitor learner‗s progress and to make daily instructional decisions. Informal assessment is used to provide feedback to the learners and to inform planning for teaching" (DBE, 2011a, p. 525).

Based on this, it may be concluded that even CAPS Mathematics for Grade 3, regarding formative assessment is relevant and consistent with other bodies of knowledge. It is also practical because educators will be able to use it to inform their teaching, and lastly it is sustainable as it has been used successfully in other countries for many years and there is evidence that if used correctly it may also be sustainable in South Africa. However, assessment of learning cannot be regarded as the end point in assessment because there is a need for assessment of learning which is also called summative assessment.

2.5.8.2. Assessment of learning/summative assessment

Contrary to formative assessment, summative assessment (also known as assessment of learning), according Taras (2005), is ―when the process of assessment is a single process which makes judgement according to the criteria and standard" (p. 58). There have always been debates around which strategy is best for enhancing learning. The explanations are consistent with Earl and Katz‗s (2006) definition of ―…summative assessment being assessment at the end of a unit or term to convey student progress" (p4). It is referred to, according to Earl and Katz (2006), as:

> ―strategies designed to confirm what students know, demonstrate whether or not they have met curriculum outcomes or the goals of their individualized programs, or to certify proficiency and make decisions about students‗ future programs or placements" (p. 55).

There is consensus in literature that summative assessment is typically conducted after a specific point in instruction to measure learners‗ understanding of a subject. Hence Earl and Katz (2006)‗s assertion that assessment of learning serves the purpose of measuring, certifying and reporting the level of students‗ learning.

> ―Some examples of summative assessments include high stakes tests, standardized state exams, district or interim tests, midterms and final exams. Summative assessments can also be used to check their mastery of a subject every few weeks or months. Many textbooks include questions for parents to use for a summative assessment based on the instruction provided. While summative assessments are important, many people feel that the information gleaned from them does not occur frequently enough for summative assessments to inform instruction at the classroom level. This is where formative assessment comes in" (Smart Tutor Education Programmes, 2008- 2013, p. 1).

Studies conducted have revealed that most, if not all, summative assessments conducted by educators are externally administered and moderated. According to Harlen and James, (2005), external summative assessments are used more frequently to monitor performance of educators and schools than to track the students learning and progress. While they are the main role players in this process, educators‗ roles are undermined because they are, to some extent, excluded in the setting and marking of their students‗ test (Harlen and James, 2005). Black *et al.* (2010) also noted with concern that these external tests dominate the system and present more barriers. There is a consensus that externally set examinations and tests put more pressure on educators. They require lots of resources and also demand that educators

work more to cover curriculum content (Harlen and James, 2005). In the South African context this is true because when it is time for administering provincial or annual national assessments tasks (ANA), the provincial Department of Education only sends one copy of the question paper per subject to the schools. It is the responsibility of the school to reproduce those question papers with the limited resources that they have. Again, educators have to ensure that they rectify mistakes in those papers, because they always come with lots of mistakes.

Besides dominating the system, externally set tests are mostly not standardised. This forces educators to spend more time focusing on revising previous question papers which takes too much teaching and learning time. This is because, according to Harlen and James (2005), the results of these externally set assessments require high stake results. However, this negatively impacts on the learning experiences of educators and on the nature of assessment. Black *et al.* (2010) revealed that not only do the effects of externally set summative assessment affect educators, students are equally affected. Based on its purpose of the summative assessment at the point in time, it can have a negative impact on students learning and achievement. In most cases learners underperform. Reflecting on the Grade 3 Mathematics performance on the ANAs from 2011 to 2014; there is slight increase on learner performance. Looking at the diagnostic reports, one may still argue that the improvement is not impressive because what we see from each assessment, the quality of the question papers have been compromised, may be to accommodate the diverse needs of learners. Of most concern also is the deterioration of performance in Mathematics from Grade to Grade. The gap within the Foundation Phase and between Foundation, Intermediate and Senior Phase also triggers a reason for concern. See the table below.

GRADE	MATHEMATICS AVERAGE PERCENTAGE MARK		
	2012	2013	2014
1	68	60	68
2	57	59	62
3	41	53	56
4	37	37	37
5	30	33	37
6	27	39	43

| 9 | 13 | 14 | 11 |

Table 5: Adapted from the Department of Basic Education's ANA report 2014 (DBE, 2014). GET Mathematics of learners performance in ANA between 2012 and 2014

There is consensus in literature that testing has a negative impact on students' motivation to learning. For this reason, in her investigation, Dwyer (2006) discovered that in many countries educators resist using external tests in their classroom. There is also substantial evidence in literature that ―assessment information for both summative and formative purposes, without the use for one purpose endangering the effectiveness of the other" (Harlen and James, 2005, p. 215). Ussher and Earl (2010, p.57) agree: ―the reality is that any assessment information gathered for the purpose of informing learning (formative assessment) could also be used to make judgement about learning to date (summative assessment), and vice versa". One of the findings in Black, Harrison, Hodgen, Marshall and Serret (2010) was that some countries have also adopted the notion of using formative assessment to support summative assessment. This is due to the great need of quality teaching, learning, and accountability. This suggests that ―quality information gathered using valid and reliable assessment tools and types could be used both formatively and summative" (Ussher & Earl, 2010, p.60). In Grade 3 the main techniques of formative and summative assessment are observations by the educator, oral discussions, practical demonstrations and written recording. However, Black *et al.* (2010) warns against this practise, despite the fact that they can yield positive results, arguing that they are placed at risk when policy makers decide that externally imposed summative tests will improve education. This suggests that if educators adhere to the assertion of those who agree with using the two forms of assessment to support each other, their quality of teaching and learning will improve. Furthermore, Black *et al.* (2010) suggests that ―to understand and improve tensions between formative and summative assessment [we] should start by exploring the quality of educators' summative assessment" (p. 16).

Studies conducted have shown that educators are familiar with the terms formative and summative assessment but there is still an absence of clarity of purpose reflected in the way they respond to how they understand them (Ussher & Earl, 2010). To support the statement Black *et al.* (2010) discovered that educators lack skills and confidence in assessment. They also found out that their literacy level of assessment is poor. Harlen and James (2005) discovered that educators understand summative assessment as a process in which they gather

information of their students' learning in a planned and systematic way. They base this on their professional judgment, which may not be reliable. This suggests that educators' understanding of assessment is flawed, hence the need for SAs, on their practices including their understanding and conducting of assessment.

Harlen and James (2005) maintain that ―there are several potential advantages in using educators' judgment in summative assessment for external and internal use" (p. 212). She maintains that it is working well in some countries. In contrast Dwyer (2006) argues that assessment, whether formative or summative; increase the difficulty of educators exercising their professional judgment about their students' performance. CAPS Mathematics Grade 1-3, states that formative assessments should be continuous in order to monitor learners' progress and make daily instructional decisions. This type of assessment is not used for progression purposes. On the other hand there is also formal assessment, which is summative in nature. An annual programme for summative assessment should be established to indicate the number of formal assessment tasks to be completed. In Grade 3 there are a total of 10 formal assessment tasks whereby a learner must obtain at least 40% for progression to Grade 4. In addition there is a detailed plan of assessment specifying what is expected for each task, including mark allocation. However, Ojuko *et al.* (2013) states that ―It is disappointing to know that educators are usually provided with common teaching and evaluation syllabi with the numbers of tests to be conducted per term" (p. 114). This poses a challenge to the quality and value of assessment activities leading to undermining the whole purpose of assessment. This is because educators focus only on formal assessment tasks to be conducted and neglect other types of assessments, i.e. the informal ones (assessment for learning) and another type of assessment, which is not as loud as the latter two, called assessment as learning.

There is evidence of great concern regarding summative assessment. Concerns are rooted around the issues of moderation, validity and reliability of these summative assessments. Black *et al.* (2010) claim that moderated educators' internally set assessment could produce results with validity and reliability at least, as compared to externally set tests. Of a different opinion, Harlen and James (2005) points out that how moderation is done ultimately controls and limits the educators' use of the full range of available evidence. For example in ANA, it is required that only sampled schools are to be moderated, and in those schools about 20 learners in each grade are selected randomly for moderation. This is contrary to how educators conduct moderation in schools. In the school context, teachers select a few learners

and this selection will include learners who performed above average, average and below average. Their scripts will then be used to draw up conclusions and suggestions on how they can improve or enhance teaching and learning. Whichever way we perceive it; educators play a central role in assessment. For this reason, studies suggest that: ―Educators must have the ability to create and evaluate assessment tools of quality to ensure they will be gathering high quality evidence about progress and achievement" (Ussher & Earl, 2010, p.60). Furthermore, they must have knowledge and understand that the information that they gather is fit for its intended purpose. In their study, Black *et al.* (2010) found that educators did not take consideration whether the assessment information they used served the purpose of reporting and making decisions about setting assessment tasks in a dependable way. This makes it crucial for educators to note that validity and reliability are dependable, meaning that reliability is optimised while ensuring validity (Harlen, 2005).

2.5.8.3. Assessment as learning

Base on the literature reviewed on assessment, one may assert that there is limited literature on this aspect of assessment as learning. There is limited mention of assessment as learning in literature that was reviewed. However, Earl and Katz (2006) explain that assessment as learning is an assessment that emerges from the idea that learning is not only about transferring ideas from someone who knows (the educator), to someone who does not know (the learner). Earl and Katz (2006, p. 41) argue that ―learning is an active process of cognitive restructuring that occurs when individuals interact with new ideas". Assessment as learning, according to Earl and Katz (2006, p.41), is ―based on research on how learning takes place and characterised by learners reflecting on their own learning and making adjustments so that they can have deeper understanding". The role of the educator in this assessment is to design teaching and assessment that give learners an opportunity to think about and monitor their own learning. This suggests that though learners are the major role players in assessment as learning, educators still have a responsibility of ensuring that they guide them appropriately to set their (learners) own meaningful goals.

Based on the above arguments it may be concluded that the way assessment processes and procedures are designed may not always benefit all learners because what is viewed as standardised by one person, may be viewed as non-standardised by another. In assessment, there are always reasons why assessment should take place, what needs to be assessed, what methods will be used when assessing, how the quality of assessment will be ensured, and

lastly how the assessment information will be used. The following table indicates how the process of assessment unfolds in the assessment types, based on the issues mentioned above.

SUMMARY OF PLANNING ASSESSMENT			
	Assessment for learning	**Assessment as learning**	**Assessment of learning**
Why Assess?	To enable SAs to determine next steps in advancing educators ability in teaching the concepts of curricular spider web	• To guide and provide opportunities for each educator in a form of school visits conducted • To monitor and critically reflect on his or her teaching, and identify next steps	To certify or inform the Department of Education or other stakeholders of educator's proficiency in relation to curriculum learning outcomes coverage
Assess What?	Each educator's progress and teaching needs in relation to the curriculum outcomes	Each educator's thinking about his or her teaching, what strategies he or she uses to support or challenge that teaching, and the mechanisms he or she uses to adjust and advance his or her teaching	The extent to which educators can apply the key concepts, knowledge, skills, and attitudes related to the curricular outcomes
What Methods?	A range of methods in different modes that make educators' skills and understanding visible	A range of methods in different modes that elicit educators' learning and metacognitive processes	A range of methods in different modes that assess both product and process
Ensuring Quality	• Accuracy and consistency of observations and interpretations of educators' teaching • Clear, detailed teaching and learning expectations • Accurate, detailed notes for descriptive feedback to each student	• Accuracy and consistency of educators' self-reflection, self-monitoring, and self-adjustment • Engagement of the educator in considering and challenging his or her thinking • educators record their own teaching	• Accuracy, consistency, and fairness of judgments based on high-quality information • Clear, detailed teaching expectations • Fair and accurate summative reporting
Using the Information	• Provide each educator with accurate descriptive	• Provide each educator with accurate descriptive feedback that will	• Indicate each educator's level of teaching • Provide the foundation

feedback to improve his or her teaching • Differentiate support by continually checking where each educator is in relation to the curricular outcomes and coverage • Provide the district and provincial Department of Education with descriptive feedback about educator's, ideas and level of support needed	help him or her develop independent teaching habits • Have each educator focus on the prescribed content and his or her teaching (not on getting the right answer) • Provide each educator with ideas for adjusting, rethinking, and articulating his or her teaching • Provide the conditions for the educator and student to discuss alternatives • Educators report about their teaching	for discussions on placement or promotion • Report fair, accurate, and detailed information that can be used to decide the next steps in a educator's teaching

Table 6: Planning assessment (Adapted from Earl & Katz, 2006).

Therefore this study, as part of improvement, will offer SAs an opportunity to influence transformation of assessment practices as part of curriculum development, hence the relevance of an action research under the critical paradigm.

2.6 Conclusion

The conclusions that can be drawn from the different studies utilised in this review indicate that the ten principles of the curricular spider web are important when one deals with issues related to the curriculum. If one is missing, the whole curriculum is affected. As a result, this study is framed around the principles of curricular spider web as a framework of analysing SAs' reflections of the supervision on Grade Mathematics Curriculum and Assessment Policy implementation. From the literature reviewed, there emerged important curriculum issues that provided insights to each concept of the curricular spider web. The literature provided answers on why supervision of mathematics implementation (rationale) is conducted; and secondly, on who is supervising the implementation of Grade 3 mathematics CAPS and whom are they supervising. Again, the literature took us through to how the Mathematics CAPS implementation is being supervised. The roles of SAs and what they are supervising

(content) was also outlined. The resources are used during supervision, the environment and time when supervision takes place were revealed. Lastly, the literature took us through the evaluation of supervision. However, gaps have also been identified in studies reviewed. Firstly, the curricular spider web seems not to be a popular frame of reference in many studies reviewed. The curricular spider web interprets aims and objectives as if they are the same as outcomes which suggests that it is aligned to the content/teacher centred approach. Again, the spider web addresses teaching activities without learning activities, which suggest its alignment to a learner centred approach, which is competence curriculum. This suggests that the curricular spider web is not aligned to any curriculum model, but can be used in any one of them i.e. competence or performance curriculum. This may be achieved if one understands the difference between the two types of curriculum models and is also able to interpret each curriculum model using the curricular spider web concepts as presented.

Secondly, most studies are positioned in the interpretivist paradigm and are mostly case studies. None of the studies probed SAs' experiences, but the experiences and views of educators on supervision and SAs is present. In this chapter, the research gaps were identified; answers to the research questions and objectives of the study will then be discussed in the next chapter on research design and methodology.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1   Introduction

Literature reviewed in the preceding chapter indicated the importance and benefits of reflections in education and how educators reflect in their practice of teaching. Other relevant literature provided an insight on curriculum in the South African context from the Apartheid curriculum to the Curriculum and Assessment Policy Statement. It was then presented as intended and implemented based on the nature of the study. There was also a distinction in the reviewed literature between competence-based and performance-based curriculum. Studies in the literature also presented how the primary school Mathematics curriculum is intended and implemented, not only in South Africa but in other parts of the world too. It also indicated how supervision of educators is carried out in South Africa and in other countries like England, Kenya and Nigeria. The findings from literature were all framed around the curricular spider web as a core frame of reference for discussing curriculum matters. Therefore, this empirical study on SAs' reflections of the supervision of Grade 3 mathematics CAPS implementation intends to achieve the following objectives:

1. Identify SAs' reflections of the supervision of Grade 3 Mathematics CAPS implementation.
2. Explain the reasons why SAs reflect in a particular way.

It is anticipated that these objectives will be achieved by answering the following research questions:

1. What are the SAs reflections of the supervision of Grade 3 Mathematics CAPS implementation?
2. Why do SAs have particular reflections on Grade 3 mathematics curriculum implementation?

This chapter on research design and methodology will therefore take us through how the study at hand will achieve its objectives. There is consensus in literature that a research design is a logical, flexible plan or a strategic framework of how the researcher intends to conduct their research (Christiansen *et al*, 2010; Terre Blanche, Durrheim and Painter (2006); Drew, Hardman and Hosp (2008); Flick (2009) and Ragin (1994). Furthermore, a research

design is influenced by the research questions, selection of research methods and available resources to be used, thereby giving a clear picture of how the data will be collected and analysed (Flick, 2009 and Terre Blanche *et al.* 2006). For these reasons, Terre Blanche *et al.* (2006) acknowledge that a research design serves as a bridge between research questions and the implementation of research ensuring that the study fulfils its purpose. Most importantly, it distinguishes research from other forms of observation because research observation is systematic and guided by concrete research questions (Terre Blanche *et al.* (2006). Given the rationale of the research design, this chapter will therefore present the research paradigm, research approach, sampling, data generation methods, trustworthiness/authenticity, data analysis, ethical issues and study limitations.

3.2   Research paradigm

A paradigm is defined by Willis, Jost and Nilakanta (2007, p. 8) as a ―comprehensive belief system, world view, or framework that guides research and practice in a field". Similarly, Christiansen *et al.* (2010) considers a paradigm as representing a particular worldview that defines, for the researcher who carries this world view, what is acceptable to research and how. This suggests that we have different perceptions and beliefs about the world. These elements therefore determine how we interpret certain issues thereby leading to our overall assumptions on what reality is and what it is that needs to be known. Hence the assertion by Cohen *et al.* (2011) that in research, it is vital for the researcher to present their world view/paradigm because this will be a reflection of how this researcher views the world. Guba and Lincoln (1994) in Elshafie, (2013, p.5) define paradigms as ―the basic belief system or worldview which influence the researcher's choice of epistemology, ontology, and methodology of the research". According to Elshafie (2013, p. 5), "each research paradigm has its own ontological and epistemological assumptions that influence its methodology and methods used". Ontology, according to Guba and Lincoln (1994), refers to the nature of reality and its assumptions are concerned with the question ‗what is there that can be known?' or ‗what is the nature of reality?'. Epistemology refers to the theory of knowledge and asks, "What is the nature of the relationship between the knower (the inquirer) and the known (or knowable)?".

A researcher can choose between the many paradigms that are available and this will depend on the type of research they are engaged in. However, there are three popular paradigms used most frequently, namely, the post-positivist, interpretivist, and the critical paradigm. According to Valsiner (2000) the difference between paradigms are their underlying beliefs

and assumptions, not the type of data each paradigm needs and selects. The post-positivist paradigm's assumptions, according to Cresswell and Miller (2000), are that research consists of rigorous methods and organised forms of enquiry. Researchers in the post-positivist paradigm are more concerned with validity and look for quantitative equivalence of it. ―The goals of the post-positivist researchers are to describe, control and predict how the world works (Christiansen *et al.* 2010, p. 22). The post-positivist researchers believe that there is one truth about the natural and social settings and we can never come to know it completely, therefore they use methods that try to strengthen the hypothesis through trying to disprove it (Christiansen *et al.* 2010). On the other hand, there is the interpretive paradigm. In this paradigm ―the purpose of the research is to understand the meaning which informs human behaviour" Christiansen *et.al.* (2010, p. 23). In this paradigm it is believed that humans behave in the ways they do because of their environment. This suggests that the environment, its settings, how people interact, and how they have been socialised (including their beliefs) have more influence on how they behave. Hence Silverman's (2013) assertion that the beliefs of interpretivist researchers are that society is not structured because the social world is created by the interactions of individuals. The last one is the critical paradigm, which was used for the purpose of this study.

The critical paradigm has its origins from the critical theory whereby it acknowledges that in society, there are issues of power and politics and its aim is to transform (Elshafie, 2013). For this reason, in the critical paradigm the purpose of the research is to focus on ―bringing about some kind of social change that will benefit those groups who are understood to have little power, or few opportunities or choices open to them" Christiansen *et al.* (2010, p. 26). Generally in education, educators have no autonomy in curriculum development matters; implementation process is entrusted to them at grass roots level. The main reason for this is that their role in this phase is to have a clear understanding of education and teaching goals (Carl, 2012) and impart them accordingly to learners. There is consensus in literature that though educators have a critical role to play in curriculum implementation, they have no autonomy as to what should or should not be included in the curriculum. They are not part of policy decision making (Mokua, 2010; Carl, 2012 and Stoffels, 2008). Educational authorities are employing the top down approach, with educators as frontline implementers.

