How do grade 3 teachers infuse pedagogies of higher order thinking skills in their teaching?

By

Rachmat Petersen

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Supervisor: Professor Yusuf Sayed

Co-supervisor: Dr Osman Sadeck

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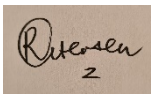
Declaration

I, Rachmat Petersen, declare that the contents of this thesis represent my own unaided work, and that the thesis has not previously been submitted for academic examination towards any qualification. Furthermore, it represents my own opinions and not necessarily those of the Cape Peninsula University of Technology (CPUT).

Signed: 

Date: 25 March 2021

Abstract

Higher order thinking skills (HOTS) are an important aspect of teaching and learning in the current global era. Teachers' understanding of HOTS and its teaching and learning strategies are fundamental to successful education. The present study aims to explore Grade 3 teachers' pedagogies used to promote HOTS in a South African context. Despite having clear curricular guidelines to help teachers infuse HOTS in their classroom practice, past studies have reported that teachers are still not fully prepared to do so. The descriptions of Shulman's PCK framework (1986), Alexander's conceptualisation of pedagogy (2003) and Bloom's (1956) taxonomy contributed towards a richer understanding of which attributes are considered most important in the analysis of teachers' pedagogies in HOTS. A qualitative case study, within an interpretive paradigm, to understand how two teachers make sense of HOTS and their strategies to infuse it into their teaching, were used. A primary school in a low socio-economic suburb on the Cape Flats was selected. This study incorporated a multiplicity of data collection instruments, which include the primary techniques of interviews, observations and post-observation interviews. A documentary review is a minor component to complement the primary techniques to explore the perceived value of HOTS implementation in the classroom. One of the main findings is that teacher motivation and beliefs impact their implementation of HOTS pedagogies. One of the key recommendations arising from this study is the need to develop the competency of all in-service teachers' pedagogy around HOTS with the provision of in-depth, systematic professional development course, in order for teachers to effectively infuse HOTS in their teaching.

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Dedication

This work is dedicated to my family:

My late parents, Salama (nee Baradien) and Omar January, neither of whom were not schooled beyond standard 3 (grade 5), but made ends meet. Their prayers and love still surround me to this day.

My mom's 9 brothers and sisters (and their families) who made my childhood and life so much richer, memorable, exciting, fun and simply beautiful. Till we meet again.

My beloved son, Tauriq, his wife, my grandchildren and all my nieces and nephews, and all their children – I love you!

May this achievement be an inspiration to seek knowledge all through your life, to resolutely believe in yourself, and to always work towards achieving your goals.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

List of Acronyms and Abbreviations

C2005	Curriculum 2005
CAPS	Curriculum and Assessment Policy Statement
CORT	Cognitive Research Trust
CPTD	Continuous Professional Teacher Development
CPUT	Cape Peninsula University of Technology
DBE	Department of Basic Education
DoE	Department of Education
DNE	Department of National Education
FET	Further Education and Training
FP	Foundation Phase
GDP	Gross Domestic Product
GET	General Education and Training
HDC	Higher Degree Committee
HOD	Head of Department
HOTS	Higher Order Thinking Skills
IP	Intermediate Phase
IEA	International Association for the Evaluation for Educational Achievement
LoLT	Language of Learning and Teaching
LTSM	Learning and Teaching Support Material
NCS	National Curriculum Statement
NEEDU	National Education Evaluation and Development Unit
NEET	Not involved in employment, education or training

OBE	Outcomes Based Education
OECD	Organisation for Economic Co-operation and Development
P4C	Philosophy for Children
PCK	Professional Content Knowledge
PEI	President's Education Initiative
PGCE	Post Graduate Certificate in Education
PIRLS	Progress in International Literacy Study
RNCS	Revised National Curriculum Statement
RR	Repetition Rate
SASA	South African Schools Act
SMT	School Management Team
SP	Senior Phase
WCED	Western Cape Education Department

CHAPTER 1

INTRODUCTION

The purpose of the study is to investigate how teachers infuse higher order thinking skills (HOTS) into their teaching and learning in the classroom. As such, the findings of this study will add to the body of knowledge on what classroom strategies are used to teach HOTS, and inform of pedagogical approaches to teach HOTS. This chapter starts with an introduction to and background of HOTS in South Africa. This is followed by the rationale for the study; problem statement; research questions; research methodology; and data procedure used in reporting this study. The chapter concludes with the outline and organisation of the study.

1.1 Background to the study

There has been a growing interest globally, and regionally in South Africa, in the Western Cape, around how learners can become more critical in their thinking. For the establishment of a proficient labour force in a global economy and for the protection of a democratic society, the development of learners' higher order thinking skills is fundamental (Tsui, 1999). In particular, policy makers outline the 21st century proficiencies throughout the majority of countries, including South Africa, embrace higher order thinking as a skill that is greatly prized by employers. Snyder and Snyder (2008) state that learners who engage in higher order thinking are better able to resolve issues and make accomplished judgements in the work place and their everyday lives.

The importance of teaching learners to become lifelong learners with the competency to think critically is central for survival in a globalised world. The impact of mobile technology and the internet raises the need for learners to become discerning in their evaluation of information that is easily available on the web through mobile and other applications. Literature reveals that developing higher order thinking skills (HOTS) of learners as an explicit learning objective within the school curriculum, has grown in prominence with many nations, including South Africa (Avargil, Herscovitz & Dori, 2012).

This researcher believes that Foundation Phase educators have the most revered job in all of education: welcoming young children to the astounding world of reading. This is achieved in conjunction with the realisation of the importance of creating an educational experience for learners that will prepare them to succeed in the 21st century, evident both internationally and nationally (Fullan & Langworthy, 2014).

South Africa is a country where many learners are taught through the medium of English, even though it is not their home language, thus rendering them limited in their English language adeptness. Many of the learners' parents and guardians place them in schools where the language of learning and teaching (LoLT) is English, despite the fact that most of them were raised using a home language other than English. This forces the learners to move into bilingualism, which according to Freeman and Freeman (1998: 229), takes beyond six years to develop competence in the second language of learning.

Noting that South Africa has 11 official languages and that the Constitution stipulates the language rights of all natives, English is the official language of most of its schools. Setati, Adler, Reed and Bapoo (2002:76) highlight concern regarding the challenges this embraces: (1) political power and English has to be apportioned; (2) English needs to be taught early, without taking into consideration the development of the first language; (3) appropriation of additional languages beyond English; and (4) in-service training and support with applicable resources are required in multilingualism.

According to Soudien (2007), one of the major trials the bulk of Foundation Phase teachers in South Africa experience is in the form of language diversity in their classrooms. Kader Asmal, the Minister of Education in 2000, emphasised the impoverished results of home language in schools in the National Policy on Whole School Evaluation (2000). He thus called for the improvement in literacy levels among primary school learners, as it has a direct impact on the achievement results of formal standardised tests. This has been shown in research findings from the Progress in International Literacy Study (PIRLS) (2016), a large-scale standard assessment. PIRLS (2016) revealed that South Africa (out of 50 countries) performed the poorest in

comparison to many low-income nations, for instance Zimbabwe, Tanzania, Swaziland and Kenya. The 3rd and 4th benchmarks in PIRLS represent the higher levels on Bloom's taxonomy, and are associated with higher order thinking skills, which include critical, reflective, logical and meta-cognitive thinking. PIRLS will be elaborated on in Chapter 2: Context.

The Organisation for Co-operation and Development (OECD) (2005:2) positions 'teacher quality' as the single, most essential seminal variable that affects learner accomplishment, and teachers as the central stimulus of successful learning. In order to enhance learners' HOTS, Foundation Phase teachers need to develop and apply effective support pedagogies across the curriculum in the South African school setting. HOTS are a set of learner skills that should be advanced through teaching and learning. To achieve this objective, teachers' knowledge about HOTS and its teaching and learning procedures become fundamental to successful education.

The assumption that underpins this study is that if teachers infuse pedagogies of higher order thinking skills in their teaching, then learning will improve. This study explored the teaching and learning of HOTS in real life classroom settings. Teachers' own voice were sought for a better understanding of the development of HOTS in the South African context, and as such, the unit of analysis is the teacher.

1.2 Rationale

The researcher has been a Head of Department (HOD) in the Foundation Phase for more than 20 years and seeks to understand why learners struggle with comprehension at school. The reason for conducting this study was that critical thinking is strongly emphasised in the South African curriculum, yet research indicates the nurturing of learners' HOTS presents an important challenge to teachers (PIRLS, 2016). Higher order thinking is an integral part of the South African National Curriculum Statement (NCS), which continues to emphasise the value of higher order thinking across different areas of learning such as Literacy, Mathematics, and Science.

Little research has been found on teachers' attitudes and beliefs regarding HOTS, especially in the FP phase, and given the reasons above, the question for this study was formulated to focus on teachers' pedagogies to enhance HOTS and how these play out in their classrooms.

1.3 Problem statement

PIRLS (2016) notes that 8 out of 10 children in South Africa cannot read with meaning. It reports that children could not uncover and retrieve explicitly stated information or make straightforward inferences about events and reasons for actions (PIRLS, 2016:55). There seems to be a problem with learners' ability to 'read with understanding'. Based on this concern, it becomes necessary to conduct an exploration of teachers' pedagogical approaches to develop HOTS in a South African context. This study seeks to understand teachers' teaching strategies that are focused on developing HOTS in the classroom.

1.4 Overview of Research Methodology

1.4.1 Main Research Question

How do grade 3 teachers infuse pedagogies of higher order thinking skills in their teaching?

1.4.2 Research sub-questions

To answer the overarching research question, the following sub-questions have been formulated to arrange the analytical focus of the study:

1. What do teachers understand by HOTS and what professional experiences do they have in teaching HOTS?
2. How do teachers teach HOTS?

In this study, a qualitative research paradigm was employed. The study was conducted within an interpretive paradigm, given that the mind constructs its own conceptual map for interpreting and interacting with the world around it (Cohen, Manion & Morrison, &

2002:23). A qualitative approach was used, as it offered options to discover authentic thoughts and individual views of what was observed. A single case study research design was applied as it interpreted Foundation Phase teachers' experiences of implementing HOTS in their classrooms. One primary school in a low socio-economic level suburb on the Cape Flats in the Western Cape was used. The purposive sample comprised two Grade 3 teachers from the selected school.