According to Guba and Lincoln (1994) the ontological basis of the critical paradigm is historical realism, meaning that reality exists outside the mind, but is historically constructed. Furthermore, what is deemed real is shaped by people through social, political, cultural, and

ethnic and gender experiences. This suggests that reality is fluid, it is not absolute, and can therefore be altered. For example, the fact that learners around Nkangala district, which is the location of this study, are not performing to the expected benchmarks set by the district, the province and national departments of education, does not necessary suggest that this level of performance will continue. This may change when proper intervention is put in place to improve performance. For this reason, through educators, SAs may be able to identify local learning needs; build on existing strengths and using local resources, and considering a range of models to decide which best suit the contexts of their supervision. Based on reality in the context of this study, SAs will be –able to develop connected coherent and balanced learning programmes that will bring about tangible improvements in educator and learner knowledge.

Elshafie (2013) also identified the aim of research in this paradigm as not only to understand, but to also improve the researched content. Therefore the critical paradigm was the most suitable for this study because its aim is to explore the reflections of SAs on the implementation of Grade 3 Mathematics CAPS, with the intention of improving educators' pedagogical practices and learners' performance. Based on evidence presented in the literature and in the national and international assessment results, there is growing concern that South African learners are not performing as well as their peers in other countries. It may be asserted that there are gaps with regard to the implementation of the Grade 3 Mathematics curriculum. Therefore by reflecting, SAs were reflecting on their own practices as a source of specialist support of curriculum implementation. Furthermore, it was anticipated that this research will help in transforming practice at the level of curriculum implementation.

The ontological assumption of the critical paradigm is based on historical realism, meaning that reality exists outside the mind; however, it is historically constructed. Hence Shah and Al-Bargi's (2013) assertion that in the critical paradigm, reality is considered a commutable human action. However, according to Elshafie (2013), the critical paradigm has been criticised for having a political agenda. Ernest (1994) has also noted with concern that researchers in the critical paradigm often lack clarity in terms of guidelines and frameworks needed to achieve the desired outcomes. This suggests that as a researcher I have to be as neutral as possible, despite my role as a Subject Advisor. To support this statement, Cohen *et al.* (2000) cautions that critical paradigm researchers should at all times remain objective, dispassionate and disinterested.

3.3   Research approach/style

When conducting a study the researcher must, during the process of the study, use research methods that are suitable for that study. The researcher can therefore choose from different approaches of research available, but this will depend on the paradigm most suited for that particular research (Christiansen *et al.*, 2010). Each research paradigm includes suitable methods which will enable it to achieve the intended outcomes. These methods are concerned with collection, analysis and interpretation of data. As this study falls under the critical paradigm, methods that may be suitable for this type of study are, according to Christiansen *et al.* (2010), case study, life histories, participatory research, action research, and feminist research.

Within the critical paradigm and based on the research at hand, to explore reflections of eight Mathematics SAs on the implemented Grade 3 Mathematics curriculum, action research was the most suitable research approach for a study of this nature. In agreement, Shah and Al-Bargi (2013) correctly pointed out that research in the critical paradigm adopts dialogic, dialectical and transformative methodologies. According to Elliot (1991), as cited in Bartlett and Burton (2007), in an action research, the researcher studies a situation with the aim of improving the quality of action within so that they can act with understanding of the practical situation. McMillan and Schumacher (2010) agree that action research is used to study current problems or issues with the focus of finding solutions to those problems. According to Christiansen *et al.* (2010, p. 39), "action research is done by particular people on their own work". It is concerned mainly with practice and gives the researcher a voice, changes the situation being researched, and improves the standard of practice.

In educational practices, according to Mills (2003), action research is guaranteed to have an in-depth view of the context being researched to improve learning outcomes through developing reflective practice and accustoming the work environment with effective changes. In this respect, this is the exact intention of this study. Furthermore, according to Christiansen *et al.* (2010), action research consists of a spiral of action and reflection with the following four steps: reflect, plan, implement and evaluate. This is important because the aims and objectives of the study are measurable and allow participants to add on other aspects that are deemed important.

Therefore, in this study the SAs were reflecting on their own practice and I, as the researcher, will be also be researching my own practice with the aim of transforming and improving the

quality of implementation of the Mathematics curriculum in Grade 3. However, the downside may be that my relationship with the SAs may make it difficult as a researcher to be objective. To overcome this, I will do my utmost to be as neutral as possible. Thus, bias and subjectivity exist in action research project and this can be problematic (De Vos, Strydom, Fousche & Delport, 2011). Though the results of an action research cannot be generalised, its strength lies in its relatability to similar situations (Bartlett & Burton, 2007). This implies that the results of this study may be easily related or accounted to other studies of this nature in other areas or provinces, however it should be noted that solutions generated from the area researched cannot necessarily be applicable in another as the results of the action research tend to be localised (De Vos *et al.*, 2011 and Bartlett` & Burton, 2007).

This action research therefore adopts a qualitative approach of research whereby I, as the researcher, need to understand SAs' reflections on their work within their natural setting. Burns and Grove (2003, p. 19) define a qualitative approach of research as a ‑systematic subjective approach used to describe life experiences and situations to give them meaning". Hesse-Biber and Leavy (2011) agree that researchers using qualitative methods seek meaning and the need to understand. For them, meaning comes from what people derive from their experiences, circumstances and situations. Because qualitative approach is a unique grounding from which to conduct research, researchers therefore have their own specific way of asking questions and thinking through problems (Hesse-Biber & Leavy, 2011). Litchman (2011) concurs that qualitative research is about investigating broadly stated questions about people, their experiences and realities.

Unlike in quantitative research, qualitative research focusses on words and texts, and not numbers. Meaning is extracted from data (Hesse-Biber & Leavy, 2011) and this assist the researcher to produce thick, descriptive scenarios that help the readers to understand those people's experiences. Flick (2009) concurs that qualitative research uses common approaches to study in order to unpack how people construct meaning of the world around them in ways that are meaningful and that offer rich insight. According to Flick (2009), the intentions of qualitative approaches are to understand, describe and explain social phenomena. Firstly, Flick (2009) asserts that they do so by analysing experiences of individuals or groups, which can be related to everyday professional practices, by analysing everyday knowledge, accounts and stories. Secondly, they analyse interactions and communications of people through observations or recording practices and analysing them. Lastly, they analyse documents or

other forms of interactions. Therefore, the research at hand is a qualitative action research, which falls under the critical paradigm.

3.4   Sampling

According to Burns and Grove (2003) and Christiansen *et al.* (2010), sampling is a process of selecting a group of people, settings, events or behaviour with which to conduct a study. In agreement, Kerlinger (1986) defines sampling as the researcher's activity of making part of a population as representative of the whole population. In this process, the topic under study also depends on the unit of analysis, which may be groups or individuals. The researcher also needs to decide on the number of people that will be included in the study and those selected will then be called the research population (Christiansen *et al.,* 2010). ‒A population is the entire set of individuals or other entities to which a study can be generalised" (Check & Schutt, 2002, p.92). Findings of a study can only be generalised when it can be assumed that what was observed in the sample of subjects would also be observed in any other group of subjects from the population (De Vos *et al.,* 2002). These definitions suggest that the researcher does not conduct a study without first deciding on their unit of analysis and the population to include in a study. The type of study conducted i.e. quantitative or a qualitative study, also determines the type of sampling suitable for that particular study. Two types of sampling have been identified, namely probability and non-probability sampling. Probability sampling is mostly used for quantitative studies and non-probability sampling is used for qualitative studies. For each type of sampling there are different sampling methods used.

As this study is qualitative in nature, focus was made on non-probability sampling methodology. Methods for non-probability sampling include purposive sampling, convenience sampling, quota sampling and snowball sampling. Quota was not suitable for this study as it is designed to ensure that the sample represents certain characteristics in proportion to their prevalence in the population (Check & Schutt, 2002). Quota is also aimed at overcoming most of the obvious flaws of convenience sampling without considering its similarity to the population of interest (Check & Schutt, 2002) Though snowball sampling is useful for hard to identify populations, it was also not suitable for this study. Reasons for non-compatibility to the study at hand are that generalisation must be tentative as the researcher cannot be confident that the sample represents the total population of interest. The other thing is that the researcher depends on members of the target population to help him locate other members of that population (De Vos *et al.,* 2002).

For the purpose of this study purposive and convenience sampling were used. Parahoo (1997, p. 232) describes purposive sampling as ‒a method of sampling where the researcher deliberately chooses who to include in the study based on their ability to provide necessary data". De Vos *et al.* (2002) argue that researchers using purposeful sampling must think critically about the parameters of the population and choose the sample accordingly. Lodico, Spaulding and Voegtle (2010) concur that using purposive sampling as a strategy helps the researcher to select participants who are best able to provide the information for the study. It should also be noted that purposive sampling was selected because the individuals sampled have the necessary information and experience related to the research questions (Lodico *et al.* 2010). Lodico *et al* (2010) concur with Check and Schutt's (2002) assertion that individuals who are targeted in purposive sampling are particularly knowledgeable about the issue under investigation. In addition, these individuals are also willing to talk and they serve as a representative of the range of point of view.

This was definitely the case with this study because the context in which this study took place was the Department of Education in Mpumalanga, Foundation Phase Curriculum section. SAs who participated in this study were conveniently sampled because they are knowledgeable about supervision and fit the criteria as supervising Mathematics curriculum implementation in the Foundation Phase. This suggests that the choice of purposive sampling for this study is relevant. Terre Blanche *et al.* (2006) also recommend purposive sampling as it is suitable as the researcher is looking for particular type of participant in relation to what they already know about the subject under study. The eight selected Foundation Phase Mathematics SAs are from all four districts within the study region. Five of them are from Nkangala District, which is the lowest performing in the province, one is from Bohlabela, one from Ehlanzeni and the last one is from Gert Sibande. The SAs supervise and support Foundation Phase educators in all circuits around the province. Purposive sampling in this study is done by convenience sampling because convenience sampling enables the researcher to choose a sample which is easy for him/her to reach (Christiansen *et al.* 2010).

For me, the sampled SAs are the most accessible and relevant as we already meet on a regular basis. In one of our meetings I verbally requested their participation and also later sent letters of request for their participation in the study. Some of them were also contacted telephonically before e-mailing the letters of consent. This activity was not difficult as all of them were readily available. It would have been a fruitless exercise for me to sample Mathematics SAs from Intermediate Phase for a study that is focused on Mathematics

curriculum implementation in Grade 3. The rationale for using these methods was firstly, that I am a colleague to the participants and they are easily accessible (convenience sampling); and secondly, because the sampled SAs are specifically supervising and supporting educators in Mathematics and are equally affected by the issue at hand. Again the SAs are supervising schools in various contexts i.e. rural, urban, semi-urban/ rural, farm schools and multi-graded schools.

Also of note is that Mpumalanga is one of the most diverse provinces because there are nine Languages used for Learning and Teaching in the Foundation Phase i.e. Afrikaans, English, IsiNdebele, IsiZulu, Sepedi, Setswana, Xitsonga, Sesotho and SiSwati. In addition, the province ranks as fifth in performance in the Annual National Assessments (ANA) 2014 (DBE, 2014), with an achievement of 50%. Gauteng tops the list with 60.3% with Limpopo holding the last position at 39.7%. In terms of the Presidential targets of at least 60% of learners achieving acceptable levels of performance, the 2014 ANA results indicate that learners have exceeded this target in Mathematics at the Grade 3 level (DBE, 2014), but Mpumalanga as a province has not. Lastly, SAs have a core responsibility to monitor and support curriculum implementation in schools. Based on the above, this will assist me, as stipulated by de Vos *et al.* (2002), to be able to generalise subjectively from the case being studied from my own experiences also as a Mathematics Subject Advisor. The profiles of the sampled SAs is tabulated below

Participants	Gender	Age	Years of experience as a classroom educator	Years of experience as a Subject Advisor	Highest Qualification	Race
Subject Advisor 1 (SA1)	Male	50	11	12	B.Ed. (Hons)	African
Subject Advisor 2 (SA2)	Female	57	8	26	B-Tech	African
Subject Advisor 3 (SA3)	Female	47	22	02	B- Tech	African
Subject Advisor 4 (SA4)	Female	48	10	12	M. Ed	African
Subject Advisor 5	Female	48			B- Ed	African

(SA5)						
Subject Advisor 6 (SA6)	Female	44	19	02	B- Ed	African
Subject Advisor 7 (SA7)	Female	45	13	09	B- Ed (Hons)	African
Subject Advisor 8 (SA8)	Female	43	16	07	B. Ed	African

Table 6: Profiles of participants

The age in years of the sampled SAs ranges from 43 to 57, with Subject Advisor 2 being the oldest and the most experienced Subject Advisor with 22 years of experience. Their classroom teaching experiences also differ and except for Subject Advisor 1 and 7, they were all Foundation Phase educators before they became SAs. All the sampled SAs are African. This however does not imply that the province has only African Mathematics SAs; there is one White Subject Advisor but she was not available to participate in the study due to other reasons. Others are supervising and supporting educators in Languages, not mathematics, therefore it was unnecessary to include them in the study. On gender it should also be noted that there is only one male Subject Advisor in the study. This is because the province has only two male SAs for Foundation Phase and Subject Advisor 1 is the one who was available. All the SAs have varying teaching qualifications, ranging from educators' certificates to a higher diploma in education, with Subject Advisor 5 being the only one with an advanced Certificate in Education, specialising in Mathematics. On the educational profile I have only indicated the SAs highest qualifications obtained. SA4 has a Master of Education (MEd), SA1 and SA7 have Honours degrees and the rest have 4 year Bachelor's degrees.

Based on the SAs' profiles above, it is implied that their various experiences in years as SAs and as classroom educators are very important to this study as they have all experienced the curriculum changes pre-1994 and post-1994. Some of them like SA1, 2, 5 and 8 were part of C2005 and CAPS Curriculum 2005 development at National (macro) level whereby they provided inputs as what is and is not relevant and in the Foundation Phase curriculum. They were also part of the dissemination team whereby they were scaling up information to educators at school level (micro). Therefore, the data collected will represent the SAs' reflections as based on different periods of time and their own experiences on curriculum

matters. As a researcher in this study I also believe that the SAs' responses will generate data that will provide answers to the research questions of this study.

3.5   Methods of data generation

Action research may use qualitative, quantitative or mixed methods (Shah & Al-Bhargi, 2013); and as this is a qualitative action research, data can be generated using different techniques that are suitable. The techniques include, but are not limited to, interviews, self-observation, self-reflection, focus groups; reflective activities and focused discussions. For data generation, this study adopted three techniques, reflective activities, semi-structured interviews and focus group discussions, and was divided into two phases. The reflective activity was the main data collection technique for this study.

3.5. 1.   Reflective activity

Reflective activities are important in helping to analyse, understand and gain meaning of a particular situation. In the reflection phase, evidence is considered and plans are made for future actions (Reason & Bradbury 2008). According to Milam (2008) a reflective activity is a written activity that asks participants to complete a number of questions as based on the study at hand. Therefore, reflective activity questions for this study were based around the issues of the curricular spider web, and focussed specifically on SAs. The questions are as follows: Why are you supervising the implementation of Grade 3 Mathematics CAPS? Who are you supervising? Towards which goals are you supervising? What are you supervising? Where and when are you supervising? What resources are you using during supervision and how is your supervision being evaluated?

The SAs were requested to complete the reflective activities. Beforehand, it was acknowledged that this activity may be time consuming if the reflective activities were to be completed during the supervision process in schools or when we are together, because their authenticity may be compromised. Therefore the activities were completed at their own time, and were guided by what they observed and their findings as documented in the monitoring tools that they use during monitoring and support visits. Of the eight SAs, two of them were given reflective activities in the form of hard copies as they are stationed at the same office as mine. The rest of the SAs were emailed the reflective activities and consent letters. They completed the activities and emailed them back to me. The consent letter were printed, filled in, and handed to me as hard copies in one of our meetings. After submission of the activities, I then arranged the interviews.

An interview, according to Christiansen *et al.* (2010, p.65), ‖is a conversation between the researcher and the respondent… it is a structured conversation where the researcher has in mind particular information that he or she wants from the respondent, and has designed particular questions to be answered". An interview is also a more natural form of interacting with participants and it assists the researcher to get up close and personal with participants in order to understand how they think and feel (Terre Blanche *et al.* 2006). Henning, Stone and Kelly (2009) agree that an interview puts the researcher in personal contact with the participants, which will assist them to ask follow-up questions and reveal rich insights to their thinking because the responses gathered will be more thoughtful and informative (Koshy, 2005). Flick (2009) believes that an interview is one of the most methods of data collection in qualitative research.

However, Christiansen *et al.* (2010) cautions that an interview is not only a data collection exercise, but also a social personal encounter which may have a negative impact on the study. This suggests that they involve personal interaction and therefore cooperation between me, as the researcher, and the participants could not have been guaranteed. My position as their colleague could have affected the study negatively in that they would not be open when answering some questions. To overcome this I ensured that the interviews took place in a relaxed environment during breaks when we were having the versioning sessions of common provincial assessment tasks for Foundation Phase. The assessment tasks are initially set in English and they need to be versioned or translated into various Languages of Learning and teaching used in the Foundation Phase. Moreover, Terre Blanche, *et al.* (2006) state that interviews in an action research are typically short and many occur during regular activities in either a group or individual format.

The interview session of this study took place when we, as Foundation Phase SAs, were busy with versioning of the 2016 March Provincial assessments. The interview was one-on-one semi-structured with 6 out of 8 SAs over a period of between fifteen and thirty minutes each. One Subject Advisor was not available for the interview as they were busy versioning the Second Additional Language CAPS. The other Subject Advisor, due to time constraints, was not interviewed on the same date, but was interviewed the following day in her office. This was possible because we are both stationed at the district office.

3.5. 2.   One-on-one semi-structured interviews

Semi-structured interview were found to be the most suitable for this study because it gave me the opportunity to follow a more flexible process as indicated by Henning *et al.* (2009). Planning for the interview included securing a comfortable, private, place to conduct the interviews, and creating a list of questions related to the topic as based on the curricular spider web issues. This helped me to generate data in a systematic and focused manner as Henning *et al.* (2009) maintained. Because we were at a lodge and the environment was conducive, the interviewees were very relaxed. Before each participant was interviewed, I first explained the purpose of the interview. It was explained that the purpose of the interview will be to assist us to get in-depth information to add on the reflective activities they completed before. Secondly, the participants were assured that anonymity will be maintained, and lastly it was clearly explained that the interview will be recorded so that I could later transcribe the audio to better analyse the data generated. Terre Blanche *et al.* (2006) correctly points out that the transcripts provide powerful evidence for presenting data and making conclusions, which is one of the strengths of interviews.

During the interviews, the interviewees were asked the questions I designed and I was able to adapt the order of questions, omit some questions and change the wording as needed, depending on how the interviewees responded. As some other issues emerged, it was also easy to add on the existing questions by probing those unexpected issues. This was very helpful because it assisted in obtaining in-depth information and provided clarity on issues that were under discussion (reflections as SAs on the supervision of Grade 3 mathematics CAPS implementation). For example, when they were asked questions on accessibility, ―who are you supervising?, follow-up questions would be ―From which backgrounds are these educators? Are the places that you conduct your supervision accessible? What are the socio-economic statuses of the communities of the schools that you supervise?". Adaptability during the interview provided unexpectedly vital perspectives from the SAs, which is also indicated the strength of the interviews.

Though the semi-structured one-on-one interviews were, according to me, successfully conducted and yielded the desired outcomes, limitations of interviews were not ignored. Some of the limitations of interviews, as identified by Henning *et al.* (2009), are that conducting interviews may be time consuming and typing of transcripts also needs sufficient time. In addition, tape recorders may intimidate participants. Lodico *et al.* (2010) added that

interviews are vulnerable to inaccuracy and distortion. Furthermore in action research, if a person who has authority over the participants is present, it may make participants feel uncomfortable revealing some thoughts or feelings (Lodico *et al*, 2010). To overcome the time challenge I made sure the interviews were planned to be conducted during a time when we are all meeting at the same venue as provincial SAs. With the issue of tape recorder, as mentioned earlier, consent was obtained from the SAs because I informed them beforehand about its use and how vital it is for me to use the voice recorder during the interviews. I am personally responsible for transcriptions of data from the recordings; this prevented the potential distortion of information if transcription was undertaken by somebody else. Our seniors were present when interviews were conducted as we were engaged in a provincial activity, however, they were not part of the interviews. Interviews were conducted in private space a therefore there was no chance that the supervisors can overhear what we were engaged in. At the end of the interviews, participants were informed that the next activity will be a focused discussion. There was a suggested date which was convenient for all of us as we were also going to meet for three days at a central venue for technical arrangements of 2016 common Provincial assessment tasks. They all indicated that they were available for a focus group interview.

3.5. 3.   Focus group

A focus group is a type of interview conducted within a group. Terre Blanche *et al.* (2006), Lodico *et al.* (2010) and De Vos *et al.* (2002) assert that a focus group is formed by a group of between 6 to 10 people who share a similar type of experience, have certain common characteristics and have common referent in relation to the topic under research as guided by the purpose of the study. These people are however not naturally constituted as an existing social group. This implies that though they are colleagues they are not friends or do not have any social relations to each other. Holloway and Wheeler (2003) state that in a focused discussion the researcher interviews participants with common characteristics for the purpose of eliciting ideas, thoughts and perceptions about specific topics or certain issues linked to an area of interest.

A focus group, according to De Vos *et al.* (2002), is called focused because it involves some kind of collective activity which is useful for promoting self-disclosure and for eliciting multiple viewpoints from participants. The researcher may also learn from the interactions of the participants and these interactions may also help the participants to build on each other's

comments, thereby producing ideas that may not occur in one-on-one interviews (Lodico *et al.* 2010). A focus group, like an interview, needs to be planned with respect to participants' location or environment and questions to be asked. The plan needs to include timeline, permission, purpose and outcomes. The focus group for this study was planned with the seven participants after the one-on-one interview sessions. Like the interviews, the focus group was going to be conducted in a comfortable environment as we knew beforehand that on the scheduled date we would be at a hotel. The eighth participant was called and informed about the arrangement. According to Terre Blanche *et al.* (2006), there are four basic components to a focus group: procedure, interaction, content and recording.

Procedure, according to Terre Blanche *et al.* (2006), means setting the ground rules of what will happen during the focus group; expectations of members of the focus group; and issues of confidentiality are also discussed during this time. Other issues that are covered include respecting the views of other and giving each other a chance to speak. For the purpose of this action research, procedure was explained to the SAs. Before the focused discussion it was explained that the discussion may take between twenty and thirty minutes and that it would be recorded in a similar manner as the interviews. A colleague, whom was not part of the study, was introduced to take some notes for us as I was facilitating the focused session. Most importantly, it was explained to the participants that maximum participation will be appreciated during the session.

Interaction, as explained by Terre Blanche *et al.* (2006), is when researchers familiarises themselves with the personal and interpersonal dynamics of the group members by checking their attention span and giving them opportunity to introduce themselves. The interactions are the main data production strategy and through this interaction the researcher is able to produce a concentrated amount of data on the topic of interest. Lodico *et al.* (2010) points out that the synergy of the group has the potential to uncover important constructs which may be lost with individually generated data of interviews. What the participants discuss in a focus group builds on the content and follows a format of semi- structured interviews. I explained to the SAs that the questions under discussion will be nearly the same as the interview ones; open-ended and probing. As a facilitator I had to listen for commonalities and differences of opinion. During their discussions there were no contrasts of opinions and I let the group reflect on the extent of commonalities as Terre Blanche *et al.* (2006) recommends. I also interpreted and formed themes based on the discussion in order to deepen the reflections and then summarised what had been said. During the whole process, the interactions and

discussion were recorded, which is the last aspect of a focus group as identified by Terre Blanche *et al.* (2006).

The recording of the focus group discussion was also done using a cell phone. Like with the interviews, I explained that the recordings of this discussion are needed so that what has been said can be transcribe without error. Notes were also been taken by one of my colleagues because I could not take notes on my own as I was facilitating the discussion. The SAs were labelled SA1- SA8 so that the note taker does not mention names in the notes. Like the one-on-one semi-structured interviews, the focused discussion went well, notwithstanding some limitations of this method of data generation.

Some of the limitations, as identified by Lodico *et al.* (2010) are that focus group sessions can be very costly and this may pose many administrative challenges to novice researchers. It was cost effective for this study as all costs were incurred by our employer and we used the boardroom that we used during the day for our official duties. While the findings of this study cannot be automatically projected to a population at large, the voice of the SAs who took part will serve as a representation of other SAs through reflections. Another challenge is that passive participants may be overshadowed by active ones. In this discussion it was agreed that each participant would be given an opportunity to give inputs so that the final product is not only based on one person's views, but on all. The last concern is that when recorded, it may be difficult during transcription to identify the speakers, hence the use of a note taker or scriber in this focus group discussion.

Using the focused discussion assisted me in getting an in-depth understanding of the participants' reflections of the supervision of the Grade 3 Mathematics CAPS implementation. When we finished with the focus group I conducted a power point presentation on issues relating to the curriculum. Firstly, the purpose of the study and why it was conducted was discussed. Then there was a discussion around the importance of reflections for us as educators and SAs. The discussion went further by focusing on curriculum: its definition, the levels, and the intended, implemented and attained curriculum. The difference between competence and performance curriculum were also part of the discussion and lastly presented the concepts of the curricular spider web with their propositions as mentioned in the literature review. The participants were then given the presentation in softcopy and also some hand–outs in hardcopies. As the reflective activity is the main data collection method for this study, the SAs were then given the second and last

reflective activity for them to complete. They were requested to return the activity via fax or email in 3-5 days as we would not be meeting again until the beginning of October 2015. In the meantime, data analysis of the first reflective activity, one-on-one semi-structured interviews and focused activities would continue. It should be noted that the data generation process of this study was not done in a haphazard manner. It was planned in a coherent manner, starting from sampling to selecting relevant data collection methods for a qualitative action research. Below is a table that reflects the data generation plan that was followed and when data was generated.

	Question: What are the SAs' reflections of the supervision of Grade 3 Mathematics CAPS implementation?	Question: Why do SAs have particular reflections of Grade 3 Mathematics CAPS implementation?
Why is data being generated?	To identify reflections of SAs on the implementation of Grade 3 Mathematics CAPS.	To explain the reasons why SAs reflect in a particular way.
What is the research strategy?	Reflective activities, one-on-one semi-structured interviews and focus group interviews.	Reflective activities, one-on-one semi-structured interviews and focus group interviews.
Who were sources of data?	Eight Foundation Phase SAs.	Eight Foundation Phase SAs.
Where was data generated?	From the four districts in Mpumalanga (Nkangala, Gert Sibande, Ehlanzeni and Bohlabela).	From the four districts in Mpumalanga (Nkangala, Gert Sibande, Ehlanzeni and Bohlabela).
How was data generated?	The data was generated through the use of reflective activities, one-on-one semi-structured interviews and focus group interview. Both interviews were voice recorded using a smartphone and were later transcribed.	The data was generated through the use of reflective activities, one-on-one semi-structured interviews and focus group interview. Both interviews were voice recorded using a smartphone and were later transcribed.
How often was the data generated?	Firstly, the participants were given reflective activity which they had to complete and email back to me. They we given three weeks to send back the activity. The one-on-one	Firstly the participants were given reflective activity which they had to complete and email back to me. They we given three weeks to send back the activity. The one-on-one

	semi-structured interviews followed the reflective activity. The interviews for each participant lasted between fifteen and thirty minutes.

The third activity was a focus group interview which was conducted about two weeks after the individual interviews.

Lastly, another reflective activity which was handed over immediately after the focus group interview. The participants were given five days to return the activity either by fax, email or hand delivery. | semi-structured interviews followed the reflective activity. The interviews for each participant lasted between fifteen and thirty minutes.

The focus group interview was conducted about two weeks after the individual interviews.

Lastly, another reflective activity which was handed over immediately after the focus group interview. The participants were given five days to return the activity either by fax, email or hand delivery. |
| **Justification of this plan for data collection** | The reflective activities were valuable in that they gave the SAs autonomy to reflect on their practice, which is supervision of curriculum implementation.

Both the one-on-one and focus group interviews afforded me, as the researcher, the opportunity to uncover important concepts that may have been omitted during the reflective activities, and also to get a fuller, deeper, understanding of the SAs reflections of their supervision of Grade mathematics CAPS implementation.

These data collection methods led to the SAs planning to improve the level of support they are providing to the educators. | The reflective activities were valuable in that they gave the SAs autonomy to explain why they reflect in a particular way on their practice, which is supervision of curriculum implementation.

Both the one-on-one and focus group interviews afforded me, as the researcher, the opportunity to uncover important concepts that may have been omitted during the reflective activities, and also to get a fuller, deeper, understanding of the SAs reasons of reflecting how they did on their supervision of Grade mathematics CAPS implementation.

These data collection methods led to the SAs planning to improve the level of support they are providing to the educators. |

Table 8: Data generation plan

3.6   Trustworthiness

Christiansen *et al.* (2010) explain validity and reliability as the accuracy of the study and the extent to which the instrument that has been used can be repeated and still produce the same results. According to Kerlinger (1986) validity is essentially about accuracy. Holloway & Wheeler (1996, p. 162) describe validity as ―the extent to which any researcher‗s tool measures what it is supposed to measure and reliability is the extent to which the instrument, when used more than once, will produce the same results or answers in the research". For the purpose of this study, as it is a qualitative study, the term trustworthiness will be used. Trustworthiness, according to Holloway and Wheeler (1996, p. 261), ―is the truth value of a piece of research" and Streubert and Carpenter (1999, p. 61) add that ―trustworthiness of the research depends on the extent to which it delves into the participants‗ experiences apart from their theoretical knowledge". Trustworthiness involves the elements of credibility, dependability, conformability and transferability.

According to Guba and Lincoln (1994, p. 307), ―credibility in qualitative research is the ability of the researcher to demonstrate a prolonged period of engagement with participants, to provide evidence of persistent observation, and to triangulate by using different sources, different methods and sometimes multiple investigators". To achieve this, the reflective activities was analysed together with the participants for reflection purposes and during the interview and focus group sessions I recorded all the information using a tape recorder for easy transcriptions. During the focus group I also asked one of my colleagues to take notes for us as I was facilitating the focus group. The methods and sources of data collection (i.e. the notes taken during the interview sessions and the tape recorder) will also be used to ensure credibility. The challenge that was identified was that the focus group recording was not clearly audible; therefore the notes came in handy during analysis.

According to (Creswell, 2003, p. 220), ―Dependability of data is the extent to which same findings could be repeated if the same research instruments were simulated with similar respondents under similar conditions". For dependability I provided original evidence of data generated from the reflective activities and use direct quotations. The transcriptions of the recorded responses will also be quoted. Unless utilised immediately, there is no guarantee that the same instruments may yield the same results, especially if they are used by another researcher because after reflection exercises the participants‗ practices may have changed as the aim of this action research is to ultimately transform behaviour.

Guba and Lincoln (1994, p.318) define conformability as ―the extent to which findings are free from bias". I ensured conformability by laying aside my pre conceptions about the issue under research and by seeking more clarity from the participants themselves through reflective activities and interviews. It may not be possible to conform as I am also a Subject Advisor, but I ensured that I requested another person who had no interest in the study to assist. Transferability refers to the extent to which the findings can be applied to other settings and contexts (Guba & Lincoln, 1994). For the purpose of this study, transferability was enhanced by organising the findings in such a way that people who are going to read this study will be able to relate them to their own experiences, and as such might benefit and also reflect on their own practices for transformation purposes.

3.7   Data analysis

To make meaning of the generated data, it had to be analysed. De Vos *et al.* (2002, p. 339) define data analysis as ―the process of bringing about order, structure and meaning to the mass of collected data". What is important during data analysis is that the researcher to be able to interpret the collected data and make sense of it within the context of the participants' responses. Data for action research can either be quantitative, qualitative or a mixture of the two and data analyses for qualitative and quantitative data is different. Qualitative data, according to Christiansen *et al.* (2010), is textual or visual data and quantitative data is mostly numerical in nature. Mahlo (2011, p. 102) adds that ―qualitative data analysis takes place throughout the data collection process, the researcher reflecting constantly on impressions, relationships and connections derived from data". This study adopted the use of qualitative data methods to collect qualitative data. Furthermore, in qualitative data analysis De Vos *et al.* (2002) point out that the researcher attempts to capture the participants' perceptions, isolate themes, interpret and make comparisons. Throughout the data collection process I had frequently called on my participants for clarity on some issues, interpreted their explanations and met with them to come up with strategies to improve practice after I have read some of the reflective activities. Hence the reason De Vos *et al.* (2002) asserts that in qualitative study, data collection and data analysis cannot be separated. Koshy (2005) further recommends that an action researcher using qualitative methods needs to create a coherent story from all the data collected. Qualitative data analysis, according to Koshy (2005), has particular strengths for an action researcher because it focuses on naturally occurring ordinary events in natural settings. This study investigates a topic from my own context as a Foundation Phase SA; therefore it is basically part of professional development.

There is consensus between Koshy (2005) and Christiansen *et al.* (2010) that a qualitative data analysis can be done through one of the two processes, which are inductive or deductive processes. In inductive processes, data is organised in categories and patterns are identified in those categories. It works from specific observations and broader generalisations and theories i.e. from the raw data, formulates hypothesis and develop theories of draw conclusions. On the other hand, in deductive processes, the researcher has a framework and uses it to analyse data. It starts from the more general to the specific i.e. the researcher begins with a theory, develops categories to organise and analyse data, looks for patterns and makes connections. However, a study may use both. For the purpose of this study, guided analysis is used because in guided analysis the categories are determined in advance of the data collection and the analysis proceeds in relation to the pre-specified categories and will be modified through interaction with the data (Dhunpath & Samuel, 2009, p. 12). This suggests that guided analysis uses both the inductive and deductive processes of data analysis. This is essential for this study because the data was appropriately categorised during analysis according to the categories or strands of the curricular spider web and will accommodate new categories that emerge from the data.

Firstly, responses from reflective activities that were done by the SAs were categorised according to themes derived from the curricular spider web. The recorded responses from the interviews and focused discussion were then transcribed, and then specific statements to formulate meaning were extracted. This process of data analysis is called data reduction. According to Koshy (2005) data reduction is a ―process of selection, focusing, simplifying, abstracting and transforming the data that appear in the written-up field notes or transcriptions" (p. 113). The third step was then to organise the statements into clusters which were immediately accessible and easy to interpret, which assisted me in drawing conclusions as spelled out by Koshy (2005). This process is called data display. I then used themes to provide and describe the reflections of SAs. Lastly I related the themes that had emerged from the data to the literature in order to draw some conclusions and present the findings.

3.8   Ethical considerations

According to Christiansen *et al.* (2010, p.50) ―Ethics in research are very important, particularly with research involving humans and animals". In light of this statement, there are certain principles that the researcher has to follow when dealing with ethical issues. These principles are autonomy, non-maleficence and beneficence (Christiansen *et al.* 2010). In this study, autonomy of all participating SAs was respected. Participants were asked to

voluntarily consent to taking part in the study. I emailed each one of them a consent form and a letter which outlined the purpose of the study and also informed them that there will be no limits of any benefits that they may receive as participants. Procedures to be followed with regard to data generation, storage and the use of voice recorder during the interview were also outlined in the letter. Participants had to print the consent letter and read through it. Where necessary they asked clarity seeking questions. I also ensured that the study does not in any way harm the participants or expose them to any kind of danger by conducting the interviews and focus group in safe and conducive environment. Confidentiality was maintained by not revealing the real names of the participants. They are identified as SAs 1- 8 (SA1- SA8).

Permission to conduct the study was sought from the Mpumalanga Department of Education. I phoned the provincial office's research section and they requested that I download the provincial research policy, read through it and then come back to them. I read the policy and called the person responsible again and he confirmed that I need to send a letter of request to conduct research which motivates fully why I should be granted permission to conduct this study. In the letter I outlined the nature of the study explained how confidentiality, anonymity and consent will be dealt with during the study. He also indicated that I need to send my research proposal together with the letter and all these should be addressed to the Head of Department of Education. I sent the required documents and received approval within two weeks. Lastly, I sent my research proposal to the University of KwaZulu-Natal for approval. After approval I was called to come and defend it in the form of presentation in the presence of a panel. I then applied for ethical clearance through the university's research ethics office. Once it was approved they sent me an ethical clearance certificate (see attached Appendix).

3.9   Limitations of the study

In this study two main limitations were inevitable. Firstly, time may be a limiting factor. Our main role is to monitor and support curriculum implementation and each month there are a targeted number of schools that we need to visit. For these reasons, there is limited time for us to meet. Participants are also involved in other curriculum related activities, for example setting of provincial assessments and national assessments, developing policies, and supporting curriculum enhancing projects. For these reasons, time constraints were the largest contributing factor because participants needed to reflect on each component of the curricular spider web and they also needed to participate in the interview and focus group sessions. To overcome this challenge I sent them reflective activities through email. Time for the

interviews was targeted during times when we were all meeting already in the capacity as Foundation Phase SAs. Prior to our meeting the participants were informed about the interviews. The reflective activities were sent back to me via email and I printed them.

Secondly, the participants are my colleagues and as a Subject Advisor I am the least experienced of them all. This may have led them to find it difficult to be free when giving responses. They may have unintentionally or intentionally provided fabricated or biased responses in fear of being undermined or giving too much information to an inexperienced colleague. This would ultimately undermine the validity and reliability of the research findings. This was not the case because to avoid this mishap, the purpose of the study was clearly outlined and they were assured that their confidentiality and anonymity will be maintained at all times. However, the downside may be that my relationship, with the SAs may make it difficult to be objective as a researcher. To overcome this, I ensured that I am as neutral as possible. Thus, it is acknowledged that bias and subjectivity exist in action research project and that this can be problematic (De Vos *et al.* 2011). Though its results cannot be generalised, the strength of an action research lies in its relatability to similar situations (Bartlett & Burton, 2010). This means that the results of this study can be easily related or compared to other studies of this nature in other areas or provinces. However, it should be noted that solutions generated from the area researched cannot necessarily be applicable in another area as the results of the action research tend to be localised (De Vos *et al.*, 2011; Bartlett & Burton, 2007).

3.10   Chapter summary

This chapter's main concern was to outline how the two research question were going be answered. To achieve this goal, the research paradigm was identified and described with its ontological and epistemological assumptions. The research approach, data generation methods, trustworthiness (with its four elements; data analysis, ethical considerations and limitations of the study) were also identified. The gaps and strengths of the critical paradigm action research were identified, and the gaps and strengths of the data generation methods that were used in this study were identified. Notwithstanding their gaps, the selected methods were used to identify SAs reflection of the supervision of Grade 3 Mathematics CAPS implementations. The next chapter will therefore take us through to the research findings and discussions of the findings of this study.

CHAPTER FOUR
RESEARCH FINDINGS AND DISCUSSIONS

4.1 Introduction

In the preceding chapter focus was made on the research design and methodology used in this study. This chapter therefore outlines the findings of this action research. Data was generated through reflective activities, interview and a focus group discussion. The research focused on a group of eight Foundation Phase SAs from the four Districts of the Mpumalanga province; Nkangala, Gert Sibande, Ehlanzeni and Bohlabela. Data was presented using the ten themes of the curricular spider web, as an analytical framework of this study; with the analysis categories for each theme. The ten original themes have been reshaped into nine as two of the themes, Location and Time, have been merged into one. Direct quotations were mostly used so as not to lose the authentic reflections of the SAs in the process. As this study is an action research, it means that it followed an action research cycle of reflecting, planning, acting and observing. To reach a transformation point, data was generated in two phases. During the first phases of reflection, reflective activities and interviews were used and for the second phase, focus group and reflective activity were used. Below is the supervision cycle that was used during the two phases of data generation processes.
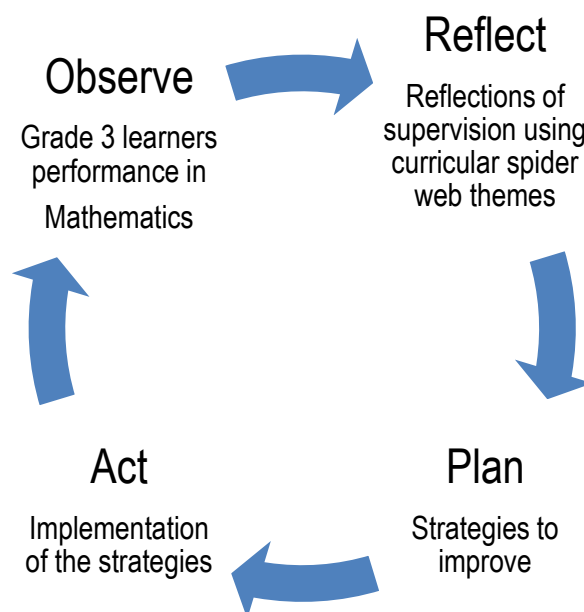
Figure 2: Supervision cycle

Firstly, the SAs' reflections will be presented one theme at a time, then analysed and synthesised. Findings and discussion will then be presented as based on the research

questions of this study and compared to the literature reviewed in Chapter Two. Detailed structure of the findings is presented in the following subsection.