Semi-structured interviews were used to determine the teachers' professional content knowledge (PCK) for the teaching of HOTS, as well as to understand teachers' understanding of strategies to teach HOTS. Post-observation interviews granted participants the opportunity to reflect on what strategies they used and why they chose to use them. Observation of lessons allowed the researcher to understand and see the enactment of the decisions taken by Foundation Phase teachers to adopt and use strategies to develop HOTS. Documentary review was used as a source to support and augment the information acquired from participants by means of the interviews and observations.

The teachers were interviewed in the middle of February 2020 and observations were conducted from the beginning of March 2020. These observations were done during teaching and learning activities, while post-observation interviews were conducted on the same day during the teachers' free time. Cognisance should be taken of the fact that the researcher adhered to the responsibilities that research ethics require. A thematic approach was applied for analysis of the data.

1.5 Research aims and objectives

"Learning is not in doing, it is in thinking about doing" (Dewey, 1933). It is argued that HOTS in the Foundation Phase classroom is not only attached to what learners can do, but it is also connected to what teachers do in their pursuit of offering learning experiences that create opportunities for learners to activate their higher order thinking (Piggott, 2011). The purpose of this study is to understand how teachers develop 21st century skills,

specifically HOTS in learners. It aims to explore teachers' practice to promote higher order thinking skills.

1.6 Structure of the thesis

Chapter 1: This chapter provides the background and rationale for this investigation, by emphasising the relevance of HOTS in a global economy and the prominence it has in the workplace, as well as in the handling of complexities of a person's everyday life. It describes the motivation for the study, outline of the research objective, the problem statement, research questions and methodology.

Chapter 2: This chapter provides a brief overview of the educational landscape in Africa and South Africa. The discussion revolves around the history of education during the colonial era, Apartheid era and the education reform which took place after 1994. Further, a brief explanation of the different types of schools is discussed, including the school that is part of this study. Finally, the PIRLS report (2016) is discussed.

Chapter 3: This chapter offers an overview of the literature and debates regarding theoretical ideas associated with HOTS pedagogies in relation to Foundation Phase teachers. It reviews the concept of higher order thinking within the South African context and describes the curriculum demands for learning and teaching, and how teachers can develop HOTS in learners. It further explores Shulman's professional content knowledge (PCK) (1986), Alexander's conceptualisation of pedagogy (2003) and Bloom's taxonomy (1956) as part of the conceptual framework, which is used as a lens to guide the study.

Bloom's taxonomy assisted the researcher with a definition of the concept of HOTS. The researcher is using Shulman to establish what teachers know about HOTS' content and how to teach it. In the same way, the researcher is using Alexander to assist in her observation of how the teachers teach HOTS. For example, when the researcher wrote about pedagogies, she observed how the participants used pedagogies to infuse HOTS in their teaching. When observing the interactions, she reflected on her understandings, to analyse the interactions in relation to the promotion of HOTS. Key concepts used

throughout this study, of which details will be found in the following chapter, are: HOTS, pedagogy, and pedagogical content knowledge.

Chapter 4: A detailed description of the methodology used in the study is provided in this chapter. Firstly, the research design and research paradigm are delineated. In addition, the chapter elaborates on the population and sample, data collection instruments, and how data was analysed in relation to answering the research questions. Principles of rigour for research, as well as the ethical considerations and limitations of the study are also clarified.

Chapter 5: This chapter presents and discusses the findings regarding the teachers and their teaching pedagogies used to stimulate learners' higher order thinking skills during their lessons. The interpretation of the data stems from the question and observation procedures that have been recorded, including supporting documents. It presents a cross-case analysis of both teachers across the two sub-research questions in relation to the literature reviewed in Chapter 3.

Chapter 6: This chapter concludes the study. It offers a summary of the main findings of the research questions that guides the study. It further discusses the findings, as well as providing recommendations for policy and practice, and implications for future teaching practice. Additionally, the chapter provides the contribution and significance of this study.

1.7 Conclusion

This chapter concludes the thesis by offering the rationale for taking up the study, providing an overview of the methodology, and offering an overview of the chapters that make up the thesis. The following chapter presents a discussion on the overview of the context of this study.

CHAPTER 2

CONTEXT

2.1 Introduction

The preceding chapter delineated the introduction and background to the study. This chapter builds on it by exploring the context for the study. It provides a brief discussion on the history of the educational landscape, both in Africa and South Africa. Additionally, it unpacks the understanding of the South African curriculum during the present era and how HOTS is positioned in it. Further, a brief explanation of the different types of schools found in South Africa are discussed, including the school that is part of this study. Finally, the Progress in International Reading Literacy Study (PIRLS) (2016) is elaborated upon and how its benchmarks are linked to Bloom's levels of higher order thinking skills.

The establishment of a democratic society is by and large the objective of all those countries which were subjected to long revolutionary struggles, of which South Africa portrays an outstanding example (Sayed & Ahmed, 2011). The South African government is still struggling to create a multicultural, multiracial and egalitarian society and to break out of the remnants of economic exploitation and racism committed by the minority white settler and Afrikaner regimes. Education liberties, land ownership and political rights were denied to all people of colour from the end of the 19th century onwards, of which the aftermath is still evident today, even after more than 25 years of democratic rule (Spaull, 2019).

However, post-1994 education in South Africa has achieved some transformation successes also, which are: (1) augmented access to schools; (2) the qualifications of educators have improved considerably; (3) per capita spending per learner has increased; and (4) the ratio of teachers to learners has improved (Duvenhage, 2006:135, in De Wet & Wolhuter, 2009).

2.2 Historical overview: colonial rule

2.2.1 African continent

Africa faced European imperialist colonisation, military invasions, racial inequality and racial antagonism between 1870 and 1900. Even though various forms of resistance against the oppressive regimes were attempted, most African societies were dominated by the European powers by the early twentieth century, except for Liberia and Ethiopia. Economic, social and political factors were the three main factors that attributed to the European imperialist push into Africa (Spaull, 2014). The exploitation of African labour was a general trend as the European colonisers of Africa viewed the natives as morally and intellectually inferior to them.

In the early 20th century, the institution of public education systems was established with the goal of producing young Africans who would be submissive and compliant labourers. This indicates that independent and higher order thinking were non-existent in this education system. For example, in Zimbabwe (earlier Rhodesia), the purpose of education policy in the formal British education system was to form a consortium of low-cost, uneducated physical labourers. This resulted in the establishment of two school systems which comprised one ruthlessly under-resourced structure for Africans and one structure which was adequately funded for Europeans (Mungazi, 1991).

2.2.2 South Africa

In the early twentieth century, the South African education dispensation for people of colour was underdeveloped and weak. This was achieved by means of a deliberate policy of apportioning insufficient financial and human resources (McKeever, 2017). The oppressive and discriminatory policies of white settler rule led to and maintained the establishment of unequal and separate systems of education for Africans and Whites respectively (Sayed & Kanjee, 2013). These policies resulted in a mediocre cognitive curriculum, where schools were subjected to rote learning with poorly qualified teachers

to deny people of colour access to better jobs and involvement in the country's economic and political concerns (Soudien, 2007).

2.2.2.1 Postcolonial rule: Education with the coming of Apartheid

Instrumental to understanding this period is the process of formal apartheid, which was instituted to implement racial segregation. Gaining independence from the United Kingdom in 1931, the minority white population kept control of the government, maintaining the education system as unequal and segregated. All spheres of social life were racially divided further by the National Party after they came to power in 1948**.** Different policies regarding pedagogy were applicable to schools for white learners and schools for learners of colour. Sayed and Kanjee (2013:7) succinctly state:

> The most salient feature of the education system prior to 1994 was its fragmentation and inequality. Under apartheid there were 19 racially and ethnically divided education departments. These included 11 separate education departments for the 'black' population: 6 in the self-governing territories, 4 in the 'independent' states (referred to as 'bantustans') and a central government department administering education for 'Africans' living in areas designated for 'whites'. In addition to these, there were three separate services of a tricameral parliament for 'Indians', 'coloureds' and 'whites', which were organised into four semi-independent provincial departments. Further, there was a Department of National Education, with responsibility for setting national norms and standards, controlling policy and making budgetary allocations.

2.2.2.2 South Africa post-Apartheid

The centrality of the role of 'equality' in the western socio-political, legal and moral tradition cannot be denied. While there is not much consensus regarding an indisputable definition of this universally acknowledged ideal, the significance of its normative and practical value is acknowledged. Humanity's insight into how unprejudiced collective and political life should be led is articulated in the idea of equality from a normative

perspective. Sayed, Badroodien, Hanaya and Rodriguez-Gomez (2017: 241) rightfully assert that the intimate connection between tuition (with the power to transform society) and instruction provision (that needs constant enrichment for the growth of social justice) is imperative. Equality personifies our fundamental philosophies of justice and righteousness, which principally profess the equality of all people (Burger, 2009).

From a practical viewpoint, the hallmark of Western democratic society's belief embodies a liberated and open society, which contains laws that embrace and guard this fundamental belief. Smith's (1971: 163) statement "Justice is the soul of the law, and equality is the heart of justice" may perhaps best describe the sentiments and aspirations which forms the basis of the post-apartheid South African equality of rights entrenched in the new Constitution.

But researchers draw our attention to the dilemmas of the educational landscape that still exist more than 25 years after apartheid, even though democracy and the even distribution of power to all its citizens are entrenched in the policies of South Africa. Research indicates that the white minority population is unfailingly able to achieve education of a higher, richer and better standard. McKeever (2017) illustrates how elusive it has become for South Africa to realise educational reform, even though it is devoid of the racist and discriminatory elements of the apartheid regime. This alludes to the devastating effects of apartheid still prevalent in our societies and the realisation that it may still take years to eradicate (Spaull, 2014).

With the attainment of democracy in 1994, the South African educational system experienced many curriculum changes. In their struggle to achieve a new and just society, a range of changes at policy level, aimed at democratising the education system for all South Africans, was announced in the South African Schools Act (SASA) of 1996 (Burger, 2009). Changes to the curriculum since the abolishment of apartheid were crucial.