4.2   Findings and discussions

Presentation and discussion of the findings are done according to the themes of the curricular spider web using guided data analysis as specified in the previous chapter. The table below displays how these themes and their categories were used in the two reflection phases of this study. To ensure trustworthiness, direct quotations from reflective activities, interviews and focus group will be used. Furthermore, where there is consensus in responding to a particular concept, there will be a brief discussion followed by evidence in the form of transcription of the discussion.

The reflection was done in two phases. Firstly, most of the SAs in the first phase of action research, reflected from the technical and practical level of reflection. Reflections from the technical level suggest that educators are more concerned with the technical application of educational knowledge which will help them to maintain order and achieve predetermined outcomes (Van Manen, 1977). On the other hand (Van Manen, 1977) maintains that reflections from the practical level indicate that educators are concerned with goals, connections between principles and practice and the assumptions that underlie their practice and the value of their goals. When moving to the second phase, after the presentation and being given some notes to read, they reflected from the critical level. The critical level is more aligned with the pedagogical rationale of supervision, with the aim of challenging issues and bringing about change (Van Manen, 1977).

Themes	Categories per level
Why are you supervising the implementation of Grade 3 Mathematics CAPS? **(Rationale)**	1. Personal reasons 2. Societal reasons 3. Professional/ pedagogical reasons
Towards which goals are you supervising the implementation of Grade 3 Mathematics CAPS? **(Goals)**	1. Aims 2. Objectives 3. Outcomes
What and when are you supervising when you get to a school or classroom **(Content and Time)**	1. Mathematics Content areas 2. Time allocation 3. Planning

	4. Usage of the correct LoLT
What resources do you use during the supervision visits? **(Materials and resources)**	1. Hardware resources 2. Software resources 3. Ideological ware resources
How are you supervising the implementation of Grade 3 Mathematics CAS **(Activities)**	1. Workshops 2. Classroom visits and lesson observations 3. Utilisation of DBE Workbooks
How do you facilitate the supervision of Grade 3 Mathematics CAPS implementation? **(Roles)**	1. Supervision and support
Who and where are you supervising and where are you supervising? **(Accessibility and Location)**	1. Physical 2. Financial access 3. Cultural access
How is the supervision of Grade 3 Mathematics CAPS implementation evaluated? **(Assessment)**	1. Assessment for learning 2. Assessment of learning 3. Assessment as learning

Table 9: Categories of SAs' reflections per theme

4.2.1 Why are you supervising the implementation of Grade 3 Mathematics CAPS?

Various studies conducted around why educators teach indicate that they teach for various reasons. According to Jansen (2004), policy makers already have the envisaged educator in mind when designing policy. However, educators do not always act in the manner anticipated by the policy makers because their behaviour changes and adapts when they teach in the classroom. What they actually teach (implemented curriculum) is based on how they identify themselves. Jansen (2004) refers to this phenomenon as educator identities. Firstly, educator identities are influenced by personal reasons. In this case, when the educator understands and acts according to their value commitments, they are acting according to personal reasons. Secondly, educators are influenced by societal reason, which can also be of political benefit (Jansen, 2004). This suggests that educators need to please learners, keep up with demands

from parents and respond to pressures from the department. Lastly, educators teach for professional/pedagogical reasons. In this case, the educators' teaching is based on their profession, subject matter competence, levels of training, preparation, and formal qualifications. Therefore, the educators' various identities may explain why educators teach a particular subject in a particular manner.

4.2.1.1 Personal reasons

SA3 *"... are learners getting something from what the educators are teaching? ... I want to see our poor leaners going somewhere with mathematics"*

SA2: *─To assist them with the interpretation so that they can have a common understanding of each and every concept they are supposed to teach".*

SA6: *"to provide more comprehensive support to Foundation Phase educators…"*

From the data generated in the first phase of reflection, the majority of SAs reflected on their personal reasons for supervising Mathematics in Grade 3. This account is consistent with several literature findings that suggest that the reasons for teaching Mathematics is based on individual goals, beliefs and knowledge (Nachlieli *et al.*, 2009). The findings indicate that the SAs concur with Jita and Vandeyar (2006) who suggest that the educators previous experiences as students shapes their knowledge and beliefs about mathematics, mathematics teaching and mathematics learning. (Khoza 2015b) maintained that personal vision is a foundation of societal and professional visions as it helps educators to choose whether they follow societal or professional visions in their teachings. It may therefore be concluded that, in this phase, the SAs still responded from the practical level of reflection. The reason for this assertion being that there is an issue of underperformance at hand and to eradicate it, SAs supervise to help educators improve by strengthening their mathematics knowledge.

4.2.1.2 Societal/social reasons

SA1: *"...Because CAPS is the policy. All educators in South Africa are expected to implement CAPS"* SA3 and SA5 agreed.

SA7: *─I'm supervising them to check and ensure that relevant Mathematics content is taught…"*

SA8: *"I want to ensure that they adhere to the national, provincial and district policies…"*

SA4: *"It is part [of] my core duties"*

SAs 1, 3, 5 and 7's reflections suggest that they are supervising the implementation of Grade 3 CAPS more for societal reasons than other reasons. Their responses bear testimony as they suggest that SAs cannot deviate from the requirements of policy. They supervise because it is required by the national curriculum policy and educators need to adhere to it. These finding concurs with the literature reviewed that most educators' reasons for teaching were based on the requirements of CAPS (societal reason), and not for personal reason (Khoza, 2015). SA4 also indicated that it is part of her core duties, indicating that there are other duties beside supervision of curriculum implementation that they are involved in.

We should be reminded that CAPS is a performance curriculum and its contents are of high statuses which are clearly separated from each other (Hoadley & Jansen, 2012). Therefore, CAPS is typical of Ralph Tyler's (1959) technical or instrumental approach to curriculum. The objectives, the curriculum content, time allocated to each content area, the methods to be used and how it should be evaluated are clearly outlined in a sequential manner (Thjis & Van den Akker, 2003). Therefore it may be concluded that the SAs' technical reflection are consistent with CAPS as it is also employs a technical approach to curriculum implementation.

From the data generated through SAs' reflective activities and interviews, it may be asserted that the SAs are supervising the implementation of Grade 3 Mathematics CAPS to ensure that through the teaching of Mathematics in schools, educators conform as it is an obligation (Fowler & Poetter, 2004). These findings are consistent with literature whereby Nachlieli *et al.* (2009) noted that educators of mathematics work under certain instructional obligations that tie them to the subject. SAs, therefore, have a responsibility to ensure that educators cover the prescribed content, each term, as required by the policy. Therefore, this suggests that these SAs' reflections are shaped by technical reflection strategies. According to Van Manen (1977), educators who reflect from a technical perspective are concerned with the technical application of the educational knowledge which will enable them to maintain order and achieve the predetermined outcomes and skills specified by CAPS. However, in the second phase, the SAs were transformed. Their reflections changed in tone during the last reflective activity which occurred in the second phase of the reflection cycle; their reason for supervising was based on professional or content reason, which was more critical in nature.

4.2.1.3 Professional/ content reasons

SA6: *"to support educators to improve the teaching of Mathematics in the Foundation Phase".*

SA8: ─*To strengthen and improve the knowledge and performance of the educators because most of the educators are not studying, so their knowledge is limited… I implement the strategies I learnt from the presentation and also from JICA to all schools around my district".*

SA5: *"My ACE qualification in Mathematics is assisting me because I learnt so much about teaching mathematics… your [researcher] presentation was also an eye opener. The types of mathematical understanding helped me to reposition my own view of supervising mathematics educators".*

In the last reflective activity, the participants were aware of the curricular spider web concepts and various ideological ware resources they can use, i.e. theories of teaching and learning mathematics Piaget's types of mathematical Knowledge and Skemp's types of mathematical understanding (Hobden, Dowlath, Naidoo & Rosenburg, 2011). The SAs were equipped with pedagogical knowledge to enable them to transform and represent mathematical knowledge they will need when conducting supervision in schools.

SA5 also indicated that, because of her qualification in Mathematics, she is one of the SAs who specialises in Mathematics in her district and has the expert knowledge needed to help in improving educators' mathematical knowledge. Besides her, none of the SAs has a qualification in Mathematics, but their experience as Foundation Phase educators seem to be used as a yard stick for their Mathematics content knowledge. Some of them also reflected on the professional part of supervision by indicating that during supervision gaps relating to content coverage and educators' Mathematical knowledge are identified, and based on these gaps the support is scaled towards improving their pedagogical practice.

The SAs acknowledge that the educators' Mathematical content knowledge needs to be improved, thereby reflecting on providing educators with comprehensive support to improve their knowledge and performance of learners. Taking the stance of improving and soldiering on to capacitate educators indicates that the SAs have reflected on their practice and identified the need to improve. In this instance they (SAs) are not only improving their own knowledge, but the knowledge and practice of educators. Based on the findings, they are emancipating themselves because most of them have been part of curriculum development.

Therefore, they transfer their knowledge to these educators. This is consistent with Dewey's (1933) assertion that, through critical reflection, an educator can transform a situation in which there are challenges (in this instance, the issue of underperformance in Mathematics Grade 3) into an improved performance of learners.

From the data generated during the first and second phase, it may be concluded that the SAs reformed in that they moved from the comfort zone of supervising for compliance and trying to assist educators based on their own belief; to a more emancipatory form of understanding that underpins mathematical teaching. The SAs' level of mathematical understanding moved from an instrumental understanding to a relational understanding of mathematics. Instrumental understanding of mathematics is when the educator knows what to teach without necessarily any knowledge why, and relational understanding is when the educator knows what content to teach and why they are teaching (Hobden *et al.*, 2011). The latter indicates a nature of reflection where the educator teaches and at the same time analyse their teaching. The type of reflection is consistent with Kreber and Cranton (2000), Walker *et al.* (1992 and Killen (2007) who state that a reflective educator, through their reflections, would devote their time and effort through critical analysis of their practice and testing their assumptions of why, what and how they teach. In the case of this SAs is on why, what and how they supervise.

4.2.2 Towards which goals are you supervising the implementation of Grade 3 Mathematics CAPS? (Goals)

Data generated from the reflective activities, interview and focus group indicate that supervision itself contains goals (purpose) which are aimed at assisting SAs to ensure that curriculum aims and objectives are met. Some SAs reflected on these goals and also on the curriculum aims and objectives, which they clearly understand and acknowledge exist.

4.2.2.1 Aims

The general curriculum aims, according to (DBE, 2011a, p. 4), are ‒to ensure that children acquire and apply knowledge and skills in ways that are meaningful to their own lives. In this regard, the curriculum promotes knowledge in local contexts, while being sensitive to global imperatives."

SA1 stated that he supervises *"to control quality and standards and to ensure that the aims and objectives of the curriculum are attained"*. He further indicated that these aims ensure

that learners acquire and apply the knowledge and skills in a way that will be meaningful to their lives and the communities in which they live. SA2 and SA8 agreed.

Data generated in the first phase of reflection indicate that SAs' personal reasons for supervising were the main contributory factor for their curriculum supervision. This helped them to align themselves with the CAPS Mathematics curriculum aims, believing that through supervision they will be able to maintain the quality and standards of Mathematics implementation.

4.2.2.2   Objectives (specific aims)

In CAPS Foundation Phase, (DBE, 2011a, p. 8),

> ‒Mathematics aims to develop critical awareness of how mathematical relationships are used in social, environmental, cultural and economic relations; confidence and competence to deal with any mathematical situation without being hindered by a fear of Mathematics; a spirit of curiosity and a love of Mathematics; appreciation for the beauty and elegance of Mathematics; recognition that Mathematics is a creative part of human activity; deep conceptual understanding in order to make sense of Mathematics; and acquisition of specific knowledge and skills necessary for the application of Mathematics to physical, social and mathematical problems, the study of related subject matter (e.g. other subjects); and further study in Mathematics"

SA6, in reflecting on the issue of developing the love of Mathematics and assisting educators in preparing learners for the future, said ‒encourage them to teach learners to make sure that at the end of the year you actually prepare them for the future". Furthermore, she indicated that she assists educators to prepare for Maths focus days. During the Maths focus day, educators and leaners showcase their mathematical skills through activities that promote the love of Mathematics.

SA7 indicated that the goals of her supervision are to instil the love for Mathematics and also to improve the quality of Mathematics skills that learners need to acquire in the Grade 3. In their responses other SAs agreed and further pointed out that through the teaching of Mathematics learners will acquire strong Mathematics foundation and be able to apply

mathematical concepts and reason to their daily lives. They will also develop problem solving skills and a love of Mathematics.

SAs in their responses did not mention each aim and objective of the Mathematics curriculum, but their responses indicate that they are aware of the aims and objectives of the Mathematics CAPS and their roles as SAs to ensure that these aims and objectives are met. Their responses are also consistent with the curriculum aims of mathematics.

4.2.2.3   Outcomes (Specific skills)

SA3 *"learners should be able to calculate and thereafter face the world where Mathematics experience is required"*

SA6 indicated that her goals of supervision are *"... to ensure that learners are able to apply what they have learnt to solve daily mathematical problems in their lives"*.

SA4 indicated that she supervises to *"ensure that the learners achieve the set outcomes"*.

SA8 also mentioned the issue of ensuring that the educators achieve the required targets.

The findings suggest that SAs are aware of the general curriculum aims, the specific aims of mathematics and the specific mathematical skills that the learners need to develop. Khoza (2015b) postulates that what learners should achieve at the end of the lesson are known as *outcomes*. As indicated in Bloom's taxonomy, these outcomes can be identified by certain measurable key words which differ according to their level of complexity. The majority of the SAs reflected on all the outcomes and this is evident that they are driven by performance curriculum which is CAPS. As CAPS is the current curriculum policy in South Africa, they are relevant. Furthermore, the findings revealed that their goals of supervision were driven by both societal and professional reasons of supervision which are more inclined to the technical level of reflection

4.2.3   What are you supervising when you get to a school or classroom? (Content)

On this question SAs were expected to focus their answers mainly on the Mathematics content areas that need to be covered in Grade 3. The content areas are Numbers, Operations and Relationships, Patterns, Functions and Algebra, Space and Shape, Measurement, and Data handling. Through the data generated from reflective activities, interviews and focus group, SAs were vocal about what they supervise in Grade 3 Mathematics classrooms. Focus

was placed on the five mathematics content areas, as per mathematics CAPS, and other content related matters that may make the teaching and learning of Mathematics successful.

4.2.3.1   Mathematics Content areas

SA2 said, ―*I supervise content that they are supposed to teach for that particular term".*

SA8 also indicated that, *"I supervise all the Maths content areas. Other SAs also agreed that they are supervising the Mathematics content areas as prescribed by Mathematics CAPS".*

Other SAs agreed.

The findings indicated that SAs supervise the teaching of the prescribed Mathematics content that should be taught to Grade 3 learners. This is consistent with literature that suggests that many educators are aware of what they are expected to teach in terms of the CAPS Mathematics Grade 3 content. According to the CAPS Mathematics Foundation Phase (DBE, 2011a), the Mathematical content that needs to be taught to learners are Number, Operations and Relationships, Patterns, Functions and Algebra; Space and Shape, Measurement and Data handling.

4.2.3.2   Time allocation

These content areas are not equal in value and the time allocated to each content area is different. Number, Operations and Relationships has the biggest weight and, depending on the Grade, the most time is allocated. The biggest chunk of the Mathematics content is in Numbers, Operations and Relationships, while Data handling has the least. Hence the SAs‗ indication that:

SA7: *"I also check the time allocation per content area"*

SA6: ―*…correctness of time table"*

There is a common understanding that time for the content areas that educators teach needs to be allocated correctly as required by CAPS Mathematics.

4.2.3.3   Planning

In the first phase of reflection, SA6 indicated that: *"... I am also checking the educators' lesson planning and making sure that they have planned according to CAPS..."* Others agreed and were vocal in mentioning that lesson plans are very important as they are an

indication that educators plan for what they teach and that teaching is aligned to the CAPS content for Mathematics.

After being conscientised that good planning, according to content only in a subject, does not ensure good teaching and learners performing well Kahan *et al.* (2003); and educators content knowledge may affect the goals and objectives of their lesson plans; SAs view of planning changed in the second phase of reflection. All the SAs maintained that they still check the educators' planning, especially lesson planning, and whether they correspond with leaner activities. When checking the coverage of the five content areas', SAs indicated that they also check whether the level of work that the educator is teaching is relevant for the Grade and whether they cater for the different abilities of the learners (inclusivity). These findings confirm that SAs became aware that not only is planning important, but that it also has to cater for learners' different abilities which is consistent with the requirement of CAPS. It is also evident that planning before teaching plays an important role in the teaching of Mathematics in Grade 3 as this will help educators to ensure that they cover the relevant content for a particular term, each week.

4.2.3.4   Usage of correct LoLT

SA8 also added the issue of using the correct Language of Learning and Teaching (LoLT). SA8 is the only one who indicated that the issue of Language of Learning and Teaching is a thorny issue. It is recommended that in the Foundation Phase, learners should be taught in their mother-tongue. Internationally, research suggests that in the early years of schooling learners will learn better if they are taught in their home language and that second language will be acquired more easily if the learners have a good foundation of his or her home language (Daniel, 2012). The LoLT issue is a cause for concern as some learners attend Ex-Model C schools where the LoLT is English and some rural and township schools also use English to teach Mathematics by arguing that they are preparing the Grade 3s for the Intermediate Phase. However, this is against policy and causes a lot of confusion for learners when they are assessed provincially and nationally. The issue of using the wrong LoLT has been identified in the phase two analysis of learners' sampled scripts by SAs and also in a workshop that was conducted afterwards with the educators. Yao Sua & Raman (2007) noted with concern that using English as a language of learning and teaching in primary schools leads to learning difficulties arising out of learning barriers.

The overall findings from the first reflection phase in the content theme indicates that SAs were supervising according to the requirements of CAPS as a performance curriculum. According to Hoadley and Jansen's (2012), evaluation in performance curriculum is focused on what is to be taught and in what order it is to be taught. The danger of this may be that the advisors may be over-emphasising the importance of religiously following CAPS when teaching, leaving little opportunity for educators to be innovative and less time to understand the exact implementation challenges educators face every day.

The second reflection cycle came about with some changes when SAs reflected that all along they have been supervising whether educators were teaching the correct content, but they were not so much concerned with the way they that particular content is being taught. SA4 mentioned that taking into consideration the approaches that educators use is of utmost importance and SA1 supported her by adding that he also observes the ways that educators impart knowledge to the learners as this may also indicate the educator' content knowledge. They acknowledged that this was an oversight because they are aware that educators are not fully knowledgeable with regard to the various methods of teaching, including unpacking the content itself. The danger of educators not knowing CAPS compliant teaching methods is that they then tend to use the educator-centred approach in order to finish their syllabus which is presented to them by their subjects' CAPS documents (Khoza, 2015a). There is an extensive body of research that postulate that in rural schools educators were struggling to use multiple teaching strategies because they have not been exposed to them (Peat, 2009; Jansen, 2009; Eurydice, 2008).

Their reflections were now more critical in nature and consistent with literature as Mohd Meerah, Halim, Rahma, Abdullah, Hassan and Ismael, (2010), based on their research findings, confirmed that educators were unaware of alternative approaches, but had no confidence in using inquiry-based teaching methods in their classroom practices to help enhance the teaching of relevant mathematics content in a rewarding manner. Hence SA's account that ―*not all educators have challenges on content knowledge and various teaching strategies. We have to work collaboratively with them so that those who are able and knowledgeable serve to assist in capacitating those who are not.*" They agreed that this move will promote good practice and social justice. Furthermore, SA2 added that when supervising teaching of content she will, at the same time, be assisting educators with strategies that help learners who are not coping or experiencing barriers to learning. This

account is in agreement with the general aims of the National curriculum on accommodating inclusivity organisation, planning and teaching.

From the SAs' reflections it may then be concluded that, SAs were rigid in following CAPS content and time allocation. They were, of course, consistent with Mathematics CAPS, however, disregarding other thorny implementation issues such as the teaching methods/ strategies that educators use. Following curriculum in a rigid manner, according to Berkvens *et al.* (2014), does not allow for individualised learning. However, they transformed and identified a crucial need to involve educators in coming up with strategies of teaching that will help in their classrooms.

4.2.4 What resources do you use during the supervision visits? (materials and resources)

Khoza (2013) explained a resource as anything that communicates learning. It can be a person or a thing and Berkvens *et al.* (2014) state that there is no definite measure to indicate whether teaching and learning resources are adequate. Khoza (2013) classified them according to hardware (any tool/machine/object used in education), software (any material used in conjunction with tools to carry/display information) and ideological-ware (things that we cannot see and touch in education such as theories, policies, teaching and learning methods and others). Therefore, SAs and educators need to have adequate and relevant resources to support the supervision, teaching, and learning of Mathematics.

Data generated from the two reflection cycles (through reflective activities, the interview, and the focus group) indicated that there are plenty of resources that SAs use for supervising and supporting Mathematics curriculum implementation from the three categories of resources. However they were not aware of the terms hardware, software and ideological-ware resources

4.2.4.1 Hardware resources

National and provincial monitoring instruments

The Department of Basic Education has developed a national instrument to monitor curriculum coverage in schools. According to the Department of Basic Education (2013, p. 9), "this instrument is a management tool, used by curriculum officials during school support visits, to track progress in the completion of syllabus".

"As a Subject Advisor, I have tools like the general tool, we also have the lesson observation tool for Mathematics and again the school based assessment tool. Lastly we have the national tool that we use to monitor the utilisation of workbooks." SA8

"I use my school support tool, which I use to record all my findings." SA1.

"I have my Maths monitoring tool that I use for Mathematics lesson observation and the other one that I use for just general information from the educator's portfolio." SA6.

From the data generated it may be concluded that the Mathematics monitoring tool is also used as a powerful tool to supervise the implementation of Mathematics CAPS and that SAs must not fail to use the tool. In this respect, the SAs indicated that they use the school support and the Mathematics monitoring tools provided because there is no way one can provide school support and monitoring without completing those tools. There is also a DBE workbook utilisation monitoring tool which the SAs also mentioned in their reflections.

Mathematics specific resources

Reflections revealed that SAs have the necessary Mathematics resources, and during supervision and support they expect educators to have the necessary resources in their classroom. They can either be commercial or handmade resources, but they need to have them.

"I have my Maths kit which I use during workshops to demonstrate to educators how they can use the resources in the maths kit to support their teaching. I also deliver Mathematics charts for them i.e. 100 number chart, shape charts, colour charts and sample of money," SA3. Others agreed.

"...you also need resources like textbooks relevant to Mathematics." SA7 and SA2 and SA6 added.

"I expect educators in a Mathematics class to have a maths kit, posters displaying numbers, a calendar, a birthday charts and also a maths corner," SA8, others agreed and added that educators should have their learners DBE workbooks and class workbooks.

Other resources

"We also use the Japanese, International Cooperation Agency (JICA) document to assist the educators in teaching mental maths and word problems," SA8.

"...you must also have your laptop." SA2 and SA5 added that during workshops, *"I use a laptop and projector for my presentations because we do not have enough funds to make copies for all the presentations, educators are many".*

The issue of transport as an essential resource, to access schools that SAs are supporting, was also reflected upon during focus group by SA4: *"Not all of us have vehicles to visit schools and it is important that each one of us have transport to enable easy access to schools".*

4.2.4.2   Software resources

During the first cycle of reflections, SAs did not reflect on this theme as they did not understand what software resources are and how to use them. After learning about the different software resources like social media applications (WhatsApp, Facebook, Wechat and Youtube), other educational mathematics applications and the hand-outs they received during the presentation that they can utilise in Mathematics; they reflected differently.

SA6 indicated that, *"...after your presentation I created a WhatsApp group for my educators who are on WhatsApp messenger and it is very helpful as we discuss a lot of Mathematical issues that really need our attention. Educators also enjoy using it (WhatsApp) as [a] group"*

SA7 had a different opinion about chatrooms and social networking; however she changed in the second phase and agreed with her other colleagues. She explained that *"...I used to think that WhatsApp is waste of time, but now I use it for my educator to discuss Mathematics related issues. Those who do not have it, I use sms' (short messaging system)".*

SA3 added: ―*... not only does it help in reaching many educators, but it also saves time as it is sometimes difficult to reach as many educators at once, unless it's a workshop".*

The findings from both cycles of reflection reveal that some of the SAs had misconceptions about chatrooms and social media, but now they are using it as a powerful tool to support the teaching of mathematics in Grade 3.

4.2.4.3   Ideological ware resources
CAPS Policy and other NCS policy documents

All the SAs indicated that when they go to supervise Mathematics, or when they are conducting workshops, they always ensure that they have their Mathematics subject CAPS document.

"The very first one and the most important one is policy document. You cannot visit the school if you do not have your CAPS document." SA2

"I take along my CAPS policy document. It always serves as a reference." SA8

In the second phase of reflection, SA8 indicated that she also uses mathematical theories and other references, but did not indicate where she gets them and how she is using them. This indicates that, in her reflection, she saw it fit to engage in mathematical studies and theories that will help in improving her practice.

From the generated data, the findings reveal that in the first phase of reflection, SAs were comfortable utilising a variety of resources from the hardware and ideological ware categories (Mathematics CAPS document) but that the most commonly used were hardware resources. In the second phase of reflections they became more comfortable to also use software resources. They were able to access these software resources from social media and used them as powerful tools to support educators in a way that enable them (educators) to be actively involved. They also emphasise and ensure that the educators have resources and that they utilise them. Their submissions are relevant and consistent with literature because Labane (2009) concurs that effective curriculum implementation depends on availability, control and the monitoring of resources.

4.2.5   How are you supervising the implementation of grade mathematics caps (activities)

Participants reflected on the actual activities that they conduct as SAs. Not only do they supervise, but they act as support for educators, indicating that before they supervise, they in fact support them by any means necessary. Supervision serves as a follow-up activity of what they have supported the educators on. This concurs with the findings from literature that SAs must build the capacity of educators by strengthening their understanding of Mathematics content and assisting them to develop more effective instruction and assessment (AMTE, 2010). Ololube and Major (2014) agree that, as methods of teaching are an important part of effective classroom instruction, supervisors are therefore responsible for assisting educators to know these methods and apply them in their daily teaching and learning activities. It was also revealed, through the reflections, that the workshops are conducted to help educators in developing high quality learners' activities and assessments.

4.2.5.1 Workshops

All the SAs indicated that they conduct workshops for educators. Workshops are school, cluster, or circuit based. These workshops cover a variety of content, depending on an individual's focus at that point in time. The focuses of the workshops are mostly driven by the gaps identified during school support visits or after administering the common national and provincial assessments. Educators are then capacitated or developed in a number of ways.

"I invite educators to workshops and capacitate them on the content of CAPS Mathematics." SA1

"How to develop quality learners' activities set quality assessments." SA3

"...I assist them on the how part of developing assessment tools, e.g. rubrics and checklists. We also encourage them to use concrete objects as Mathematics is a practical subject." SA8, SA2 also agreed.

Based on the findings from the first phase of reflections, it is however not explicit as to how intense the impact of this workshops is. The reason is that there is an outcry by educators that the workshops, that are meant to capacitate educators on how to successfully implement curriculum and to address challenging content areas, are usually allocated a short time. These claims are consistent with Smit's (2001) findings on her study on how educators experience education policy change in South Africa. The participants noted many challenges regarding the workshops that they attend. Firstly, they indicated that workshops and trainings are normally offered late in the day and within a short period of time. They are only offered once in a while without any follow-up event and they are not sufficient. Furthermore, the information is always distorted before it reaches all educators. Again the facilitators themselves seemed not to know the workshop content they are supposed to facilitate. Lastly, the workshops are not up to standard and facilitators also lacked the skills they were supposed to teach. Bantwini (2010) conducted a similar study on how educators perceive the new curriculum reform in Western Cape and the findings were consistent with Smit's (2001) findings. Educators in this study indicated that they lacked support from SAs and the meetings with them are infrequent and they noted this as a deterrent for successful curriculum implementation.

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4.2.5.2 Classroom visits and lesson observation

SA6: *"through daily school support visits… making sure that educators are planning, observation of Mathematics lesson presentation, checking correctness of timetable and evidence of school-based moderation of formal assessments"*.

SA5 also indicated that she carries out supervision, *"through classroom visit which involves observation of a lesson."*

SA8 added *that "I manage the lesson. Firstly, the preparation, how the educator presents and how the educator interacts with the learners when presenting that particular lesson. I also check the quality of informal and formal assessment tasks"*.

SA4 agreed during the focus group by indicating that, *"the relevance of the content and whether the informal tasks are in line with the content of that particular term are also checked"*. She also included the issue of how the educators manage time during the presentation of a lesson.

SA8 further indicated that she also checks the recording and reporting because sometimes educators do not record according to the requirements of CAPS, and they do not have mark sheets.

SA3, *"we also look into the lesson plan and the actual activities in the learners' books. Are the learners doing and writing what the educator has planned for them?"*

During the focus group, SA6 added that she also observes whether the educator uses whole class teaching, independent and group teaching in her class.

SA3 mentioned that they also supervise the quality of the informal and formal assessment tasks that educators give to learners.

In both phases of reflections, findings revealed that daily classroom visits also proved to be one of the main supervision activities that SAs carry out. The SAs, during these classroom visits, supervise whether educators: cover all of the five Mathematics content areas; have used the correct weightings for each content area; and cover the relevant content for that particular term. They also ensure that educators use relevant teaching strategies appropriate for CAPS.

4.2.5.3 Monitoring utilisation of Department of Basic Education (DBE) Workbooks and other resources.

The DBE workbooks have been developed by the Department of Education ―to assist educators in their day to day teaching" (DBE, 2012, p.1). It has been noted with concern that in South Africa many educators have no access to resources and photocopiers that they need for their teaching and these workbooks are meant to provide that support (DBE, 2012). In the Foundation Phase, workbooks have been developed for use in Home Languages, Additional Languages; Mathematics and Life Skills. For these reasons, SAs are therefore tasked with the responsibility of ensuring that the workbooks are effectively utilised in schools.

SA1, 2, 6 and 8 indicated that, amongst other things, they also supervise the utilisation of workbooks. As some educators did not receive training on how to utilise workbooks, SA2 also indicated that she demonstrates to educators how to use the workbooks by aligning them with their lesson plans in order to support their teaching.

SA6 and SA8 also mentioned that during school visits they check availability of resources e.g. Mathematics kits and stationery; and how educators are using the resources provided to them to support their teaching of Mathematics.

The findings from data generated in the first phase of reflections indicated that SAs were not considerate of educators' contributions in transforming their practice. This is evident because in their reflections they only talk about themselves and the role they play during school visits and when conducting workshops. The SAs were the ones who were always facilitating. They brought their own content and facilitated the workshops. This approach was more technical, which is consistent with CAPS and at the same time offered educators no flexibility and autonomy as frontline implementers. However, before conducting the second phase of reflections, SAs designed a transformational model which was informed by the provincial assessments. They found it appropriate to involve Grade 3 educators in the transformation process. The approach changed to be what Hoadley and Jansen (2012) call the critical, contextualised or action reflection approach to curriculum and Stenhouse (1975) calls it the process or competence approach. The approach is nonetheless consistent with CAPS, but it offers educators' opportunities to base the support they need for their everyday teaching experiences, their schools' and learners contextual needs. It may therefore be concluded that using both the technical and practical approaches was not yielding the expected results in

SAs' activities and their use of critical or action reflection approach was proving to be more beneficial as educators were more involved and motivated.

4.2.6 How do you facilitate the supervision of grade 3 mathematics caps implementation? (roles)

According to the DBE (2011b, p. 41,) "the position of Subject Advisor exists to ensure that for every subject there is specialist capacity to monitor and support the implementation of the curriculum in the relevant subject; provide and or source relevant teaching and learning material to improve performance in the subject; ensure that educators have all the requisite curriculum and assessment documents for the subject; support educators in effectively delivering the curriculum in the classroom; support educators in strengthening their content knowledge; moderate school based assessment, including Annual National Assessment and support educators in organising relevant/related co-curricular activities". Reflecting on their roles, SAs indicated that:

"I do monitoring, moderation, content enrichment workshops, cluster meetings and school based support workshops," SA7.

"I visit educators at their schools. I engage them in activities of Mathematics policy. I also conduct school based and cluster workshops," SA1. SA2 agreed.

"We are requested by the provincial and national office to… evaluate LTSM before they can be put on the national or provincial catalogue," SA8.

"Our department work in collaboration with different projects. They are mostly interested in finding out what challenges learners have in Mathematics. What they do is that they go to piloted schools and check the needs of the schools; they provide schools with relevant Mathematics resources to improve performance. So I'm working with these projects or donors to make sure that the schools receive intervention," SA6.

"I give them guidance as to how they are going to do some of the things they are not doing correctly when implementing CAPS," SA3.

"You analyse the paper after writing the common assessments, identify the problem and therefore go back to your educators. With them you do the activities so that they can improve in their teaching," SA2.

"After they have written some formal assessment activities, we always check where there are loopholes and also check how they are correcting problematic areas that they found from the analysis that they did as educator and we did as SAs," added SA3.

"Give guidelines on assessment requirements," SA6.

"Through setting common national and provincial assessments and also moderating school based assessments," SA8.

"By means of checking CAPS content coverage and by monitoring educators' POEs," SA8.

"Through monitoring and moderating educators' files." SA4.

Most of the SAs' reflections on their roles as SAs are strongly related to the supervision activities that they carry out during supervision. Though the SAs' reflections are more explanatory or explicit, they are in line with the roles of SAs as identified in the literature review. Amongst other roles, SAs are to provide curriculum support to educators in schools in areas of specialisation. They also provide curriculum management support to Education Specialist, who are also known as Heads of Departments (HODs) in schools and to manage support rendered to schools in areas of specialisation (OSD, 2008). Fowler and Poetter (2004) add that inspectors are given the opportunity to revise the country's formal Mathematics curriculum for learners from Grades K to 5 in France. It may be concluded that the SAs initiate each activity they carry out to educators, typical of performance curriculum. Performance curriculum is educator- and content-centred and from the technisist perspective of curriculum. These findings are consistent with the findings from the activities theme of this study. This is consistent with Van den Akker *et al.'s* (2009) assertion that each strand of the curricular spider's web should be as strong as the other. On the other hand, the assertion is in contrast with Van den Akker *et al.'s* (2009) suggestion that one of the major challenges, when it comes to improving curriculum, is the difficulty of creating a balance and maintaining consistency between all the components of a curriculum. In this study, we witness a balance between the SAs' activities and their roles.

4.2.7 With whom/who and where are you supervising? (accessibility and location)

During the first reflection, SAs did not reflect on the physical and cultural access of accessibility. They only reflected on these two aspects during the interviews and focus group because the questions were open ended, and also the last reflective activity because they were

already aware of the concepts of the curricular spider web and they were able to reflect on the financial and cultural access.

4.2.7.1 Physical access

From the data generated in the first phase of reflection, all the SAs indicated that they supervise Foundation Phase educators. In the second phase, after they have been made aware of the physical, financial and cultural access to education, they indicated that in the Mpumalanga province they are supervising a diversity of educators from various locations and who teach learners from diverse communities with different socio-economic backgrounds.

"I am supervising Foundation Phase educators from Grade 1… some schools are in urban, some are in semi-urban, others in farms and others are multi-grade schools. - Grade 3." SA6 and SA4 agreed and in her reflection also indicated that she is supervising former Model-C, White dominated schools.

"...the majority of them are from rural areas, but few are from semi-urban areas. We have a lot of educators from farm schools and in these farm schools we do have multi-grade classrooms." SA8

"All the schools that I'm supervising are in rural areas." SA3.

The responses indicate that the SAs only supervise educators in the Foundation Phase. The reason may be based on the fact that their job description specifies that they are ECD and Foundation Phase SAs.

Asked whether it is easy to access these schools, SAs said:

"Yes it's easy to access the schools except the schools in (name of the place). (Name of the place) circuit is far away from where I am staying and from the district office because we travel more or less 180 km. So when visit (name of the place) you have to be prepared, you have to make sure that you access the schools, but now I'm used to (name of the place). It's easier because I have a subsidised vehicle." SA8.

SA6 also indicated that, *"...I use the subsidised vehicle from the department"*

However, some SAs indicated that it is difficult for them to access schools because:

"Sometimes I use my own transport." SA7 and SA2 agreed.

SAs' responses indicate that for them to easily access the schools they are supervising, they need to have transport to move them from the office to school A, then to school B, and so on. It is evident that public transport will not suffice in their work because schools are mostly far apart and in different areas. Even if a person is a local resident, if there a three schools in that community it would not be easy to access them if they don't have their own transport. Therefore, transport may also be classified as a vital resource because without transport it would be difficult for them to reach schools. The findings also indicate that the majority of the SAs have transport in order to access schools. While some use their subsidised vehicles, others use government vehicles for ease of access to schools. It may therefore be concluded that the majority of educators are supervised and supported adequately.

4.2.7.2 Financial access

Schools in South Africa are categorised according to a poverty index, referred to as a quintile, where a quintile of 1 would indicate ‒poverty", and a quintile of 5 would indicate ‒affluence" in the parent community (DBE, 2014, p. 89). Mostly quintiles 1 to 3 schools are located in rural schools, whereas the quintile 4 and 5 schools are former White (Model-C) schools. Using ANA 2014 as a benchmark for analysing learners performance based on their socio-economic backgrounds, the Grade 3 learners' performance in Mathematics indicated that pass percentage rate of learners from quintile 1 schools was at 52.5%, quintile 2 at 52.9%, quintile 3 at 53.9%, quintile 4 at 58.0% and quintile 5 at 68.9% (DBE, 2014). Msila (2014) pointed out that equity; access and success in schools are influenced by the socio-economic status of the learners' families. Schools that are not performing according to the set benchmarks are deemed dysfunctional, and according to Msila (2014) many dysfunctional schools are situated in the townships and rural areas whilst functional schools are situated in former White areas. Learners who attend the so called dysfunctional schools are from families where parents are usually unemployed, unskilled and black. Their schools have no prospects of succeeding given the prevailing circumstances. Moreover, these schools are different from the suburban former White schools that serve middle class families. Bayat, Louw and Rena (2014) concur that besides poor management and leadership within school systems, ‒the socio-economic backgrounds of the students and parents also contribute significantly to this underperformance" (p. 184). Msila (2014) correctly points out that in spite of asserting that poverty is the main cause in demotivating the poor children's future, it should however be noted that other role players in education are unable to serve children from poor backgrounds. Amongst these role players are parents, educators and districts. The inability of stakeholders

to provide the required support, cause schools to be more dysfunctional and end up fuelling the malaise for poor families Msila (2014).

When reflecting on the financial accessibility of schools, SAs concurred with literature findings and indicated that:

"Mostly [learners] are from poor communities… most of the parents of learners they teach are not working and for those who are working in town their children stay with grandparents… Children in these schools also do not pay school fees." SA2

Others agreed with SA2, but SA4 and SA6 added that their educators teach learners who are also from working and middle class because their areas of operation are surrounded by mines. Parents of learners are working in the mines, occupying various positions from the general (unskilled labourers) to top managerial positions (professionals).

From the generated data through reflective activities and interviews there is no evidence to indicate that the financial access to schooling for educators, learners and SAs negatively or positively impacts learners' performance. However, the literature review indicates otherwise. It can therefore be concluded that, while SAs are doing their utmost to supervise the schools and support educators in order to provide quality teaching as according to the requirements of CAPS, the learners' financial access to schooling remains a contributing factor to their performance.

4.2.7.3 Cultural access

From the reflections, based on the nature of the schools that the SAs are supervising, it may be safely argued that the SAs supervise educators from diverse cultural backgrounds in terms of race, gender and language. These educators also teach learners from diverse cultural backgrounds.