In South Africa the change in power relations, both within and between power groups before and after apartheid, had a powerful impact on the South African curriculum. Before

the implementation of apartheid, The National Educational Policy Initiative (RSA, 1993), defined the curriculum by including the aims and objectives of the education system, the selection of content to be taught, ways of teaching and learning, as well as forms of assessment and evaluation (Sayed and Kanjee, 2013:7).

2.3 The South African Teaching and Learning landscape

Since 1994, the transformation of the education landscape in South Africa has been the top priority of the government. In 2010/2011, 20% of the budget was spent on education and 6% of the Gross Domestic Product (GDP), which describes the total market value of all services and goods produced in the country on an annual basis (Stats, South Africa 2019). More recently, the biggest portion of the education budget was spent on salaries, which amounts to 78% of the total budget. Figure 1 illustrates the percentage spent on education in comparison to other state expenditures in the 2017/18 year.

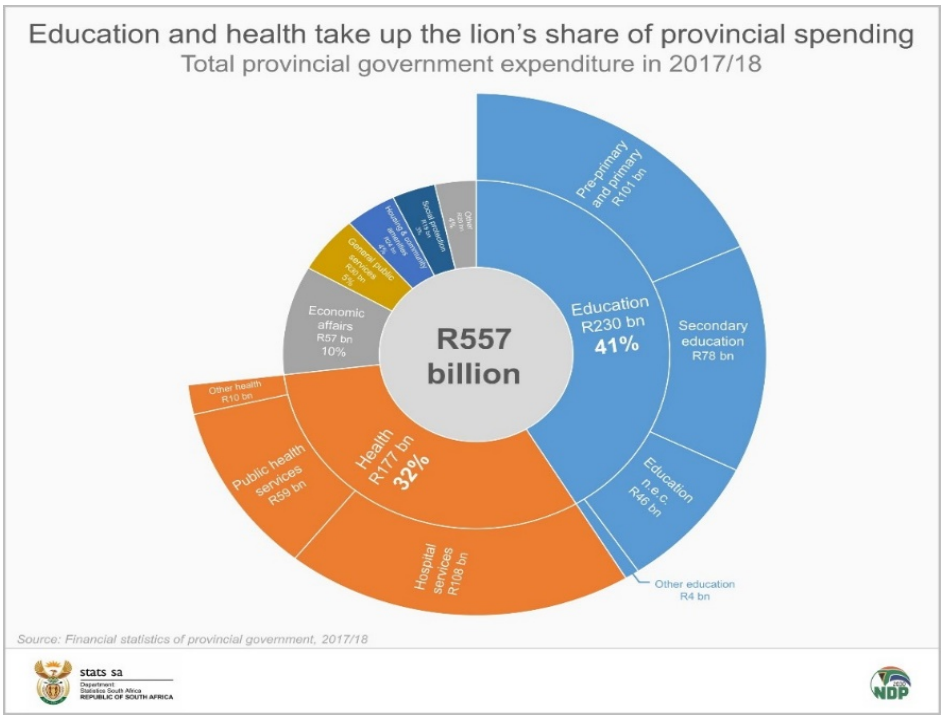

Figure 1: Total provincial government expenditure in 2017/18 *Source: Stats South Africa 2019*

Table 1 displays a few of the foremost challenges encountered by public school learners during the 2018 school year, per province. Some of the major issues reported nationally were that classes were too full (3,3%); shortages of books (2,8%); exorbitant fees (2,6%); bad facilities (2,1%) and absence of teachers. Learners in the Western Cape indicated violence against teachers as a major concern (0,7%).

Table 1: Problems experienced in public schools

Problems experienced in public school	Province (Per cent)									
	WC	EC	NC	FS	KZN	NW	GP	MP	LP	SA
Lack of books	3,2	1,8	2,1	3,0	3,7	2,3	2,9	4,1	1,4	**2,8**
Classes too large	6,7	1,2	1,2	1,8	3,1	5,6	3,6	4,3	2,2	**3,3**
Fees too high	5,5	2,2	1,2	1,9	1,7	2,4	4,5	2,4	0,5	**2,6**
Facilities bad	3,8	1,6	1,0	2,4	1,9	2,8	2,1	2,5	0,9	**2,1**
Lack of teachers	3,2	3,5	1,4	0,6	0,8	1,5	1,5	1,1	0,5	**1,6**
Teachers absenteeism	2,2	0,7	1,3	0,6	0,6	1,7	2,3	0,5	0,7	**1,2**
Poor quality of teaching	2,8	0,4	1,2	0,5	0,9	1,2	1,9	1,6	0,6	**1,2**
Teachers striking	1,9	0,1	0,5	0,3	0,5	0,9	1,2	0,5	0,4	**0,7**

Source: Stats South Africa 2019

2.3.1 Total learners in South African Public School

The figure below displays the percentage of children and youths in relation to their age in several facilities of education, and whether they are enrolled or not in any institution of learning. In South Africa, 15% of children from 5 years old are not in school, 54.2% of them are in primary school, and 30.25% of the 5 year old children are in pre-school. Figure 2 depicts the learners of 5 years old in facilities of learning.

	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Not in education	15,0	2,8	1,2	0,9	0,3	1,3	0,5	0,8	1,0	1,1	2,6	4,6	9,9	25,5	45,7	58,0	69,0	76,4	85,8	88,6
Other	0,4	0,0	0,5	0,5	0,2	1,1	0,3	0,3	0,6	1,3	0,9	1,4	0,9	1,0	0,6	0,5	1,0	0,6	0,5	0,6
TVET and other colleges	0,0	0,5	0,3	0,2	0,2	0,2	0,1	0,3	0,1	0,1	0,0	0,3	0,7	3,4	5,1	7,6	7,6	6,9	5,0	4,2
University	0,0	0,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,0	0,4	2,8	6,4	8,5	8,1	7,7	5,3	4,6
Secondary school	0,1	0,1	0,2	0,4	0,4	0,5	1,8	6,7	44,3	72,4	86,3	87,8	86,4	66,3	41,4	24,7	14,1	8,4	3,3	1,9
Primary school	54,2	86,8	96,6	97,3	98,9	97,0	97,4	91,9	54,0	25,1	10,1	6,0	1,6	0,9	0,8	0,8	0,3	0,1	0,2	0,1
Pre-school	30,2	9,7	1,3	0,8	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

Figure 2: Total learners in South African public schools *(Source: Stats South Africa 2019)*

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2.3.2 South Africa's NEET problem

The acronym NEET (not involved in employment, education or training) refers to the group of youth in the age range of 15 to 24 in South Africa who are not involved in employment, education or training. In 2017, South Africa had the highest NEET figure (37%), compared to 40 developing and developed countries. This equates to more than 6 million NEETs, of whom only 6% indicate some sort of further training after matric (Organisation for Economic Co-operation and Development [OECD], 2017). This percentage was followed by a distant second by Turkey at 27, 2%. This results in the NEETs becoming isolated socially and living below the poverty line without any skills to better their financial situation. Another difficulty in the schooling system is the high age of learners in public primary schools and high schools. Figure 3 below emphasises the NEET problem in South Africa.

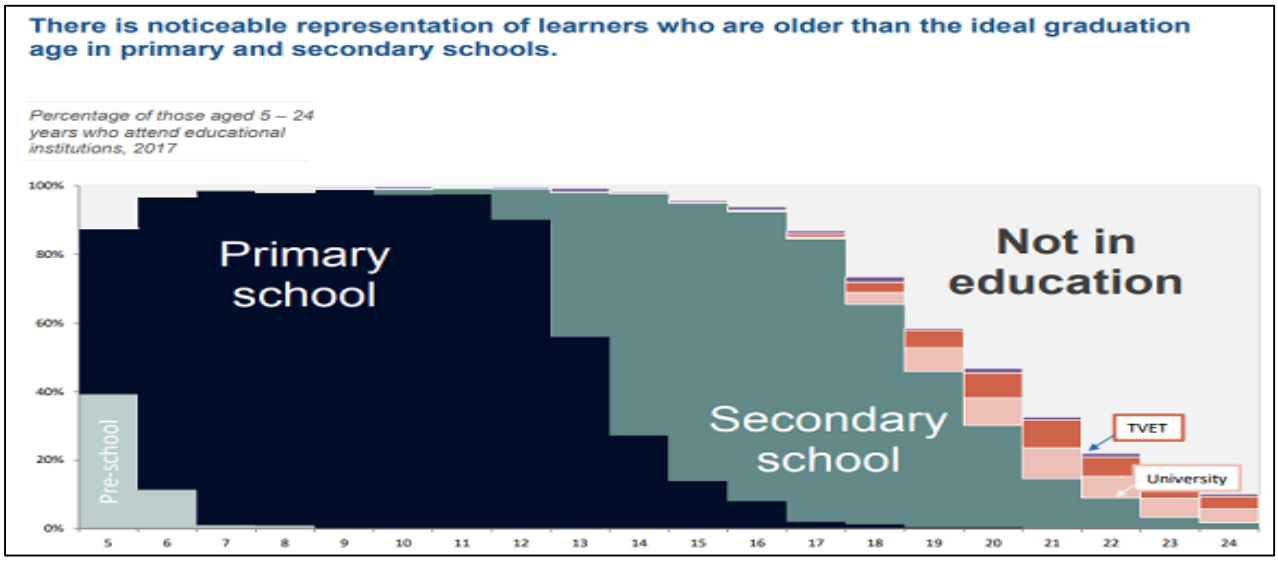

Figure 3: Percentage of learners who attended educational institutions in 2017/18

Source: Stats South Africa, 2019

South Africa does not have ample provision in the form of education facilities to allow these youth opportunities, which is aggravated by the fact that this group has no financial support to get them into technical schools and universities (OECD, 2017). Consequently this problem increases the crime rate in South Africa, as a large percentage of NEETs turn to crime, drugs or other illegal activities to sustain themselves and their families. The funnel graphic (Figure 4) below indicates South Africa's NEET problem in 2010 and 2014 respectively. 3 million youth, between the ages of 18-24, were classified a s NEET in 2014, and this escalated to more than 6 million NEETs in 2018 (Rogan, 2018).