4.2.7.4 Location

"I visit their schools and I usually visit from Monday to Thursday because Friday I do administrative work. Sometimes I invite the educators to a common venue if I need to conduct a workshop. I visit the schools during normal school hours and conduct workshops after 14:00." SA8

"Except visiting the schools, we also arrange content workshops which start at one o'clock as we are not allowed to take educators out of class during school hours," added SA2

Others agreed that they provide supervision at schools, on a daily basis, during school hours. They also arrange workshops where they call educators to a common venue. The workshops are sometimes arranged for clusters, circuits or districts. This exercise is normally done after normal school hours, depending on the district and circuit, and workshops usually start after 13:00 and end at around 16:00. However, there are some exceptional cases where the workshops will be arranged by districts, with approval from the provincial Department of Education and unions, during school holidays. These types of workshops are conducted for about 3 consecutive days and take place from 08:00-16:00.

"Some workshops we conduct during school holidays, like last year the Mathematics workshop was done during winter school holidays across the province," SA5 added.

In a paper on Addressing the Quality Challenge: Reflections on the Post-2015 UNESCO Education Agenda, Berkvens *et al.* (2014, p. 18) correctly points out that "learning should take place through interesting activities carried out in inspiring environments that provide adequate teaching and learning materials". The findings from the two phases of reflection reveal that supervision, like learning, is a planned activity that is conducted in an enabling environment at specified times. This suggests that if not planned, supervision may be a fruitless exercise.

4.2.8 How is the supervision of grade 3 mathematics caps implementation evaluated? (assessment)

4.2.8.1 Assessment for learning

Based on the data generated from the two reflective activities, interview and focus group, it is apparent that the SAs' think that the daily informal activities do not serve as evidence for their effectiveness. Nothing much was said about informal assessment tasks. In addition of what the SAs said on how their supervision is evaluated, they indicated that their supervision is evaluated through formal and informal assessment tasks.

4.2.8.2 Assessment of learning

School Based Assessment is a compulsory component for progression and promotion in all the different school phases (National Protocol on Assessment, 2011, p.5). According to the NPPPPR, the Foundation Phase progression of learners is 100% based on school based assessment (DBE, 2011). Other forms of assessments that are conducted in the Foundation Phase are the provincially set common assessment tasks and the Annual National Assessments (ANA).

SA6 and SA2 indicated that their supervision and support of educators is evaluated through school based assessments that are conducted at school level.

Other SAs, like SA1 added that the effectiveness of their supervision regarding assessment is evaluated through the results of the quarterly common assessment tasks and also by checking the results of ANA. The other SAs agreed and SA2 added that:

"... thereafter I collect scripts for analysis and then provide intervention strategies to the educators".

"Before we conduct Mathematics workshops we go to schools for item analysis. During the visits I identified that most of my schools have a challenge teaching word problems, money and time as learners did not get the questions right. Then I plan workshops for them in such a way that emphasis is put more on that problematic content." SA6

SA3 agreed that *"Those assessments give us a reflection of whether we are improving or not,"*

The focus group reflections were consistent with what the individual SAs said in reflective activities and interviews. The SAs concurred with one another about how they are evaluated. They indicated that the effectiveness of their supervision is evaluated through the common assessment tasks that they set in Term 1, 2 and 4 at the Provincial Department of Education. Again, it is also conducted during the Annual National Assessment (ANA) which is administered in Term 3. After learners have written these tasks, the SAs said they go to selected schools, sample scripts, and then analyse them. This exercise, they said, assists them to identify how learners have performed, check if there is content that seemed problematic to the learners, and also analyse what the possible causes for this may be. After the analysis is completed, the SAs prepare for intervention, call educators to a workshop, and together with the educators develop intervention strategies on how to improve learners' performance. It may then be concluded that SAs focus more attention on assessment of learning (summative assessment) than on assessment as leaning (formative assessment).

4.2.8.3   Assessment as learning (Planning and Action)

The SAs, in the second phase of reflection, articulated much on this topic and it has served as a turnaround strategy after the initial data generation through the first phase reflective activities, interviews and focus group. Assessment as learning incorporated the planning and action cycle of the reflections. During interactions assessment of learning was not even

related to assessment, but when critically engaging with literature on the significance of assessment as learning, it was discovered that, as Earl and Katz (2006) explain, assessment as learning is an assessment that emerges from the idea that learning is not only about transferring ideas from someone who knows (the Subject Advisor), to someone who does not know (the educator). Earl and Katz (2006) argue that ―learning is an active process of cognitive restructuring that occurs when individuals interact with new ideas" (p. 41). Assessment as learning, according to Earl and Katz (2006), is based on research of how learning takes place and characterised by educators reflecting on their own teaching while making adjustments so that they can have a deeper understanding of their role in learning. The role of the Subject Advisor in this assessment is to design facilitation activities and assessment that give educators an opportunity to think about and monitor their own teaching.

When asked, as the wrapping up question of the focus group, if based on what we planned, do we think we are going to achieve the expected outcomes? SAs intimated further on the issues of improvement and how the plans are going to be scaled out to educators in their respective districts.

"In our district we have started a project of bringing all the educators together. We have realised that calling the HODs only or sample a few educators per grade per school and leaving the others behind is problematic because when those who attended the workshops go back to their schools, the information gets distorted and they are unable to give out first-hand information. We are now trying to call the educators, like we did in our district in the past weeks. We call all the educators per grade separately. The Grade 1s attend alone, the Grade 2s and 3s also. During the workshop we give them content-related information for that particular term. Then [we] go through the previous question papers, check the difficult questions and try to get a remedy for that by asking educators to come up with strategies as to how these challenges can be resolved. We found this to be a very productive exercise as it is a joint for us and the educators. We all reflect and come up with solutions," SA1 said.

"Another thing is resizing the groups for the workshops. Mathematics is a practical subject; therefore instead of working with a 100 educators, we divide them into manageable groups of 25 educators minimum. This is to ensure that each educator gets one-on-one attention at some point. As mathematics is a practical subject, you cannot just talk without giving educators an exercise to do. Give educators practical activities mark them and identify those who are struggling with certain concepts and you give an individual support. You know,

blanket cover is not working anymore. We look at individual educators' problems, the errors that they are making. So if the educator is making an error, it means children are dying (not literally, but academically) in that system. So we attend to such problems. The other thing that helps us to identify educators' problem is after analysing learners' assessments. Based on that, you pick up those challenging content, set a paper for the educators. After the workshop you mark it at home at your own time then you analyse it. You get the errors that the educators are making and you go to individual schools, give support. I think this is going to improve learners' performance in mathematics as well". SA5

SA8 added that *"the baseline assessments that we used to assess the learners may also be used for assessing educators".* She thinks they may also help as they will assist the SAs to still identify problems that educators are having regarding the Mathematics content.

"Even if we invite them to standard setting workshops, discuss the content of that particular term in advance and also discuss the ANA diagnostic report with them (educators). Discuss all the possible challenges the learners may be experiencing during the writing of ANA. Another thing, discuss even the ANA framework with them because even if they have the framework in hardcopy, there are the things that they do not understand. Take them through the content that is expected to be covered based on the framework and also show them how resourceful the framework can be in designing their formal school- based assessments" SA2

From the generated data created through this cycle of reflection, SAs were now reflecting on the critical level of reflection. During the critical level of reflection, Van Manen (1977) explains that educators are concerned with issues beyond the classroom. It may be argued that educators driven by critical reflection teach because of pedagogical/professional reasons, with the aim of questioning and addressing some other challenging issues and bringing about change. Findings now reveal that SAs have addressed and established strategies that deal directly with the challenges of continuous underperformance of Grade 3 learners in Mathematics. Instead of calling one educator per Grade they have now decided to call and schedule them all.

To implement the plan, SAs utilised the provincial and district programmes of the workshops and focused the workshops on the planned improvement activities. Firstly, at one planned provincial meeting they designed assessment frameworks, with clear test specifications for Mathematics. Appreciating the value of these frameworks, the SAs also designed them for Grade 1 and 2, guided by the ANA frameworks. Below are the two types of framework. The

first one (Table 10) is the framework that was previously designed before reflections and the second one (Table11) is the modified one done after reflections.

Secondly, during the implementation of the plan, educators were provided with analysed results of the March 2015 and June 2015 common provincial assessment tasks. As a plan of improvement, these results were analysed as a joint activity by SAs of one of the districts. These tasks were used as benchmarks as they are regarded as compliant to CAPS and standardised. They are regarded as standardised because each of the five components has been weighted. Secondly, these assessments serve as determinants of whether the educators have covered the relevant content for that particular term. A sample of how one district improved their analysis. The 2014 Mathematics Grade 3 analysis (Table 12) which occurred before the study and the 2015 Grade 3 analysis (Table 13) that occurred during the study after reflections have taken place are presented below.

ASSESSMENT FRAMEWORK MATHEMATICS GRADE 3

PAA MARCH 2016

CONTENT AREA	TOPICS TO ASSESS IF THE LEARNER CAN:	SKILLS/COMPETENCES ASSESSED – ITEMS	SCORE
NUMBER OPERATION AND RELATIONSHIPS	1. Count forwards and backwards	• Counting backwards in 4s from any multiple of 4 between 0 and 200	1
	2. Number names and symbols	• Writing number names from 0 to 100.	2
	3. Describe, compare and order numbers	• Compare whole numbers up to 99 using smaller than, less than and is equal to.	2
	4. Determine place value	• Know what each digit represent. • Identify and state the value of the number. • Decompose two-digit number up to 99 in multiples of tens and ones/units.	4
	5.	• Solve word problems in context and	

	5.1. Demonstrate problem solving techniques in context	explain own solution to problems involving addition with answers up to 99.	
	5.2. Do sums that involve repeated addition leading to multiplication	• Solve number problems in context and explain own solutions to problems involving multiplication with answers up to 50.	4
	6. Do sums that involve: money	• Solving money problems involving totals and change in Rand and cents	2
	7. Demonstrate Techniques in context-free calculations	• Using different techniques • Addition, subtraction, multiplication and division symbols	4
	8. Do fractions	• Recognise fractions in diagrammatic form	1 **(20)**
PATTERNS, FUNCTIONS AND ALGEBRA	9. Patterns 9.1. Geometric patterns	• Copy and extend the pattern once.	1
	9.2. Number patterns	• Count forward with intervals specified in grade 2 with increased number ranges.	1 **(2)**
SPACE AND SHAPE	10. Work with 2-D shapes	Describe and compare 2-D in terms of : • Shapes, straight sides and round sides.	2 **(2)**
MEASUREMENT	11. Time	• Tell time in half hours on an analogue clock and digital clock.	2
		• Reads dates on calendar.	3 **(5)**
DATA HANDLING	12. Analyse and interpret	• Answer questions about data on the bar graph.	1
TOTAL			**30**

Table 10: First phase Grade 3 Mathematics Assessment framework.

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ASSESSMENT FRAMEWORK MATHEMATICS GRADE 3

MARCH 2016

TIME: 1 HOUR TOTAL MARKS: 50

Content Area	Content Area	Topics	Concepts and Skills	Marks
1	**NUMBER OPERATION AND RELATIONSHIPS**	1. Count forwards and backwards	• Counting backwards in 4s from any multiple of 4 between 0 and 200	1
		2. Number names and symbols	• Writing number names from 0 to 100.	2
		3. Describe, compare and order numbers	• Compare whole numbers up to 99 using smaller than, less than and is equal to.	2
		4. Determine place value	• Know what each digit represent. • Identify and state the value of the number. • Decompose two-digit number up to 99 in multiples of tens and ones/units.	4
		5. 5.1.Demonstrate problem solving techniques in context 5.2.Do sums that involve repeated addition leading to multiplication	• Solve word problems in context and explain own solution to problems involving addition with answers up to 99. • Solve number problems in context and explain own solutions to problems involving multiplication with answers up to 50.	

				4
		6. Do sums that involve: money	• Solving money problems involving totals and change in Rand and cents	2
		7. Demonstrate Techniques in context-free calculations	• Using different techniques • Addition, subtraction, multiplication and division symbols	4
		8. Do fractions	• Recognise fractions in diagrammatic form	1 **(20)**
	PATTERNS, FUNCTIONS AND ALGEBRA	9.1.Geometric patterns	• Copy and extend the pattern once.	1
		9.2. Number patterns	• Count forward with intervals specified in grade 2 with increased number ranges.	1 **(2)**
	SPACE AND SHAPE	10. Work with 2-D shapes	• Describe and compare 2-D in terms of: shapes, straight sides and round sides.	2 **(2)**
	MEASUREMENT	11. Time	• Tell time in half hours on an analogue clock and digital clock.	2
			• Reads dates on calendar.	3 **(5)**
	DATA HANDLING	12. Analyse and interpret	• Answer questions about data on the bar graph.	1
	TOTAL			**30**

Test Specifications: Mathematics Grade 3 March 2016

Question Number	Content Area	Topic	Concept and Skills Test whether the learner is able to…	Cognitive level	Level of Difficulty	Type of item (MCQ,SA, OEQ)	Marks
1	**NUMBERS, OPERATIONS AND RELATIONSHIPS 63%**	Count forwards and backwards	Counting backwards in 4s from any multiple of 4 between 80 and 100	K	E	SA	1
2.1 & 2.2		Number names and symbols	Writing number names from 0 to 100.	K	E	SA	2
3.1 & 3.2		Describe, compare and order numbers	Compare whole numbers up to 99 using smaller than, less than and is equal to.	K	E	SA	2
4.1 to 4.4		Determine place value	Know what each digit represent. Identify and state the value of the number. Decompose two-digit number up to 99 in multiples of tens and ones/units.	K	M	SA	4
5.1		Demonstrate problem solving techniques in context	Solve word problems in context and explain own solution to problems involving addition with answers up to 99.	A	D	SA	2
5.2		Do sums that involve repeated	Solve number problems in context and explain own solutions to problems	A	D	SA	2

		addition leading to multiplication	involving multiplication with answers up to 50.				
6.		Money	Solving money problems involving totals and change in Rand and cents	A	D	SA	1
7.1 to 7.4		Demonstrate Techniques in context-free calculations	Using different techniques Addition, subtraction, multiplication and division symbols	K	E	SA	4
8.		Fractions	Recognise fractions in diagrammatic form	A	D	SA	1
9.1	**PATTERNS, FUNCTIONS AND ALGEBRA** **10%**	Geometric patterns	Copy and extend the pattern once.	A	E	SA	2
9.2		Number patterns	Count forward with intervals specified in grade 2 with increased number ranges.	A	E	SA	1
10.1 & 10.2	**SPACE AND SHAPES 6,6%**	Work with 2-D shapes	Describe and compare 2-D in terms of: shapes, straight sides and round sides.	A	M	SA	2
11.1 a & b	**MEASUREMENT** **16,6%**	Time	Tell time in half hours on an analogue clock and digital clock.	K	M	SA	2
11.2			Reads dates on calendar.	K	D	SA	3
12	**DATA HANDLING 3,3%**	Analyse and interpret	Answer questions about data on the bar graph.	A	M	SA	1

TOTAL:	30

Table 11: Second phase grade 3 Mathematics Assessment framework.

Key:

Cognitive levels: K – Knowledge

A – Application

Type of question: MCQ – Multiple Choice Question

OEQ – Open Ended Question

SA – Short Answer

Level of Difficulty: E – Easy

M – Moderate

D - Difficult

GRADE 3 MATHEMATICS COMMON PROVINCIAL ASSESSMENT TASK ITEM ANALYSIS

NAME	Mental	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	TOTAL
	10	2	3	4	4	4	1	4	3	2	4	2	1	1	2	3	50
Mthethwa	6	1	3	4	4	3	1	0	3	0	2	1	1	1	2	1	33
Gule	10	1	3	4	2	1	1	0	2	2	1	1	1	1	2	3	35
Gumbi	8	0	3	4	3	2	1	0	3	1	2	2	0	1	2	3	34
Dlamini	9	1	3	4	3	4	1	0	2	1	0	1	0	1	2	3	36
Shabangu	6	1	3	3	2	2	1	2	3	1	2	2	1	1	2	0	32
Sibiya	7	1	3	4	3	4	1	2	2	2	2	1	1	1	1	3	38
Mahlangu	7	1	3	4	3	4	1	0	3	1	0	0	1	1	2	0	31
Zwane	5	1	3	4	3	4	1	2	3	2	0	1	1	1	2	2	35
Simelane	10	1	3	4	4	4	1	2	3	2	0	2	1	1	2	3	44
Makuwa	10	2	3	4	4	4	1	4	3	2	4	2	1	1	2	3	48
Dlamini	9	2	3	4	2	4	1	4	3	2	0	2	1	1	2	2	43
Mlangeni	9	1	3	1	3	4	1	2	2	1	0	1	1	1	2	3	35
Thwala	10	1	2	4	3	4	1	2	2	2	4	1	1	1	2	2	43
Skosana	9	1	3	4	4	4	1	4	3	2	0	1	0	1	2	1	40
Sibande	10	2	3	4	3	4	1	4	2	1	2	2	0	1	2	3	44
Matlala	10	2	3	3	4	4	1	4	2	1	2	0	0	1	2	3	41
Khontsiwe	2	0	1	4	0	0	0	0	1	1	0	2	0	1	2	2	16
Ndlagamandla	7	2	2	4	0	3	1	2	2	2	2	2	1	1	2	3	36
Mdluli	4	1	3	2	1	3	1	0	2	2	2	2	0	1	2	2	29
Mthombeni	2	0	0	2	1	3	0	0	2	1	0	1	1	1	2	2	18
Motaung	2	0	0	2	2	1	0	0	3	1	2	1	1	1	2	3	21
Meletse	8	0	0	0	0	3	0	0	2	0	0	0	0	1	2	2	18
Duma	6	0	0	0	0	0	0	0	2	0	2	1	1	0	2	1	15
Mofokeng	9	1	3	4	2	4	1	4	3	1	4	2	1	1	2	3	45
Nene	8	1	2	4	4	4	1	4	2	1	0	0	0	1	2	3	37
Dakile	7	1	2	4	4	0	1	4	2	1	2	1	0	1	2	2	33

Khoza	9	1	3	4	4	0	1	4	3	1	2	2	0	1	2	2	39
Mbeko	7	2	1	4	4	3	1	2	3	1	2	0	0	1	2	0	33
Motaung	8	2	1	4	3	2	1	0	2	1	4	1	0	1	2	2	34

Table 12: First phase item analysis

Report

6 Schools' assessment results were analysed. Two schools are in the Thebe Foundation Maths project.

The performance in the schools in the project does not show greater improvement than those not in the project.

Comments to teachers

- Teach and give learner practical activities on all four basic operations.
- Mental activities take place daily for 10 minutes and must be planned for.
- Teachers must use manipulatives as much as possible and counting strategies to be taught to learners.
- Other areas that need improvement
- Money
- Time
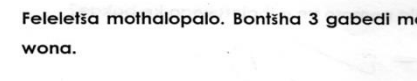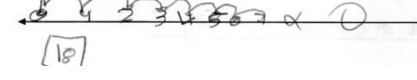- Patterns: both number patterns and geometric patterns.

Achievements

Some learners scored 100%

MATHEMATICS

TOTAL NUMBER OF SCRIPTS: 120

GRADE	SKILL	LEARNER RESPONSES	CAUSE	INTERVENTION
3	COUNTING FORWARD IN 3s	GENERALLY: Learners' performance was average. Although most learners' indicated that some content areas were not yet well mastered. Findings: 1. Some questions were ambiguous e.g. question 12. 2. Use of number line is still a challenge. 7.2 Qedela lomuqga wezinombolo. Phinda okuthathu (3) (2) kabili. 7.2 Feleletša mothalopalo. Bontsha 3 gabedi mo godimo ga (2) wona.	1. It might happen that the Policy was not correctly followed/the phrasing of the question(s) was/were not clear. 2. The skill of using number line/ruler is not yet well developed. 3. Most learners displayed incompetency in solving money problems (involving change) 4. Learners misunderstood the question. 5. Instruction might	1. Questions must be clear and to the point. 2. Learners must be given enough activities on number line. (make use of the DBE workbooks and other relevant resources) 4. Ambiguous questions need to be avoided. 3. Activities on money need to be reinforced. Real life experiences need to be linked with the activities in the classroom, e.g. role playing spaza shops (buying and selling using play money). 4. Activities must include the
	NUMBER SYMBOLS AND NUMBER NAMES			
	ORDERING WHOLE NUMBERS			
	PLACE VALUE: DIGIT REPRESENTATION AND VALUE OF			

	THE NUMBER	3. Money problems could not be solved.	have confused the learners (Draw the fourth pattern)/ content was not well interpreted. Learners only know the 12 hour time as per Policy and not the 24 hour time. Digital clock is also not understood by learners. (p86 CAPS)	real clock so that learners can feel, see and operate it during lesson presentation. They can use waste material to make their own for correct practise. Activities on passing of time should be a norm. Number sense is important for learners to be able to manipulate numbers.
	PLACE VALUE: DECOMPOSING TWO DIGIT NUMBERS	Qala izinto ezingenzasi bese uphendula imibuzo 8.1 no 8.2:		
	ADDITION WORD PROBLEMS IN CONTEXT	R2,50 R5,00 R3,15 8.1 UJane uthenge **ipakana yamatjhipsi namadribe** nge- **R10** yephepha. Uthole itjhentjhi yemalini? (1) R10		
	CONTEXT FREE CALCULATIONS USING NUMBER LINE	8.2 Nange uJane athenga **iintjherefe ezimbili** zamabhangana, uzokubhadela malini? (1) R2.50	6. Some learners did not master days of the week/calendar from the previous Grades. Learners have not yet mastered the calendar.	5. Learners' daily activities must include weather chart, calendar, and birthdays. These charts must be displayed in classes. Educators are encouraged to have print rich classes.
	SOLVING MONEY PROBLEMS INVOLVING TOTALS AND CHANGE IN RANDS AND CENTS	Lebelela dijo tše gomme o arabe potšišo 8.1 le 8.2: R2, 50 R5, 00 R3, 15 8.1 Mokgadi o rekile **phakete ya ditšhipisi** le **ngatana ya diterebe** ka **R10** ya pampiri. Na o hweditše tšhentshi ya bokae? (1) 38		7. More activities on breaking down strategy need to be done. e.g. use of concrete objects (sticks/beans/stones/etc).
	ADDITION, SUBTRACTION, MULTIPLICATION AND DIVISION SYMBOLS USING DIFFERENT	8.2 Ge Mokgadi a ka reka **dingatana tše pedi tša dipanana**, (1) o tla lefa bokae? 5R	7. Learners have not yet mastered (from previous Grades) that strategy of breaking down. 8. Skill of interpreting the graph might not yet developed/reading	8. More activities on graph activities need to be done. (learners can do it practically like collect and sort objects

			information with understanding is not there.	according to colour/size/shape/texture/etc)
	TECHNIQUES			
	COPY AND EXTEND THE PATTERN ONCE	4. Some learners struggled with/in extending the patterns.		
	COUNT FOWARD WITH INTERVALS SPECIFIED IN GRADE 2 WITH INCREASED NUMBER RANGE	2. Zalisa ngeenomboro ezingekho: 2.1 35; 45; 6 b6 9 213 ; 75 (2.2 39; 37; 35; 10 2 9 ; 12 7 ; 29 (IsiNdebele, Mathematics Grade 2 March 2015 3/11		
	DESCRIBE AND COMPARE 2-D IN TERMS OF SHAPES, STRAIGHT SIDES AND ROUND SIDES	5. Most learners could not do a digital clock as required by the question		
	TIME: TELL TIME ON AN ANALOGUE CLOCK AND DIGITAL CLOCK	13.2 ULinda ubuya esikolweni ngesikhathi esitjengiswe ewatjhini **A** . Tjengisa isikhathi leso **ngewatjhini yedijithali.** 3 : B 9		
	TIME: READS DATES ON CALENDER	6. Most learners were unable to interpret the calendar.		

| | **ANALYSE AND INTERPRET: ANSWER QUESTIONS ABOUT DATA ON THE BAR GRAPH** | 14. Phendula imibuzo **ngekhalenda le:**

NTAKA 2015

Mvulo	Lesibili	Lesi thathu	Lesine	Lesi hlanu	Mgqi belo	Sondo
						1
2	3	4	5	6	7	8
⑨	10	11	12	⑬	14	15
16	17	18	19	20	21	22
23	24	25	26	27	㉘	29
30	31					

14.1 Ilanga langomhla ka 13 kuNtaka lingolosingaki? (1)

_____13 ∝_____

14.2 UMvulo wesi-2 uzabe angezingaki? (1)

___3 ∝___

14.3 Inyanga kaFebherbari iphele ngaliphi ilanga? (1)

___28 ∝___

7. Learners could not do word problems using breaking down technique. | | |

Ka gare ga pese ya mathomo go na le batho ba **64**. (2
Ka gare ga ye nngwe go na le batho ba **27**. Ke batho ba
bakae bao ba nametšego ka gare ga dipese tše tše
pedi?
Šomiša mokgwa wa go **hlahlamola dinomoro** go hwetša
karabo ya gago.

30 + 7 = 22
40 + 2 = 60
70 + 9 = 34

Ka gare ga pese ya mathomo go na le batho ba **64**. (2)
Ka gare ga ye nngwe go na le batho ba **27**. Ke batho ba
bakae bao ba nametšego ka gare ga dipese tše tše
pedi?
Šomiša mokgwa wa go **hlahlamola dinomoro** go hwetša
karabo ya gago.

18 17 · 6

7.1 **Tafola e tee e na le maotwana a 4. Na ditafola tše 9 di na** (1)
le maotwana a makae?

Maotwana a ___19___ .

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8. Learners could not interpret and analyse bar graph.

Bana ba Mphato wa 3 ba boloka tšhelete ya khonsarata.
Lebelela krafo gomme o arabe dipotšio tše di latelago:

Bobolokelo bja khonsarata.

Tšhelete yeo e bolokilwego					
R140					
R120					
R100					
R80					
R60					
R40					
R20					
	Solly	Ntsako	Chris	Hilda	Betty
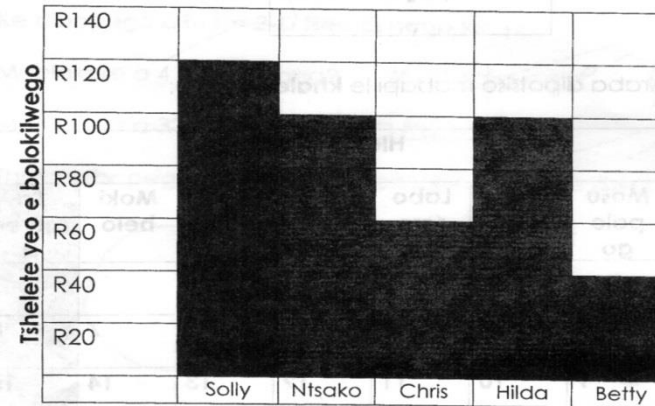
Bana bao ba bolokilego

Na Hilda, Betty le Ntsako ba bolokile bokae kamoka?   (

2   9

Table 13: Second phase item analysis

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4.3   Chapter summary

This chapter discussed the research findings as presented through reflective activities, interviews and the focus group discussion. The analysis was done using the two phases of the action research cycle which included observing, reflecting, planning and acting. The observation part is the initial aim for undertaking this study whereby research and literal observations has indicated that Grade 3 learners are underperforming in Mathematics, and as an exit class in the Foundation to the Intermediate Phase this raises concerns. Data was generated by using the ten themes of the curricular spider web, with some themes merged i.e. content and time, and accessibility and location. SAs reflected on each theme and thereafter their responses were analysed and discussed. After critically engaging with each theme, whereby assessment theme proved to have the strongest link, they then planned for improvement. SAs came up with strategies to capacitate educators to improve learner performance. Strategies were then implemented in the second phase of the action research which is the action part in the reflection cycle. Based on the findings, it may be concluded that SAs' reflection were more inclined on CAPS requirements which is performance curriculum. Furthermore, they were able to identify gaps and transform their own practices. These findings are consistent with literature on the purpose of an action research. McMillan and Schumacher (2010), Christiansen *et al.* (2010) and Mills (2003) concur that action research is used by particular people to study current problems or issues in their practice; with the focus of finding solutions to those problems. An action research is guaranteed to have a thorough investigation of the researched context in order to improve learning outcomes by developing reflective practice and adapting the work environment (McMillan and Schumacher 2010; Christiansen *et al.*, 2010 and Mills, 2003). The next chapter will therefore present a summary of the previous chapters, a summary of the findings, conclusions, and recommendations.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1   Introduction

The main aim of this study was to explore SAs' reflections of the supervision of Grade 3 Mathematics CAPS implementation. The study's main objectives were to identify SAs' reflections of the supervision of Grade 3 Mathematics CAPS implementation and to explain the reasons why SAs are reflecting in a particular way. To achieve these objectives, the study was informed by the following two research questions:

1. What are the SAs reflections of the supervision of Grade 3 Mathematics CAPS implementation?
2. Why do SAs have particular reflections on Grade 3 Mathematics curriculum implementation?

This chapter will start by summarising the foregoing chapters i.e. Chapters One to Four. Subsequently, in an attempt to find out whether the above research questions have been answered, the chapter will then summarise the findings of this action research from the literature review and from the data analysis perspectives, offer conclusions and propose some noteworthy recommendations. The process that has been undertaken throughout the study will also be reflected upon. Besides reflecting on whether the main research objectives have been met or the research questions have been answered or not, the conclusion will also indicate how this study could be considered valuable. Guidance will also be offered on how the study could be progressed for the future.

5.2   Summary of chapters

Chapter One presented the background of the study at hand. It presented the title: SAs' *reflections of the supervision of Grade 3 Mathematics CAPS implementation*. The focus and purpose of the study were also presented. The chapter furthermore informed us that the study will be conducted in the four districts of the Mpumalanga Province. The rationale that I am conducting the study because of personal interest was also highlighted, including the significance of conducting the study. A brief explanation of the research approach, research methods, and sampling methodology was also shown. The chapter also informed the readers that the objectives of the study are to:

1. To identify SAs' reflections of the supervision of Grade 3 Mathematics CAPS implementation.
2. To explain the reasons why SAs reflect in a particular way.

To achieve the objectives, the following research questions were asked:

1. What are the SAs' reflections of the supervision of Grade 3 Mathematics CAPS implementation?
2. Why do SAs have particular reflections on Grade 3 Mathematics curriculum?

In Chapter One I pointed out the research design and methodology that was used in this study by outlining the research paradigm (critical paradigm), research style (action research), sampling (purposive and convenience sampling), data analysis, ethical clearance, trustworthiness and limitations of the study.

Chapter Two, in addressing the issue at hand, reviewed literature and summarised evidence of the four main areas of this study (SAs' reflections, the curriculum, competence and performance curriculum, and curriculum implementation) as framed by the curricular spider web as conceptual framework. The chapter first discussed why it is important for educators to reflect on their experiences. Literature revealed that reflections are important because, firstly, education is viewed as the servant of the economy and teachers as technicians. Secondly, education is viewed as an agent of social change and educators are seen as innovative professionals (Bell & Gilbert, 1994; Killen, 2007). A definition of reflections was also presented from various studies (Kabilan, 2007; Killen, 2007 & Dewey, 1933). The importance of reflections was also discussed at length. Furthermore, the SAs' reflections were categorised according to three levels of reflections identified by Van Manen (1977), which are the technical level, the practical level and the critical level of reflection. Through the generated data in the two cycles of reflection, findings revealed that SAs reflections fit the three levels of reflections. The chapter further defined the curriculum, its five levels (supra, macro, meso, micro and nano) and presented the three forms of curriculum (intended, implemented and attained) with the main focus on the intended and the implemented curriculum.

Lastly, Chapter Two presented the curricular spider web as the conceptual framework of this study. Literature was reviewed against the ten concepts of the spider web as presented by Van den Akker *et al.* (2009) i.e. rationale, accessibility, goals, content, resources, roles location,

time and assessment. Literature revealed that the personal rationale for supervision is the one that informs whether the SAs supervise for societal or professional/content reasons. Furthermore, the rationale for supervision drives the success for all the other concepts with assessment being the strongest of all concepts in curriculum implementation. This is consistent with Van den Akker's (2003) and Berkvens *et al.*'s (2014) argument that it is difficult to maintain consistency and balance between the various components of a curriculum and this leads to the intended curriculum not attaining the desired objectives. The strengths and gaps of each concept were identified within their propositions.

Chapter Three detailed the research methods used in this study, including the research paradigm, research approach, sampling, data generation methods, trustworthiness, data analysis, ethical considerations and limitations of the study. The study is a qualitative action research within the critical paradigm. Eight Foundation Phase SAs were purposively and conveniently sampled from the four districts of Mpumalanga province as they were the most suitable for this study (Lodico *et al.* 2010). Over and above understanding the phenomenon, which is the SAs' reflections of the supervision of Grade 3 Mathematics CAPS implementation, the aim was also for the participants to transform their practice in order to improve learners' performance in Mathematics as an exit Grade in the Foundation Phase. Reflective Activities, semi-structured interviews and focus groups discussions were used in two reflection cycles as data generation methods of this study. The SAs had to reflect, plan, implement, observe and reflect again, following the reflection cycle.

Trustworthiness was ensured by paying more attention to the elements of credibility, dependability, conformability and transferability. The chapter also presented guided analysis as the analysis framework of the study and explained how it uses both the inductive and deductive reasoning approaches. The chapter also outlined how the ethical considerations were addressed. These principles (autonomy, non-maleficence and beneficence) were outlined clearly in the informed consent letter which the participants were requested to sign before participating in the study. Furthermore, the chapter informed us that permission to conduct the study was sought from the University of KwaZulu-Natal and Mpumalanga Provincial Department of Education. Lastly, the chapter highlighted possible limitations of the study and how these limitations will be overcome if they manifest.

Chapter Four, which may be viewed as the core of this study, presented, analysed and discussed the action research findings according to the ten themes of the curricular spider

web. In this chapter, the SAs' responses were transcribed and presented mostly in a form of direct quotations so as not to lose authenticity. The summary of findings from the analysed data and some conclusions drawn are presented below.

5.3 Summary of findings and conclusions

The conclusions drawn are derived from the data analysis and reviewed literature. These conclusions will be discussed from SAs' reflections of the supervision of the grade 3 maths implementation based on the themes of the curricular spider web. It should be noted that the curricular spider web was initially designed for classroom educators and for the purpose of this study it was adapted to suit SAs, who are also educators, whose responsibilities, amongst others, are to educate classroom educators. The themes of the curricular spider web were found to be relevant for SAs too because they monitor and support curriculum implementation in order to ensure that the intended curriculum (CAPS) serves its purpose and achieves its goals. Therefore, there was no better frame of reference to use than the curricular spider web.

5.3.1. Rationale

There is consensus in literature (Berkvens *et al..* 2014 and Jansen, 2004) that educators teach for various reasons and that policy makers, when designing policies, have an ideal educator in mind. Reasons for teaching vary from personal/pedagogical, societal/social or professional/content knowledge professional reasons. Khoza (2015b) maintained that the personal rationale is the core and foundation of societal and content/ professional reasons for teaching. The findings revealed that there was no balance between the SAs' reasons for supervision. They were mostly supervising for societal reasons to ensure that educators adhere to CAPS without critically evaluating whether their reasons for supervision are functional or not. There was a certain level of comfort related to their supervision. It was taken like an everyday routine activity but after critical reflections, the SAs reason for supervision changed and they transformed. SAs started acknowledging the importance of supervision with the aim of providing educators with comprehensive support after identifying gaps. They were no longer supervising for compliance. In the process there was evidence of a shift from supervising for checking and monitoring, to supervising for strengthening and support for educators and improving content knowledge. This move is consistent with relative literature that inspectors, according to Fowler and Poetter (2004), inspect and check to make sure that the teaching of Mathematics in schools conforms to that of the national

curriculum. For these reasons, their supervision was not having any developmental benefit for the learners.

Through the SAs' reflections, from a technical level of reflection all the way down to the critical level of why they supervise, there is a need to engage all the other SAs' reflections in the province. The activity of involving other SAs may be conducted, at the beginning of each year. Furthermore, a reflection activity may be used as part of an inductive process of the newly appointed SAs so that they can, at an early stage, indicate their reasons for supervision. The SAs, through identifying their rationale for supervising, ended up knowing what to do and how to do it. Their supervision alone however did not have any developmental benefit to educators. The data analysis findings therefore indicate that a grounded rationale for supervision, backed by continuous reflections of SAs, will be a very strong foundation for SAs to improve their supervision practice.

The findings indicate that personal and societal rationale played a major role in the first phase of reflection. The SAs were deeply immersed in their everyday knowledge personal perceptions of supervision and adherence to policy (CAPS). Their personal perceptions indicated that they were reflecting from technical and practical levels of reflection. After the second phase of reflection, which indicated the critical level of reflection, SAs transformed and started understanding that the reasons for supervision complement each other.

5.3.2. Aims and Objectives

From the findings it is evident that the SAs are aware of the general aims of the South African curriculum and also the aims and objectives of the Mathematics curriculum, but they cannot classify that these are objectives or outcomes as CAPS did not identify them as such. According to CAPS Mathematics Foundation Phase, the objectives of Mathematics are identified as specific aims and outcomes as specific skills (Khoza, 2015a). Though no mention of objectives and outcomes were made by SAs, one could deduce from their responses which were objectives and which were outcomes. Their responses on aims were therefore consistent with the curriculum aims of Mathematics. On the outcomes that learners need to achieve, findings indicated that the SAs used certain measurable key words from Bloom's Taxonomy which were consistent with literature and CAPS as the performance curriculum. Furthermore, despite being involved in the two phases of reflections, the SAs and their goal for supervision were still driven by societal and professional reasons for supervision which are more aligned to the technical level of reflection.

Based on the above findings, SAs are unable to single out their objectives and outcomes which suggests that there may be a bigger challenge for educators in schools to identify them. Therefore for CAPS Mathematics to be sustainable, simple terms need to be used in a user friendly language that can be understood by all the educators

5.3.3.   Content and Time

According to the literature reviewed, the intended curriculum sets out what its designers intend to be taught. Educators should be well versed with this content. In relation to the Mathematics content in Grade 3, findings reveal that the SAs are aware of the Mathematics content they need to supervise in Grade 3 as outlined in the Mathematics CAPS. These are: Number Operation and Relationships, Pattern Functions and Algebra, Space and Shape, Measurement and Data Handling. They were also aware that each content area is weighted and allocated its own time. This is relevant for CAPS as a performance curriculum. Furthermore, findings revealed that they were also aware that each content area has a number of topics that need to be covered across the weeks that make up a term. It was further revealed that for the SAs to ensure that each content area and its topics are covered, they also supervise how the teachers have planned their daily lessons. However, during the reflection the SAs found out that most of the educators they supervise plan for compliance and their content knowledge is very limited.

They were rigid in ensuring that teachers follow CAPS content and the time allocation which was consistent with CAPS Mathematics Grade 3 thereby disregarding actual implementation challenges that educators face in the classrooms. After the second phase of reflections, finding revealed that educators had challenges with the very same content. Their Mathematics content knowledge proved to be very limited hence their move to transform and their decision to involve educators in coming up with strategies of teaching that will help them in their classrooms. They also pointed out that there were also challenges with the teaching strategies used; the use of correct Language of Learning and Teaching was also a problem as in some schools as educators were using English to teach Mathematics, claiming to be preparing them for Grade 4. Reasons for teaching learners in English are to give them a strong foundation so that they can cope from Grade 4 onwards as the LoLT is English.

5.3.4.   Resources

It has been revealed from literature that without resources no meaningful teaching and learning can effectively take place. Furthermore, it was also revealed that curriculum

implementation without utilisation of relevant resources may fail. Literature identified various resources that are used in Mathematics and also classified them into hardware, software and ideological-ware resources (Khoza, 2013). Therefore, utilisation of relevant resources for the teaching of each subject is a norm. Educators need to be provided with resources by the Department of Education and other stakeholders who are in partnership with the Department of Education in a bid to improve performance in Mathematics. Literature also revealed that the use of technological resources is on the rise and takes centre stage in the successful teaching of Mathematics. The use of these resources, according to (Gojack, 2014), has increased the importance of student reasoning and opportunities to make sense of Mathematics. Therefore, in this study, the use of technological resources has helped the classroom educators. CAPS also outlines mathematical resources to be used in Grade 3 and the whole Foundation Phase where they are only limited to hardware resources (CDBE, 2011a, p. 16). The findings revealed that the SAs use adequate resources during the supervision of Mathematics in Grade 3.