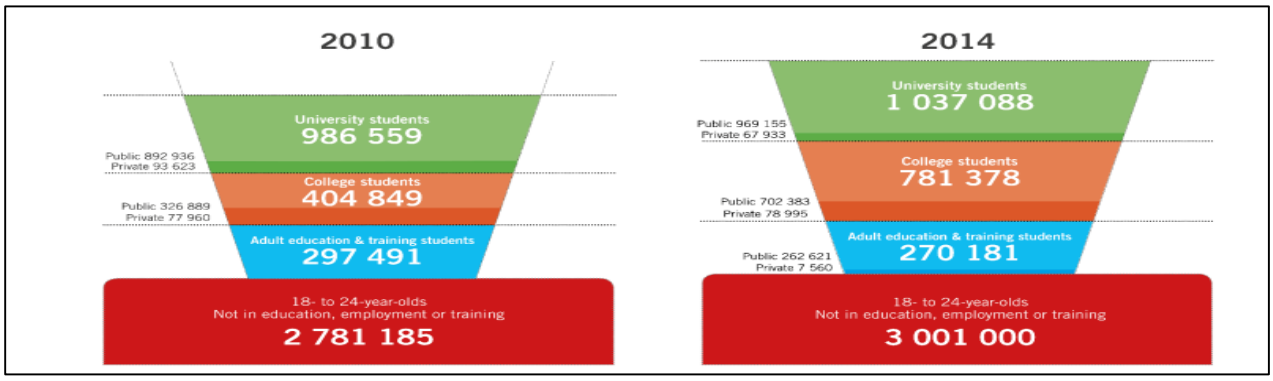

Figure 4: South Africa's NEET problem in 2010 and 2014

Source: Stats South Africa, 2019

Statistics South Africa (2019) published the results of the General Household Survey (GHS) with regard to education. Table 2 below indicates several metrics concerning education in different provinces in South Africa. Attention is drawn to the Repetition Rate (RR) of learners in Grades 10 and 11. This is worrisome, as the only external examination is in Grade 12.

Table 2: Education indicators by province

Indicators	Province									
	WC	EC	NC	FS	KZN	NW	GP	MP	LP	RSA
Age-specific Enrolment Ratio (ASER) expressed as a percentage										
Primary School	99,0	98,7	98,3	99,4	99,3	98,9	99,7	99,5	99,9	99,3
All	93,2	95,3	92,2	96,6	96,7	94,4	96,1	96,3	98,8	96,0
Repetition rate (RR) Grd 10	19,9	17,1	19,1	31,4	16,1	32,1	18,7	19,1	35,5	22,2
Repetition rate (RR) Grd 11	13,7	22,7	25,3	18,9	20,4	24,4	15,4	21,7	26,5	20,5
Repetition rate (RR) Grd 12	8,4	10,3	0,0	6,5	8,3	14,0	7,2	11,8	16,9	10,2
% of 16-18-year-olds who attend any institution	77,8	85,3	74,1	87,1	88,2	79,9	85,4	88,0	95,0	86,0
% of children with special needs aged 7–15 NOT enrolled in educational institutions	4,8	16,2	11,2	8,2	18,4	2,8	2,2	7,7	0,6	7,7
% of learners in public schools that do not pay school fees	50,6	79,4	62,4	76,5	68,1	69,8	55,9	65,1	94,7	69,7
% of learners in schools receiving social grants	51,0	73,4	67,2	68,4	70,3	66,6	46,6	63,0	67,3	62,9
Numbers of learners enrolled (16–18) in any institution N ('000)	232	298	49	123	536	137	531	225	327	2459

Source: Stats South Africa, 2019

Further South African education metrics are shown in Table 3 below.

Table 3: Education indicators by province (concluded)

Indicators	WC	EC	NC	FS	KZN	NW	GP	MP	LP	RSA
% of learners in schools who walk for more than 30 minutes to the nearest school of its kind	1,2	12,2	5,5	6,3	22,2	10,4	4,1	10,4	9,7	11,4
% of learners in public schools benefiting from free scholar transport	5,2	4,5	4,4	1,3	1,3	1,8	3,0	3,8	1,6	2,8
% of learners in public schools benefiting from the nutrition programme	55,9	90,2	86,0	80,3	80,5	80,5	54,8	87,7	92,2	77,3
% of learners attending school who reported incidents of corporal punishment	1,1	12,7	8,6	12,6	10,1	7,4	1,3	6,7	4,5	6,8
Adult literacy rates (persons 20 years and older with less than Grade 7 as highest level of education)	8,4	20,5	19,1	15,3	16,4	17,5	7,4	17,2	19,7	13,8

Source: Stats South Africa, 2019

In total some 11.4% of households reported that it took their children more than 30 minutes to walk to the nearest school. KwaZulu-Natal households indicated that 22.2% of their children have to walk for longer than 30 minutes to arrive at school, in comparison to Western Province households, which only reported that 1.2% of learners walked more than 30 minutes to school.

The above section sets the context for the schooling landscape for South African learners. It indicates that attempts to afford additional assistance for learners from indigent family units remain inadequate, and that little improvement has been shown in educational outcomes (Van Staden, 2020).

2.4 Progress in International Reading Literacy Study (PIRLS)

PIRLS measures reading comprehension and oversees developments in reading ability every five years, under the sponsorship of the International Association for the Evaluation for Educational Achievement (IEA). PIRLS sets world-wide standards for reading comprehension with more than 60 countries participating in it. South Africa took part in the 2006, 2011, 2016 cycles, and is listed for the 2021 cycles. South Africa's results rated last on the list of all 50 countries who participated in the 2016 cycle (Howie, Combrinck, Tshele, Roux, McLeod Palane & Mokoena, 2017).

Table 4: PIRLS benchmark descriptions

4 Advanced International Benchmark 625 and above score points	When reading Literary texts, learners can: • Integrate ideas and evidence across a text to appreciate overall themes • Interpret story events & character actions, provide insights that are text based. When reading Information texts, learners can: • Distinguish and interpret complex information from different parts of text • Integrate information across a text to provide explanations, interpret significance and sequence activities
3	When reading Literary texts, learners can: • Identify significant events & actions • Make inferences & explain relationships, give text based support • Identify significance of events, recognise

High International Benchmark 550 - 625 score point	language features (tone). When reading Information texts, learners can: • Locate relevant information within complex text or table • Make inferences & logical connections to provide explanations • Evaluate content & make generalisations
2 Intermediate International Benchmark 475 - 549 score points	When reading Literary texts, learners can: • Retrieve & reproduce explicit information • Make straightforward inferences about character feelings, motivations • Interpret obvious reasons and causes, give basic explanations When reading Information texts, learners can: • Locate & reproduce 2-3 pieces of information from text • Use sub-headings, figures & text boxes to locate information • Retrieve & reproduce explicit information
1 Low International Benchmark 400 - 474 score points	When reading Literary texts, learners can: • Locate and retrieve explicitly stated information. When reading Information texts, learners can: • Locate & retrieve 2-3 pieces of information in text • Find information in text boxes, headings and figures

Source: PIRLS (2016)

Attainment score points between 400 and 474 (Low International Benchmark), places the learner at the elementary level of comprehension. This means that the learner has the ability to retrieve obvious information from reading the text. Learners who are unable to achieve this benchmark cannot read for meaning or answer simple questions from the text. This is related to the lower level of Bloom's taxonomy Level 1: Recalling of facts and basic concepts.

The Intermediate Benchmark (475-549 score points) indicates that learners start to recognize and understand apparent reasons for things that are happening in the text. This benchmark is associated with Bloom's Level 2 (on the lower level), which relates to the explanation of ideas, locating, identifying, reporting, etc.

At the High International Benchmark score points (550 and 625), learners start to make complicated connections between events in the script. The identification of key features in the text, and the presentation of conclusive evidence from the text place learners on this benchmark. Bloom's levels 3 and 4, which reflect the ability of learners to use information in new situations and to draw connections among ideas (compare, experiment, demonstrate etc.). In other words, the higher levels of Bloom's taxonomy is representative of this benchmark.

The interpretation of the author's stance, integration of ideas, interpretation of main events and their ability to integrate evidence through a text places learners at the Advanced International Benchmark (625 and beyond score points). This benchmark places learners on the highest levels (5 and 6) of Bloom's taxonomy, which is to justify a stand or decision, as well as to produce new or original work (analyse, evaluate and create), thus indicating the application of their higher order thinking skills.

An example (Figure 5) of mean scores attained by each province, indicates the Western Cape Province attained the highest mean score amongst the other provinces in PIRLS 2016.

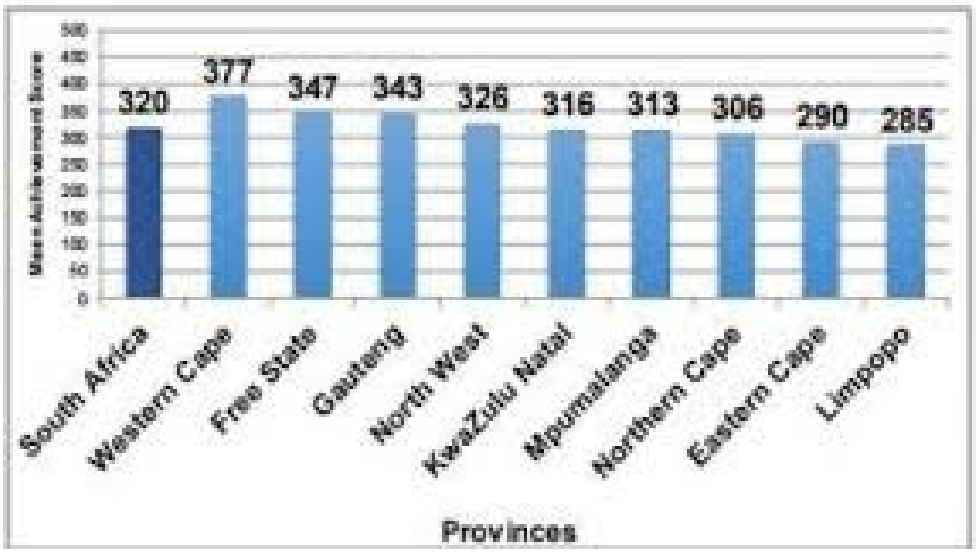

Figure 5: Mean scores attained by each province in 2016 (PIRLS) *Source: PIRLS SA 2016*

2.5 Quintile ranking

South African Grade 4 learners attained the lowest overall in the 2016 PIRLS cycle (out of 50 schools) with a mean score of 320, of which the international average is 500. Achievement of reading is indicated by the quintile system in the study. The quintile system was introduced to ensure equitable distribution of funds, to alleviate the disparities of the past. Quintile 1 to 3 are non-paying fee schools and quintile 4 to 5 are the more affluent schools which pay school fees. The scores indicate a huge gap between grade 4 learners from quintile 1 schools and their more affluent counterparts (PIRLS, 2016), signifying the educational disadvantage of the learners of the poorer schools in South Africa, in comparison with schools serving middle class communities.