However, they did not indicate whether the teachers they supervise have the resources or not, but they expect teachers to have them and utilise them. It is only a challenge in schools which have no resources. It was also found that that during the second reflection phase, SAs used hardware resources when supervising and capacitating educators as the main resource. This included the math kits, monitoring tools for math lessons, workbook utilisation and other content relevant for monitoring. In the second phase, findings showed that they started using the software and ideological-ware resources. They engaged in theories like Blooms taxonomy, Piaget's levels of cognitive development while additional readings also helped in transforming how they viewed the supervision of Mathematics. Additionally, they also found the use of software resources like WhatsApp messenger and Short Message System (SMS) very beneficial, cost effective and time-saving as it enabled them to easily access as many educators as possible; simultaneously and within a short period of time. At first, findings revealed that SAs were sceptical of these available software resources because of their attitudes and misconceptions about social media. It may therefore be concluded that proper utilisation and management of available resources is critical. SAs also need to ensure that resources in classrooms are available and properly managed by educators for successful Mathematics curriculum implementation.

5.3.5.   Supervision Activities

Literature reviewed does not specifically identify the actual supervision activities that the SAs carry out during supervision and support visits. However, literature highlighted that teaching and learning activities should be provided in a way that helps learners to understand the main mathematical concepts and understand the solid industry of the numeration system. Furthermore, it indicated that the teaching activities should focus on developing learners' interests in mathematics. Based on the literature, it is recommended that these can be achievable when teachers use enquiry-based teaching methods in their classroom. It was further revealed in the literature that CAPS mathematics in the Foundation Phase specifies teaching guidelines with suggested activities and questions that may be asked during these activities. SAs are very much aware of these activities, and as such it was highlighted in literature review that it is the responsibility of Subject Advisor to build capacity of educators by strengthening their understanding of mathematics (AMTE, 2010). Furthermore, Ololube and Major (2014) indicated that SAs are responsible for assisting teachers to know and apply methods that help teachers in planning daily, meaningful, mathematics activities (Ololube & Major, 2014).

The findings of this study indicate that in pursuit of helping educators to understand content, identify relevant teaching methods, and plan activities, SAs' conducted daily classroom visits, workshops focused on content, and also monitored utilisation of workbooks. The findings further indicate that in the first phase of reflection the activities were not proving to yield positive results as educators were not contributing anything to their own development. This approach employed the technical approach to curriculum implementation which is consistent with CAPS but offered teachers little and hindered their autonomy. Findings from the second cycle of reflection indicate that teachers became more involved and contributed a lot more as SAs now employed what Hoadley and Jansen (2012) call the critical/action reflection or the process/competence approach. Though the approach is not consistent with CAPS curriculum, it offered SAs an opportunity to actively engage teachers.

Though competence and performance curriculum do not engage in some focus areas, both frameworks' good practice may be transferred form one curriculum framework to the other. SAs may use both competence and performance curriculum frameworks as they deal with teachers who are adults and who will be able to reflect. Involving teachers in decision making related to their classroom practice helps them to become more productive and reflective.

5.3.6.   Roles

The literature identified specific Subject Advisor roles as specified by the Department of Education and other authorities from other countries. It was revealed that amongst others, their roles are to monitor and support curriculum implementation; ensure that educators have relevant policy documents for the subject and support educators in delivering curriculum in the classroom. They also have to support initiatives that are set to improve numeracy and literacy. Again, they serve the purpose of assisting educators in building their mathematical and pedagogical knowledge. Lastly, they have to ensure attainment of high quality school mathematics programmes through knowledge and skills they impart to educators. These roles are consistent with roles of other SAs in various countries around the world.

According to the research findings, SAs' roles in the first cycle of reflection are influenced by their roles as stipulated by the department. Their roles are strongly related to the supervision activities that are carry out during supervision for improving teaching and learning overall. Therefore, findings from the second phase reflected a shift from the technisist view to the more liberating view. The findings indicate that as much as the SAs' roles are pre-determined, they were able to be autonomous and realised that they cannot work in isolation; hence the engagement of the educators is needed in transforming SAs' supervision practice. SAs' roles are therefore consistent with roles of SAs elsewhere. The uniformity poses a challenge as their roles make them (SAs) operate as technicians and portray supervision as a scarecrow for educators whereby they view them as threats and tend to resist support. This will in turn hinder successful curriculum implementation. Therefore, the transformational process of involving educators that was adopted by SAs in this study needs to be adopted by all the SAs.

5.3.7.   Accessibility and Location

Findings from the literature reveal that SAs supervise teachers in schools from various socio-economic backgrounds. Some school are located in rural, semi- rural and others in urban areas. These schools are therefore classified according to a poverty index called a quintile. Schools range from quintile 1- 5, where 1 indicate poverty and 5 would indicate affluence (DBE, 2014, p. 89). Furthermore most of the learners who attend these schools in various bands of the schooling system are from poor socio economic backgrounds and various cultural groups. Despite teachers and learner' backgrounds the findings indicated that

location, time of teaching, and learning activities should take place in a formal classroom setting, at a school and during school hours as stipulated by policy. Furthermore as CAPS is a performance curriculum, the literature indicates that in performance curriculum teaching and learning occurs in clearly marked learning sites. The findings are consistent with Berkvens *et al.* (2014) assertion that for effective teaching and learning to take place, the learning environment should be inspiring. However, there is no literature that was found on when SAs should conduct their supervision. It is therefore assumed that they supervise during school hours and conduct workshops after school hours.

Findings from the two phases of supervision revealed that SAs plan for supervision activities and conduct them during school hours, when there is a need. They conduct workshops after school and during school holidays in well organised venues e.g. school hall, facilitation room or at teacher development centres.

5.3.8   Assessment

The literature reviewed identified all forms of assessment, Assessment for Learning, Assessment of Learning and Assessment as learning, as an integral part of curriculum implementation. There is consensus in literature that assessments serve a number of purposes. It can be used as a measure of learning, can improve learning, and can also be used to evaluate the system and provide feedback for both the intended and implemented curriculum (Jansen, 2012; Taras, 2005; Hoadley & Jansen, 2012; and McIntosh, 1997). These types of assessment have been identified in literature i.e. formative assessment, summative assessment and assessment as learning. The most commonly used types of assessments are formative and summative assessments which are used according to CAPS Mathematics to monitor learners progress on a daily basis while summative assessments is used for overall learner progression. There are a number of formal assessment tasks that are given per term that count at the end of the year to determine whether or not the learner will progress to the next grade.

Though there is limited literature on assessment as learning, it has been revealed that this type of assessment is used to measure how learning takes place and is characterised by reflections and making adjustments in order to have deeper understanding. The role of assessment as learning is to assist educators to design teaching and assessments that give learners an opportunity to reflect and monitor their own learning.

Findings from the first phase of reflection indicated that SAs were convinced that the effectiveness of their supervision is only evaluated through assessment of learning (summative assessment) than on assessment for learning (formative assessment). This however posed a challenge as they made more of an effort to monitor administration of formal assessment tasks and provincially set assessments. They reflected on the technical and practical levels of reflection. In the second level of reflection, findings reveal that SAs started reflecting on the critical level of reflection. This is evident as it was revealed that SAs identified the importance or need to design facilitation activities and assessment that gives educators opportunities to think about and monitor their own teaching. Baseline assessments for commonly set assessment tasks were conducted. Challenging Grade 3 Mathematics content was identified by both teachers and SAs in the question papers. This assessment was used as a reflection activity. Continuous use of this practise going forward may yield improvement in Grade 3 Mathematics learners' performance as educators were part of designing intervention strategies that were viewed as not only practical, but achievable. Findings also reveal that this activity involved all educators in the Foundation Phase and they were given a chance to attend according to the Grades they teach.

5.4 Suggestions for further research

Based on the findings of this study, the following recommendations are made for further research:

1. The literature review indicates that there is limited research that focuses on SAs reflections on mathematics curriculum implementation. Therefore it may be worthwhile to extend a study of this nature to other provinces; especially those underperforming according to the National targets.

2. A further study needs to also be conducted on the reflections of the supervision of Mathematics CAPS implementation across the Foundation Phase, not only in Grade 3.

3. As the use of the correct Language of Learning and Teaching has been identified in the analysis findings as one of the causes of poor performance in mathematics in Grade 3, there is therefore a need to conduct a study which will focus on the impact of a LoLT in the teaching of Grade 3 mathematics.

4. Findings from literature and data analysis indicate that there is still some confusion on concepts of competence curriculum (C2005) and performance curriculum (CAPS). Therefore, it is critical to conduct a study that will investigate teachers', SAs', school

management teams', circuit managers' and other people involved in curriculum matters' understanding of the two curriculum models i.e. C2005 and CAPS.

5.5 Recommendations

Recommendation 1

There is a strong need to involve SAs and other educators in the curriculum decision development process. This move will enable them to view their rationale for supervision as not only limited to societal or personal, but extended to professional reason as well. This will help them to be more reflective, which will ensure successful curriculum implementation from the bottom up. Furthermore, to be able to identify themselves accordingly, SAs, like classroom educators need to be supported.

Recommendation 2

Curriculum aims and objectives should be clearly stated in simple, understandable, language in the CAPS documents. SAs also need to conscientise educators about curriculum aims and objectives, and also encourage them to set clear lesson outcomes which will help them to meet curriculum objective SAs. SAs also need to understand the importance of using Bloom Taxonomies and engaging in other learning theories to transform their teaching. SAs not only need to depend on their own experiences (everyday knowledge), but also need to engage in literature on theories of learning as related to aims and objectives.

Recommendation 3

There is an urgent need to amend the time allocation for Mathematics in the Foundation Phase as there is some contradiction in the Foundation Phase Mathematics CAPS as indicated in the reviewed literature. There needs to be a balance between the weighting of content, number of lessons to be taught per term, number of lessons for each content area in the DBE workbook, suggested teaching time per week per content area, and time allocated for each content area per week. The story itself is a bit complicated which suggests that this may be a causing a lot of confusion for implementation level teaching in schools.

Recommendation 4

SAs' roles and their supervision and support activities are well defined, but these roles need to be clarified to teachers so as not to cause tension between educators and SAs during school visits.

Recommendation 5

All Foundation Phase educators need to be provided with relevant Mathematics resources that will ensure successful teaching of mathematics. When these resources are procured, teachers need to be capacitated on how to maintain them so that they remain in use for quite some time. SAs also need to assist and encourage educators on how to develop resources in instances where they are not supplied. According to Ololube and Major (2014) one of the SAs' roles is to assist teachers in the development of instructional materials.

Recommendation 6

The significance of assessment should be viewed as a powerful transformational tool in curriculum implementation. Not only should assessment be used for and viewed as only important for learners, but also as a learning tool for educators. It needs to be utilised as a tool that can be used for reflection in all stages of teaching and learning by both SAs and classroom educators. SAs need to ensure that they capacitate educators on how to develop assessment tasks that cater for learners different abilities and assess various cognitive and difficulty levels.

5.6 Conclusion

The purpose of this study was to explore Foundation Phase SAs' reflections of the supervision of Grade 3 Mathematics CAPS implementation in Mpumalanga Province and also to explain why the SAs reflect the way they did. To achieve these objectives, the following research questions were asked:

1. What are the Foundation Phase SAs reflections of the supervision of Grade 3 Mathematics CAPS implementation?
2. Why do Foundation Phase SAs reflect in a particular way?

According to van Manen (1977) there are three levels of reflection that people can reflect on. They are the technical, practical and critical levels of reflection. Furthermore, reason for supervision can either be informed by personal/pedagogical, societal/social and

content/professional rationale (Berkvens *et al.*, 2014). The findings in this study indicate that personal and societal rationale played a major role in the first phase of reflection. As the SAs were immersed in their personal perceptions of supervision and adherence to policy (CAPS), which are mostly based on everyday knowledge, it indicated that they were reflecting from technical and practical levels of reflection. After the second phase of reflection, which indicated the critical level of reflection, SAs transformed and started understanding that the reasons for supervision complement each other and that critical reflection are key in transforming one's practice.

On answering the second question it is revealed that SAs reflected in a particular way because their supervision is based more on their experience as teachers and SAs. The way they reflect is more inclined to everyday knowledge (competence curriculum) and a little on school knowledge (performance curriculum). According to the findings, both reasons of SAs' reflections accommodated the technical, practical and critical levels of reflection. Furthermore, there is evidence in the findings that in both phases of reflections, transformation was a process through these three levels of reflections.

This chapter provided a summary of the findings from literature, data analysis and also compared them with the requirements of Foundation Phase CAPS Mathematics, focusing specifically on Grade 3 content. There was also provision of recommendations from curricular spider web concepts that indicated gaps in the findings. No recommendations were made on accessibility, location and time of the supervision process as the findings revealed that SAs have limited challenges on these two concepts. Berkvens *et al.* (2014) indicated that in relation to the curricular spider web, there are four quality criteria that need to be considered for successful intended curriculum implementation, (relevance, consistency, practicality and sustainability) and these criterion complement each other, like the curricular spider web concepts. The findings from SAs' reflections reveal that the supervision of the intended curriculum, CAPS (Performance Curriculum), still has the feel and essence of Curriculum 2005 (Competence Curriculum). Reflecting on the four quality criterion, it may be argued that CAPS is practical and relevant when used in conjunction with some of C2005's principles. Now, food for thought is whether Mathematics CAPS in the lower Grades can remain consistent and sustainable on its own and still achieve its aims and objectives.

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Appendix 1

P. O. Box 284
Fauna Park
0787
16 March 2014

The Head of Department
Mpumalanga Department of Education
Building No. 5
Riverside Park
Mbombela
1200

Madam

Application to conduct research in Mpumalanga Department of Education

I am a Master Education Student, studying at the University of KwaZulu-Natal and also a Foundation Phase Subject Advisor in Nkangala District. I intend to conduct a research on SAs Reflections of the supervision of Grade 3 Mathematics Curriculum and Assessment Policy Statement Policy Statement implementation.

I chose Grade 3 because for two reasons. First, I am a Foundation Phase subject advisor, with one of my main responsibilities being the monitoring and support of curriculum implementation in schools. Secondly, Grade 3 is an exit Grade in the Foundation Phase and also that the Annual National Assessment uses Grades 3, 6 and 9 to enable system-wide reporting (Department of Basic Education, 2013) and it is of concern that performance of learners Mathematics does still not meet the National and International Standards.

I therefore believe that there is a need to conduct a study of this nature in order to explore SAs' reflections of the supervision of Grade 3 Mathematics Curriculum and Assessment Policy Statement (CAPS) with the aim of transforming current practices. The results of this study may not only benefit me in my journey as a subject advisor, but may also help other SAs to reflect on their current practices and perhaps increase the level of support they are providing to teachers with regard to Mathematics in Grade 3. Teachers could also find how best can they improve the way their mathematical content knowledge and teaching methods to be as beneficial as possible to the learners.

Based on the above reasons and also to fulfill the requirements of my Masters Education studies, I therefore request permission to conduct a research in the province.

Attached find my research proposal and proof of registration.
Thanking you in advance.

Regards
Galane Charlotte

Appendix 2

<div align="right">
No. 1 Tangerine Street
Bendor
Polokwane
0699
</div>

Dear Participant

<div align="center">

INFORMED CONSENT LETTER

</div>

My name is **<u>Charlotte Galane;</u>** I am a Curriculum Studies MED candidate studying at the University of KwaZulu-Natal, Edgewood Campus, South Africa.

I am interested in studying about SAs' reflections of the supervision of Grade 3 Mathematics Curriculum and Assessment Policy Statement implementation. As a subject advisor you are one of my sampled participants. To gather the information, I am interested in asking you some questions. Please note that:

- Your confidentiality is guaranteed as your inputs will not be attributed to you in person, but reported only as a population member opinion.
- You will be requested to fill in reflective activities and participate in an interview which may last for about 1 hour and may be split depending on your preference.
- Any information given by you cannot be used against you, and the collected data will be used for purposes of this research only.
- There will be no limit on any benefit that the participants may receive as part of their participation in this research project.
- Data will be stored in secure storage and destroyed after 5 years.
- You have a choice to participate, not participate or stop participating in the research. You will not be penalized for taking such an action.
- The participants are free to withdraw from the research at any time without any negative or undesirable consequences to themselves;
- Real names of the participants will not be used, but symbols such as A, B, C or X, Y, Z … will be used to represent participants' names;
- The research aims at exploring your reflections of the supervision of Grade 3 Mathematics CAPS implementation.
- Your involvement is purely for academic purposes only, and there are no financial benefits involved.
- If you are willing to be interviewed, please indicate (by ticking as applicable) whether or not you are willing to allow the interview to be recorded by the following equipment:

	Willing	Not willing
Audio equipment	X	
Photographic equipment		
Video equipment		

I can be contacted at:
Email: charismaton@gmail.com
Cell: +2772 868 9268 or +2713 947 1562

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My supervisor is Dr. SB Khoza who is located at the School of Education, Edgewood campus of the University of KwaZulu-Natal.
Contact details: email: khozas@ukzn.ac.za   Phone number: +2731 260 7595.

Discipline Coordinator is Dr. LR Maharajh,
Curriculum Studies, School of Education,
Edgewood Campus, University of KwaZulu-Natal
(Tel) 031 260 3422 (Cell) 072 435 6968, Email: maharajhlr@ukzn.ac.za.

You may also contact the Research Office through:
P. Ximba
HSSREC Research Office,
Tel: 031 260 4557 E-mail: ximbap@ukzn.ac.za

Thank you for your contribution to this research.

DECLARATION

I……………………………………………………………………… (full names of participant) hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project.

I understand that I am at liberty to withdraw from the project at any time, should I so desire.

SIGNATURE OF PARTICIPANT   DATE

…………………………………   …………………………………

Appendix 3

<div align="center">Reflective Activity</div>

Dear Participant

- You are requested to answer the following questions regarding your practice as a subject advisor.
- Answer all questions using a black or blue pen.

1. Who are you supervising?

    _____
    _____
    _____
    _____
    _____

2. Why are you supervising the implementation of Grade 3 Mathematics CAPS Implementation?

    _____
    _____
    _____
    _____
    _____

3. Towards which goals are you supervising the implementation of Grade 3 mathematics CAPS?

    _____
    _____
    _____
    _____
    _____

4. What are you supervising when you get to school or in a classroom?

    _____
    _____
    _____
    _____
    _____

5. How are you supervising the implementation of Grade 3 Mathematics CAPS?

    _____
    _____
    _____
    _____

6. How do you facilitate the supervision of Grade 3 Mathematics CAPS implementation?

_____
_____
_____
_____
_____
_____

7. What resources do you use during the supervision visits?

_____
_____
_____
_____
_____
_____

8. When and where are you supervising the implementation of Grade 3 Mathematics CAPS?

_____
_____
_____
_____
_____
_____

9. How is the supervision of Grade 3 Mathematics CAPS implementation evaluated?

_____
_____
_____
_____
_____
_____

Appendix 4

<div align="center">

Interview and Focus Group Questions

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Introductions

- My name is Charlotte Galane, a Master of Education (Curriculum Studies) student at the University of KwaZulu- Natal.
- Also ask each participant to introduce themselves.
- Explain the interview procedure: during the interview session I will take notes and the tape recorder will also be used to ensure credibility.

I am going to ask you the following questions regarding your practice as a Subject Advisor. These questions may have follow- up questions to enable us to get in-depth responses from you.

1. Who are you supervising?

2. Why are you supervising the implementation of Grade 3 Mathematics CAPS Implementation?

3. Towards which goals are you supervising the implementation of Grade 3 mathematics CAPS?

4. What are you supervising when you get to school or in a classroom?

5. How are you supervising the implementation of Grade 3 Mathematics CAPS?

6. How do you facilitate the supervision of Grade 3 Mathematics CAPS implementation?

7. What resources do you use during the supervision visits?

8. When and where are you supervising the implementation of Grade 3 Mathematics CAPS?

9. How is the supervision of Grade 3 Mathematics CAPS implementation evaluated?

Appendix 5: Permission to conduct research from Mpumalanga Department of Education

Appendix 6: Ethical Clearance certificate from the University of KwaZulu- Natal