In the post-Apartheid South African education milieu, the government is required by the South African Schools Act 84 of 1996, to fund all public schools. This is achieved through a quintile ranking system to generate equality in schools, by the distribution of funding through the classification of schools into wealth quintiles, where schools serving the middle class communities receive less funding than those in the poorer communities (Mestry, 2014). Quintile 1 to 3 schools are no school fee schools, while quintile 4 and 5 schools pay school fees, as indicated above. Figure 6 is representative of the allocation of schools in relation to quintiles.

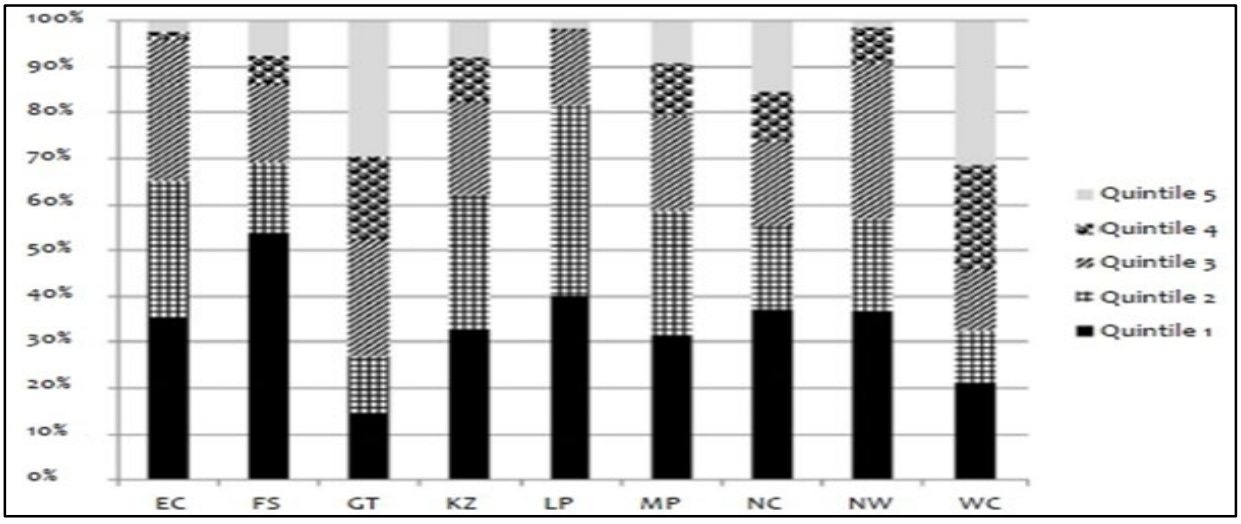

Figure 6: Allocation of schools in relation to quintiles *Source: van Wyk, 2015*

2.6 Curriculum

Although the concept ‘curriculum’ is broad and includes many different definitions and aspects, many of the definitions of curriculum are logically satisfactory and no definition on its own will suffice. The intent of curriculum should be to promote equality and diversity, which the South African curriculum embraces in principle. The post-apartheid curriculum changes are discussed further below.

2.6.1 Outcomes Based Education (OBE)

Curriculum 2005 (C2005), in the form of Outcomes Based Education (OBE) was introduced by the Department of Education (DBE) in 1997. Mouton, Louw and Strydom (2012: 1214) state, “C2005 was launched in March 1997, with implementation in Grade 1 scheduled for 1998 and Grade 7 in 1999 and C2005 was thus intended to be phased in progressively, so that it would cover all sectors of schooling by 2005”. C2005 comprised two bands, General Education and Training (GET), which included Grade 1 to Grade 9 learners, and Further Education and Training (FET), comprising learners in Grades 10-12. Schooling in the GET phase was compulsory for all learners.

The rationale behind this radical change in the curriculum was to move away from the apartheid curriculum and address the commendable outcomes of skills, knowledge and values for social justice, equality and development. Mouton et. al. (2012:1214) further elaborate: “C2005 rejected each of the principles of the traditional curriculum. It aimed to open up the curriculum to all children and integrate it with their experience”. The transformation was envisioned in the OBE approach, which underpinned the philosophy of curriculum 2005. The motivation for the change in curriculum by government, was for the fortification of the many black disadvantaged teachers and learners. Furthermore, the other changes were to put “a focus on learner outcomes rather than teacher inputs” (Gultig, 2003:171).

Even though the government of SA has made a commitment to HOTS in the curriculum, it is only implied in the CAPS policy document. This stands in contrast to the education

system in Malaysia, which according to Chun and Abdullah (2019), amended their Education Act 1996, with the intent of achieving their objectives to meet 21st century demands. The Malaysian Ministry of Education (MoE) started reducing the emphasis on school and nationwide assessment (summative assessment). The MoE replaced the school exam for their lower grades (South Africa's FP) with Classroom-Based Assessment. The removal of these exams in the early grades indicates that the MoE has taken a meaningful step in the promotion of HOTS (Chun & Abdullah, 2019).

The heart of Jansen's (1998) critique of outcomes-based education (OBE), which underpins a learner-centred and an activity-based approach to teaching, is that it is set for failure from the very start. He argues that the absence of important transition phases, needed to transit from an apartheid education system to a democratic system, were not in place. The most significant of the dilemmas encountered by the government in trying to implement OBE were the need to retrain teachers, the culture of weak teaching and learning, poor resource allocation and classroom infrastructure. Even though the new OBE attempted to redress some of the past inequalities, it was not successful in lowering the teacher learner ratio in schools with historically disadvantaged pupils (Alexander, 2002; Soudien, 2012). Consequently, C2005 was changed "due to shortcomings and was strengthened with [the] RNCS four years later" (Moodley, 2013:23).

2.6.2 The Revised National Curriculum Statement (RNCS)

According to the Western Cape Education Department (WCED) (2010), the RNCS was officially endorsed on 15 April 2002 and was effected in Grade R in 2004. The RNCS provides guidelines on what should be taught from Grades R to 9, with explicit outcomes identified and also the assessment standards to assess the achievement of the specific outcomes (WCED, 2010). In conjunction to the RNCS, the National Curriculum Statement (NCS), developed in 2002, and introduced in Grades 10 to 12 (DOE, 2009:14).

In addition, the National Curriculum Statement Grades 10-12 (General) was based on the following principles: social transformation; OBE; high knowledge and high skills;

integration and applied competence; progression; articulation and portability; human rights, inclusivity; environmental and social justice; valuing indigenous knowledge systems; and credibility, quality and efficiency (Hofmeyer, 2010).

The RNCS Grades R-9 and NCS Grades 10-12 were combined to form one NCS Grade R-12. The aims of the RNCS is to restore the injustices of the past and to create a better society. It is a huge improvement on OBE, as it produced a curriculum that was relevant and challenging, which focussed on the development of learners' higher order thinking skills needed for national development in the global economy (Hofmeyer, 2010).

The contention with the NCS is that "while there has been positive support for the new curriculum, there has also been considerable criticism of various aspects of its implementation, manifesting in teacher overload, confusion and stress and widespread learner underperformance in international and local assessments" (DOE, 2009). Due to this, another change to the South African curriculum was adopted.

2.6.3 Curriculum Assessment Policy Statement (CAPS)

Pinnock (2011) states that CAPS should not be regarded as a new curriculum, but rather as an adjustment to the NCS curriculum. In other words, it still follows the same process and procedure as the NCS Grades R-12 (2002). Du Plessis (2013:1) asserts this view: "CAPS is an adjustment to what we teach (curriculum)". He states further that the Foundation Phase (Grades R-3) and Grade 10 Further Education Training (FET) was introduced in January 2012. (Grades 4-6) Intermediate Phase (IP) and (Grade 11) FET in January of 2013, and finally in January 2014, the Senior Phase (Grades 7-9) and (Grade 12) FET. Both Du Plessis (2013) and Pinnock (2011) are in agreement that CAPS is a better way to modify the curriculum.

Warnich and Meyer (2013) state that the RNCS was replaced in 2012 with an "improved and more user-friendly curriculum", as the CAPS curriculum has clear guidelines for the teacher with regard to teaching the content. It also makes it easier for both teachers and

learners to better understand the work that needs to be covered. CAPS encourages an active and critical approach to learning, with the intent to empower learners. The teacher thus has the responsibility to guide learners to actively participate in their own learning, and to develop their higher order thinking skills, both co-operatively as members in a group, as well as individually.

2.6.4 Disadvantages of the curricula changes

Firstly, C2005, “had many implementation problems which included the following: a complex curriculum policy; inadequate co-ordination and management; insufficient capacity in terms of finance and staff; inadequate teacher development; and limited curriculum development for teachers” (Mouton et al., 2012).

Secondly, the implementation of the RNCS and NCS was intended to eliminate the above problems, but came with its own set of concerns. These concerns are explicated by Du Plessis (2013:2): “teachers were overburdened with administration, different interpretations of the curriculum requirements and underperformance of learners”.

2.7 School categorisation in South Africa

According to Statistics South Africa (2016), schools are categorised in the following groups:

No fee state schools: Parents generally do not pay any school fees at these schools, which are fully funded by the state. The benefit of this type of school is that it allows schooling access to every child in South Africa. A disadvantage of these schools is that classes are large and the general standard of teaching is poor.

Ex-Model C schools: These schools are recipients of large state subsidies, but parents still have to pay school fees. An advantage of this type of school is that it is diverse and multicultural and many of these schools deliver excellent quality education for a reasonable fee. They also attract most of the best teachers in their specific field, as parent

funding employ additional teachers, which allows for smaller classes. Some of these schools also struggle financially.

State schools on private property. Similar to ex-Model C schools, a number of independent schools became state schools, but they remained on their own property at the end of apartheid. They offer effective quality tuition at a very low cost.

Schools owned by a trust or non-profit organisation fall under the Independent Schools ambit. Their fees range from low and basic to astronomical. In South Africa there are many such schools with different faith denominations, including Christian, Jewish and Islamic.

2.8 The specific school that is part of this study

The primary school, which is situated on the Cape Flats in the Western Cape Province in South Africa, has served the educational needs of the Muslim community for the past 25 years. It is a subsidiary educational institution of a large Muslim Association in South Africa. The school was established in November 1994, with the signing of an agreement between the particular Muslim Association and a prominent university in Cairo, Egypt, and endorsed by the Provincial Government of the Western Cape.

The uniqueness of the school lies in that the school provides normal secular education, as mandated by the curriculum of the Department of Basic Education (DBE), as well as Islamic education, according to the curriculum of the schools in Egypt. The school boasts a huge complement of teachers, both from South Africa and Egypt. The staff comprises 8 Egyptian shuyoogh (teachers), and 7 South African Islamic Studies teachers, delivering the Islamic syllabus.

The academic component is staffed by 24 academic teachers. The bulk of the teachers has been with the school for 20 years or more and all generally hold 3 year tertiary qualifications. About 10% of the staff are young teachers who are still studying towards their degrees to become qualified. The Egyptian staff are graduates from one of the oldest

universities in the world, and teach the learners Quran (Islamic Holy Scriptures in Arabic, as well as the Arabic language), to promote understanding of the Arabic texts in the Quran.

The school has 570 learners, which include 276 males and 294 females. The number of learners in the FP (Grades R – 3) is 327, in the IP (Grades 4 – 6) 155 and the SP (Grade 7) 45. The school falls under quintile 4 according to the WCED, as it is a fee paying school.

Even though it is considered a private school, the school relies heavily on the government subsidy, as it caters for learners whose parents earn low wages or salaries. The school fees per learner are less than R500 per month.

In past years, the first graduates received noteworthy results, both to enable them to attend local universities, or to pursue a degree course at the university in Egypt. Since then, more than 20 students have enrolled for further studies at the university in Cairo, with a possible 5 students enrolling in the current year. The National Senior Certificate (NSC) results for the same period have been excellent, with some of the learners featuring among the top ten in the Western Cape Province.

2.9 Conclusion

This chapter outlined the rationale of the study pointing to its context, and the South African education milieu pre- and post-Apartheid rule. PIRLS benchmarks are discussed in relation to the levels of Bloom's taxonomy. It showed that HOTS as an outcome has endured and remained fundamental in the curriculum, despite the curriculum changes that led to the development of CAPS. In general, it shows that all subjects in the CAPS curriculum demonstrate elements of HOTS. Further, the different approaches to curriculum, as well as the changes to the curriculum in South Africa are elaborated on. The next chapter looks at the literature surrounding higher order thinking skills.

CHAPTER 3

LITERATURE REVIEW

3.1 Introduction

Drawing in the literature since 1910, the purpose of the literature review is in order to answer the main research question, 'How do grade 3 teachers infuse pedagogies of higher order thinking skills into their teaching?' This literature review is divided into three main sections.

The first section covers the concerns pertaining to a conceptual understanding of higher order thinking skills (HOTS), in order to get a clear understanding of the term, and of how it is intended in this study.

The second part of the chapter discusses the key concepts that influence the researcher's understanding of teaching in schools, specifically Shulman's Professional Content Knowledge (PCK), Alexander's conceptualisation of pedagogy and Bloom's taxonomy, to ascertain how teachers in this study teach and assess higher order thinking skills in the classroom. This is to attend to the second sub-research question: How do teachers teach HOTS?

Thirdly, it provides reviews of literature (first in the international context and then in the South African context) associated to the teaching of HOTS, to get an idea of what the literature reveals about what teachers should do to promote the teaching of HOTS. This is linked to answer the first sub-research question: What do teachers understand by HOTS and what professional experiences do they have in teaching HOTS?

This chapter concludes with the synthesis of a conceptual framework, which ties all the literature reviewed together. The conceptual framework embodies all types of knowledge reviewed and encompasses the framework that defines HOTS, Shulman's PCK, Alexander's framework of pedagogy, and Bloom's Taxonomy.

Upon researching HOTS, the researcher found a great deal of literature in the international arena, but mostly in the Senior Phase (SP) and Further Education Training (FET) bands (Higgins et al., 2004). Venville et al. (2002) indicates that even though the literature attends to the promotion of HOTS, not much consideration is given how to successfully achieve this outcome in the classroom.

A paucity of research on HOTS in South Africa, particularly in the Foundation Phase, has also been encountered. Some educators are of the opinion that young learners are not ready to use these skills, as they must first learn to read and write in the Foundation Phase. This goes against the thinking of the researcher, who argues for the importance of teaching HOTS to younger learners. The researcher assumes the sooner that learners are exposed to the teaching of higher order thinking skills, the better they become at solving problems.

An important view expounded by Perkins and Unger (1999:97) is that the mental processes used for thinking are not limited to advanced stages of thinking and reasoning. They argue that:

> Understanding a topic is being able to think and act creatively and competently with what one knows about the topic. …The ability to perform in a flexible, thought-demanding way is a constant requirement.

This implies that thinking skills are applied in all school subjects, including the foundational reading, writing and mathematics. For learners to understand something, they need to engage in thinking that makes sense to them, through inferencing and problem solving. This implies that the view that HOTS can only be taught to learners in higher grades, and those who can read and write, can no longer guide didactic applications. Instead, all learners, at all stages, have the ability to and can apply HOTS if they are guided and exposed to the teachings of HOTS (Bransford, Brown & Cocking, 2000; Resnick & Resnick, 1992; Perkins, 1992).

3.2 Meanings of HOTS

Critical thinking, creative thinking, good thinking, metacognitive thinking, productive thinking, logical thinking and higher order thinking are terms prevalent in the literature, and these terms are often regarded as synonymous (Moon, 2007). For the purpose of this study, the terms higher order thinking and critical thinking are used interchangeably, as is the case in many other studies in the field of higher order thinking and critical thinking (Schraw & Robinson, 2011; Zohar, 2013).

The literature reveals many definitions of higher order thinking with no universal agreement that defines HOTS. Evidence indicates that it has roots in two academic disciplines, which are philosophy and psychology (Lewis & Smith, 1993), and a third strand, according to Sternberg (1986), within the education field.

3.2.1 Conceptual understanding of HOTS

The definitions of higher order thinking is a complex concept which has been proposed by many experts in the field, and its intricacy should not be misjudged. The varied definitions of higher order thinking enable comprehension and provide insights into what higher order thinking actually entails. To locate the definition of higher order thinking in this study, several definitions of higher order thinking and some perspectives on its conceptualization found in the literature will be explored.

Three kinds of thoughts exist. The first kind of thought mentioned is conscious thought, which is “everything that goes through our head”. The second, contrary to conscious thought, is imaginary thought, which comprises a “note of invention” instead of thought based on observation. Imaginary thoughts “do not aim at knowledge, at belief about facts or in truths”. The third kind of thought is reflective thought, which is evident when “the ground or basis for a belief is deliberately sought and its adequacy to support the belief examined” (Dewey, 1910:2-3).

Dewey (1910:4) regarded reflective thought as the only type of thinking that has value to education and is identified as: “Active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends”. Thinking must be stimulated by problems or questions or any perplexity, or doubt, as it does not happen spontaneously (Dewey, 1933). As a result it is important to teach learners “metacognition”, which means to think about their own thought processes (Kauchak & Eggen, 1998).

Walsh and Paul (1988:13) add that critical thinking is an aptitude that can be enhanced in everybody and further reason that it does not refer to intelligence. Ennis (1984:6) compartmentalises critical thinking into a variety of features. These features include deduction, induction, definition, observation, value judgement, recognition of assumptions and determining believability.

According to Lipman (1998:28-34) ordinary thinking is not as complex as critical thinking, as it involves *inter alia*, the ability to argue a point, which does not rely on guessing; reach conclusions that are logical and based on criteria; present opinions that are supported by evidence; and nuanced judgement and hypotheses without assumptions. Furthermore Brookfield (1987:5) argues that critical thinking is not an outcome, but rather a continuous process that should be rehearsed and developed continuously. The context in which critical thinking takes place is attributed to the development of a mindfulness to the “diversity of values, behaviours, social structures, and artistic forms in the world” and to also grasp that others “have the same sense of certainty we do – but about ideas, values, and actions that are completely contrary to our own”.

The complexity of HOTS is brought to light by the multiplicity of definitions encountered in the review of the literature, as there is no uniform and concise definition found. There are several contributors to the field of HOTS, of which attention will be paid below to a few of the best known consensus reports.

The Delphi Report is a national study which was commissioned in 1988 by the American Philosophical Association (APA) to form agreement among a panel of 46 experts on the function of critical thinking, instruction, theory and assessment. Critical thinking is elaborated upon in this report (APA, 1990:3) as:

> purposeful, self-regulatory judgement which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgement is based.

The report (APA, 1990:6) included the following agreed upon cognitive skills (not in hierarchal skill) for critical thinking: interpretation (categorization; decoding significance; clarifying meaning); analysis (examining ideas, identifying arguments, clarifying meaning); evaluation (assessing claims; assessing arguments); inference (querying evidence; conjecturing alternatives; drawing conclusions); explanation (stating results; justifying procedures; presenting arguments) and self-regulation (self-examination; self-correction).

The aim of higher order thinking skills is to reflect on or examine logic when individuals experience uncertainties, unfamiliar problems or dilemmas. The development and nurture of these skills empowers a person to perform better during explanations and decision making, as HOTS embody critical, reflective, logical, metacognitive and creative thinking (Ennis, 1985). Through reflection and rational reasoning, sound decision-making is achieved, according to Ennis (1991:6), when he describes critical thinking as “reflective and reasonable thinking that is focused on what to believe or do”.

Case and Wright (1997:3) concentrate on when critical thinking occurs, and consequently assert and build on Ennis’s (1991) definition by defining critical thinking as “thinking through any ‘problematic’ situation where the thinker needs to make a judgement about what it would be sensible or reasonable to believe or do”. Critical thinking is described by

Paul and Elder (2007:2) as “the art of analyzing and evaluating thinking with a view to improving it”. Bailin, Case, Coombs & Daniels (1999:273) make clear that:

> Critical thinking is done with the purpose of making up one’s mind about what to believe or do. It must be described in terms of adequately accomplishing certain intellectual tasks. This kind of thinking allows the fulfillment of standards of adequacy and accuracy in one’s thinking. Thinking catalogued as critical thinking must be done with a purpose whether it is to answer questions, make a decision, solve a problem, resolve an issue, devise a plan or carry out a project.

3.2.2 Constituents of HOTS

Evidence indicates in most of the definitions of higher order thinking that it has two components: firstly, a collection of conviction and information making processing skills, and secondly, the disposition, which refers to habits of mind, to guide and influence behaviour. Dispositions are indicated by the Delphi project as part of the core components of critical thinking. As Facione (1990:3) points out:

> The ideal critical thinker is habitually inquisitive, well-informed, trustful of reason, open-minded, flexible, fair-minded in evaluation, honest in facing personal biases, prudent in making judgements, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry, and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit.

There is general agreement among most scholars in the field that there is more to critical thinking than the use of the right cognitive skill in the right context. The observation that an individual with critical thinking skills might tend not to use it can be a consequence of the person lacking a critical thinking disposition. Consequently, it can be concluded that there is a need for environments to be created to teach critical thinking cognitive skills

and to nurture willingness, desire and disposition of critical thinking in learners (Facione, 1990).

3.2.3 Brief comparison of different approaches to HOTS

The philosophical point of view focuses on the ideal thinker, where critical thinking is mainly considered as the norm of good thinking (Facione, 1990). On the other hand, psychologists theorise critical thinking as higher-order thinking skills and their focus is mainly on the appropriate instruction and learning procedures**.** It also focusses on people's actions and behaviours as resultant of their critical thinking (Lai, 2011). For this reason, one can conclude that this difference underscores the distinction between attitude and skills. The distinction between attitude and skills is emphasized through this differentiation. Skills signifies analysis, reasoning, formulating hypothesis, inference, reaching a new conclusion, etc. However, attitude represents curiosity, searching for truth, cognitive maturity, self-confidence and integration.

Sternberg (1986:3), in agreement with the cognitive, psychological approach, affirms critical thinking as "the mental processes, strategies and representations people use to solve problems, make decisions and learn new concepts". The cognitive psychological approach is criticized by philosophers for reducing a complex organisation of knowledge and skills into a collection of discrete steps (Sternberg, 1986). Facione (1990) expresses caution that the component skills should not be confused with critical thinking itself. Even though one could be involved in all the steps of critical thinking, there is the possibility that one might not be thinking critically (Bailin, 2002).

For the processing of information, the three highest levels of Bloom's taxonomy (analysis, synthesis and evaluation) are often considered as the demonstration of critical thinking in the educational approach (Kennedy, Fisher & Ennis, 1991). Sternberg (1986) contends the taxonomical concepts are not sufficient to afford effective instruction and assessment, even though the educational approach is grounded on classroom observations of student learning.

Lai (2011:9) highlights the conformity that exists in the views of researchers in all three schools of thought as firstly, the analysis of arguments, claims and thought (Ennis, 1985; Facione, 1990; Paul, 1992). Secondly, the use of inductive and deductive reasoning to make inferences (Ennis, 1985; Facione, 1990; Paul, 1992). Thirdly, evaluation and judgement (Case, 2005; Ennis, 1985; Facione, 1990; Lipman, 1988). Lastly, problem-solving and decision-making (Ennis, 1985; Halpern, 1998; Willingham, 2007).

Agreement on the following dispositions, cited by researchers of all three schools of thought, is also highlighted: open-mindedness (Bailin et.al., 1999; Ennis, 1985; Facione, 1990; Halpern, 1998); the inclination towards understanding and to seek reason (Bailin et.al., 1999, Ennis, 1985; Paul, 1992); desire for knowledge (Bailin et.al., 1999, Facione, 1990); aspirations to be knowledgeable (Ennis, 1985; Facione, 1990); flexibility (Facione, 1990; Halpern, 1998) and acknowledgement of other people's perspective and view (Bailin et. al., 1999; Facione, 1990)

As noted in the literature above, conceptions of critical thinking abound, and there is no general consensus on one definition. On close inspection, however, there is much cohesion of these definitions, which revolve around certain ideas. For the purpose of this study, the researcher embraces the explication of higher order thinking skills according to the APA Delphi report (1990:3). This is elaborated as "purposeful, self-regulatory judgement which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgement is based".

3.3 HOTS in relation to other concepts

Philosophers and educators propose a link between critical thinking and critical reading, creative thinking, motivation and metacognition. These connections will be elaborated upon individually below.

3.3.1 HOTS and critical reading.

Research clearly indicates that reading is an active, intricate process of constructing meaning, and not merely skill application. The contrast of these strands of research has granted a wealth of information about what proficient readers do as they create meaning and about the kind of instruction needed to promote or enhance higher order thinking. Through metacognition and “think-aloud” activities, researchers have discovered that ‘good reading’ is made up of a set of highly complex, advanced and well-accomplished skills and abilities. Keene & Zimmerman (2007:27) note that many learners read words well, but have little sense of the meaning of what they read; especially meaning that goes beyond the literal.

In view of the above, it is asserted by Paul and Elder (2003a) that a natural relationship can be found between critical thinking and reading, and that it presents the possibility for the promotion of higher order thinking. Spache (1963:82-83) is of the opinion that critical reading incorporates “distinguishing between fact and opinion, recognising the author’s purpose or point of view” and it encompasses an “active integration of the author’s facts and the reader’s insights into new understanding and interpretation of the material”. The critical reader bases his conclusions on evidence, as he “checks the authenticity of the material, evaluates the author’s credentials, look for errors in reasoning and develops sensitivity to the rightness or wrongness of what is presented” (Dechant, 1973:269-270). When learners collaborate through discussions, it fosters learning and promotes thinking.

Logical reasoning skills are developed when learners elaborate on their point of views and when they work together to solve problems, thus nurturing them to become critical thinkers and learners. Collins (1993:4) holds that critical readers “question, confirm and judge what they read throughout the reading process”. Taglieber (2000) affirms that critical thinking and critical reading are defined in ways that show great similarity. Flynn (1989) draws our attention to the fact that critical thinking skills listed in textbooks (for the

teaching of critical thinking) and those listed in reading texts as critical reading skills, are similar.

As Flynn (1989:142) maintains, an indispensable part of reading is reasoning, and that critical reading involves:

> …an interactive process, using several levels of thought simultaneously as for example, analysis – the clarification of information by examining the component parts; synthesis – the combining of relevant parts into a coherent whole; and evaluation – which involves establishing standards and then judging ideas against the standards to verify their reasonableness. It thus becomes obvious that these levels of thought, analysis, synthesis and evaluation are tantamount to higher order thinking.

3.3.2 HOTS and metacognition

The simplest way to describe metacognition is “thinking about thinking”. Metacognition embodies metacognitive knowledge and metacognitive regulation. Metacognitive knowledge is divided into three groupings: knowledge of person, task and strategy variables. To ensure that a cognitive goal has been reached, which includes the usage of sequential processes (metacognitive approaches) according to Flavell (1979). Halpern (1988:454) further portrays metacognition as “what we know about what we know and the ability to use this knowledge to direct and improve the thinking and learning process”. Views concerning the relationship between critical thinking and metacognition are extensive.

Critical thinking functions on declarative knowledge (metacognitive understanding), procedural knowledge (metastrategic understanding) and incorporates how knowledge is produced (epistemological knowledge), according to Kuhn (1999). Self-regulation as a component skill of critical thinking is listed in the APA Delphi report (Facione, 1990), and this indicates that they observe self-regulation as the relationship between critical thinking and metacognition. The importance of metacognition in higher order thinking cannot be denied. Learners should be provided with opportunities to develop metacognitive skills,

in order to activate their higher order thinking skills. Therefore the explicit teaching of metacognition to learners is encouraged, through the reflection and evaluation of their activities (Halpern, 2003).

3.3.3 HOTS and motivation

It is argued by Halonen (1995) that learners who have the predisposition to think critically, often need motivation to do so. To demystify critical thinking, she proposes a framework in which the features to motivate critical thinking are attitude, emotion and physiological preparedness. Halonen (1995:77) explains that critical thinking is activated by uncertainty and surprise when a person "engages in critical thinking to reduce the feeling of being off balance or confused", and further expounds that well-managed emotions encourage critical thinking.

Teachers should endeavour to correlate learners' own experiences to the lessons taught, as personal relevance and attitude also motivate learners to think critically. Nieman and Monyai (2010) argue similarly that when teachers deem the task given as important, learners are also motivated to use their higher order thinking skills.

The influence of physiological factors on critical thinking can be either positive or negative. Fatigue, hunger and anxiety have a negative impact on critical thinking. In contrast to this, factors which prompt critical thinking include the teacher's enthusiasm in delivering the course material, as well the learners' interest in the topic under discussion (Lawrence, Serdikoff, Zin & Baker, 2008).

3.3.4 HOTS and creative thinking

Paul and Elder (2004:21) propose that "creativity requires the expansive empowerment of sound critical thought" and "critical thought requires the will to create and improve". The characteristics of critical thinking is to identify strengths and weaknesses, which requires the thinker to be skilled in evaluative thinking. Consequently, to reorganise thinking in improved form, when the need arises, the thinker has to be skilled in creative thinking.

Analytical, evaluative and creative thought all embrace creative thinking. Therefore it can be derived that the integration of all three characteristics is imperative for instruction to be successful. (Paul & Elder, 2004).

3.4 Contestations around HOTS

It is argued that an educational system that does not infuse HOTS produces learners who cannot think for themselves and consequently fosters learners who are dependent on others to guide them in their decision-making. The main focus of critical thinking is to produce citizens who are able to deal with any problems encountered, and solve them in an unbiased and responsible manner (Snyder & Snyder, 2008). Therefore, the desirable goal of teachers should be to inculcate critical thinking skills in learners to help them deal with the essential competencies for life in the 21st century.

In spite of this, Walsh and Paul (1986:1) contend that "although most school systems espouse the goals of reasoning, inquiry and critical thinking, few systems accomplish these goals". Research also support the need for professional development of in-service teachers to develop their ability to infuse higher order thinking skills in their teaching. (Torff 2005; Braaten & Windschitl 2011).

3.4.1 Teaching young children HOTS

A debate that often arises in the literature is whether higher order thinking skills can be taught and learnt by young learners. As the current study involves Foundation Phase teachers, this contention has direct bearing on it. With his stages of developmental theory, Piaget (1969) suggests that young learners cannot engage in critical thinking as they are not proficient in formal operations. However, Lipman (1980) counters that for internalisation to be effective, the teaching of critical thinking should be encouraged early in the elementary school. An overall maturation process is not a prerequisite for children to engage in higher order thinking (Heyman, 2008). The view asserted by Lipman (1988), Ennis (1989) and Sternberg (1990) is that critical thinking skills should be nurtured in learners from a young age, as it is not an innate entity. Individuals are not born with the

power to indulge in critical thinking, but it is a skill that should be taught. (Schafersman, 1991).

In their study, Lutz and Keil (2002) discovered that young children at the age of four are aware of the fact that people have expertise in different domains. Children understood that certain people's expertise rendered them more credible on issues related to their field of expertise. For example, they considered that a doctor's evaluation of car problems is less credible than a mechanic's (Lutz & Keil, 2002). Critical thinking has also been observed in children as young as three years of age.

Children's social experiences have a significant impact on their ability to reason. Heyman (2008:346) argues that there is "evidence of a link between critical thinking and children's social experiences". The APA Delphi Report (Facione, 1990:27) proposed that "from early childhood, people should be taught, for example, to reason, to seek relevant facts, to consider options, and to understand the views of others". These studies prove significant to this study, as it shows that learners, even before schooling age, can be guided to think creatively and critically. Likewise, it collaborates with the view of the researcher, which is that HOTS can and should be taught to younger learners.

The following proposals for the instruction of HOTS in schools are advocated by Bailin et. al. (1999), as cited in Lai (2011:24): the value of reason and truth should be understood; cultivate respect for others during discussions; be open minded; take cognisance of other's viewpoint; distinguish the difference between definitions and observed statements; apply cognitive strategies, such as asking for examples when something is unclear; and use principles of decision-making.

3.4.2 Transfer of learning

The debate pertaining to whether higher order thinking skills can be transferred from one context to another is highlighted in the literature. De Bono (1992:6) is of the opinion that when authentic learning activities are practised in a school setting, the transference of

higher order thinking skills is possible to deal with problems experienced in daily life also. McPeck (1990a) contends that when learners are given opportunities to engage in HOTS, they should be applied in different contexts and domains, which will enable learners to transfer those skills. However, findings are contradictory regarding the transference of HOTS.

To illustrate, Willingham (2007) found that learners could not transfer critical thinking skills displayed in one domain to the other. Halpern (2001), on the other hand, found some college students, were able to apply critical thinking skills learnt in a specific domain to a non-academic problem. We can thus derive, in the quest for transference of knowledge to take place, that learners should practise higher order thinking skills in all domains and subject areas. This is pertinent to this study, as Foundation Phase teachers teach all four subjects in the curriculum.

3.5 Different approaches to curriculum

Three influential educationists, namely Ralph Tyler, Lawrence Stenhouse and Paulo Freire had different approaches as to what should be included in a curriculum and how the curriculum should be approached. Tyler advocates a technical or objective approach to curriculum development that views the curriculum as a product (Hoadley & Jansen 2002:59). This approach encourages learning experiences and goal setting. However, Stenhouse advocates a process approach, which argues that a curriculum plan can at most give recommendations as to the content and processes of working with knowledge and that it can never anticipate the outcomes of learning (Hoadley & Jansen, 2002:61).

Assessment should therefore only be for developmental purposes and learners should undergo some change while learning. Additionally, Freire refers to teaching and learning as “banking education”, where learning is viewed as a process of accumulation of bits of knowledge presented as a “gift” from the teacher (Morrow & Torres, 2002:121). Learners should be able to link the knowledge acquired to everyday life and be able to reflect on the value of learning. Although there are tensions between the three different approaches of Tyler, Stenhouse and Freire, they have some universal principles in their approaches:

defining outcomes, aims or objectives; the importance of knowledge, skills and values; and individual learning (Booyse, Du Plessis & Maphalala, 2020).

Tyler's approach is behavioural and is based on a 'blueprint' which in turn relies on technical and scientific principles, and includes paradigms, models and step-by-step strategies for formulating curriculum (Ornstein & Hunkins, 2004:2). This model is based on the need to produce favourable learning conditions regarding teaching strategies and leaming (Booyse et. al., 2020). Stenhouse (1975:3), argued that "It is not enough that teachers' works should be studied, they (learners) need to study themselves". In addition, Stenhouse encouraged learners to participate in classroom activities, to express their own views and reflect on their own experiences (Stenhouse, 1975: 85-97). Furthermore Stenhouse's ideas of a teaching, learning process prepares learners for success in fulfilling various life roles.

Nekhwevha (in Kallaway, 2002:141) states that Freire's pedagogy of knowing had a tremendous impact on how South Africans thought about the best way of fashioning education. Freire promoted the idea that all leamers can reach the desired teaching outcomes if given favourable learning conditions. He wanted teachers and curriculum developers to make sure that educational experiences can be used in real life (Booyse et. al., 2020). The impact of these principles are thus as follows: (1) leaming implies the progression of the learner's knowledge, skills and values; (2) teaching strategies include critical thinking, reflection and action by the educator; and (3) assessment forms a part of teaching and learning, and continuous and various methods should be implemented.

Lastly, the assessed curriculum described by Booyse et.al (2020) as an important aspect of the curriculum, is all about measuring the knowledge and skills in order to determine learner achievement and performance. The assessed curriculum is used to improve student learning and teaching in manageable ways. From this, we can derive that the teacher plays an important role in the designing, implementing and evaluation of the curriculum. Although the concept curriculum is broad and includes many different

definitions and aspects, many of the definitions of curriculum are logically satisfactory and no definition on its own would suffice.

3.6 Assessment of HOTS

Most of the various published instruments for the assessment of critical thinking only assess generic critical thinking skills. The California Critical Thinking Test (Facione, 1990) and the Cornell Critical Thinking Test (Ennis & Millman, 2005) are examples of such tests. These tests do not take into consideration learners in the Foundation Phase though, and are not based on different subjects.

Assessment tasks for HOTS should allow for the learners to voice their opinion, which can be achieved through open ended questions instead of just multiple choice questions (Ku, 2009). It should encourage learners to make inferences or evaluations, so that they can be evaluated on the merit of their arguments. It should also be grounded in authentic issues, in order for learners to focus on, to apply their skills in real world settings (Linn & Grunlund, 2000). To make sound judgements, higher order thinking requires appropriate criteria to evaluate problems encountered (Lipman, 1998; Case, 2005). Different criteria are needed for different domains of knowledge; for example, the criteria to evaluate a legal document are different to those required to evaluate a piece of art (Lipman, 1988).

3.7 HOTS and teacher beliefs

The literature reveals that teachers' beliefs around teaching have a significant influence on their practices, irrespective of the subject that they are teaching (Campbell, McNamara & Gilroy, 2004). There exists a relationship between the teachers' beliefs regarding education and planning, decisions on instruction and their classroom practices, especially their way of teaching (Pajares, 1992 in Hasni, Ramli & Rafek, 2018). Categorically, it is not easy to say why teachers teach in the way they do, but all teachers have life histories which shape their understanding of their content knowledge, their learners, their career and their world.

Hoadley and Jansen (2010) state that individual experiences that are unique to the teacher are brought into the classroom. People teach in particular ways because of a set of values and beliefs that they hold, which originates from: (1) their families; (2) communities; (3) the schooling they received; (4) the institutions they studied at to become teachers; (5) the contexts of the school within which they teach; and (6) the societies they live in.

Teachers' assumptions about teaching and learning are developed in relation to these influences. This does not mean that individual teachers are merely products of these influences, which pull or push them into particular conceptions about what it is to be a teacher. Individuals have the potential to accept, reject or modify the influences of these forces on their lives, and on their conceptions about what a successful teacher is (Hoadley & Jansen, 2010:119).

This framework will form the lens for the analysis of the participants' beliefs in the promotion of HOTS in this study.

3.7.1 Approaches to teaching HOTS

The literature reveal some "suggested" activities in the promotion of higher order thinking skills across the curriculum. These activities include the development of multiple perspectives on issues encountered; activating learners' prior knowledge to make connections with texts and lessons taught; to distinguish the difference between fact and fiction; co-operative learning by working in small groups; questioning; inductive strategy; and problem-based learning (Nieman & Monyai, 2010).

For the effective promotion of children's higher order thinking skills, most researchers are in agreement that a variety of pedagogies should be utilized, such as explicit instruction (Facione, 1990; Paul, 1992; Halpern, 1998; Case, 2005); collaborative and co-operative learning (Abrami et. al., 2008); modelling (Paul, 1992; Facione, 2000) and constructivist approaches (Paul, 1992; Nieman & Monyai, 2010). Findings suggest that through a

repertoire of instructional strategies, higher order thinking skills can be developed and enhanced in children. Hence the need arises for teachers of primary school learners to promote higher order thinking skills early in the education of the child.

3.7.2 Shulman's professional content knowledge (PCK)

If we deliberate education research over the decades, one of the golden threads that runs through the literature is the quest to deeply understand what good teaching is and how new teachers develop their expertise. Lee Shulman made a major contribution in the mid-1980's when he introduced the concept "pedagogical content knowledge (PCK)" that he believed was the answer to "the missing paradigm" (Shulman, 1986:7) in research and practice on teaching. Shulman was analysing teacher development programmes when he observed that content, or subject matter, had almost completely disappeared from teacher preparation programmes, and that pedagogy had come to be observed as a basically content-free skill (Shulman, 1986). In an endeavour to feature the prominence of content, and to bring it back into teacher preparation programmes, he put forward a knowledge which is "an amalgam of content and pedagogy that is uniquely the providence of teachers" (Shulman, 1987:8).

This new knowledge, pedagogical content knowledge, separates the teacher from the subject matter specialist. In his explanation, PCK refers to the conversion of content into a form that makes learning possible. PCK encompasses subject matter, content knowledge, instructional skills and strategies, conceptions in teaching, and learners' learning difficulties. This study focuses on the instructional pedagogies used for the promotion of HOTS in grade 3 classes.

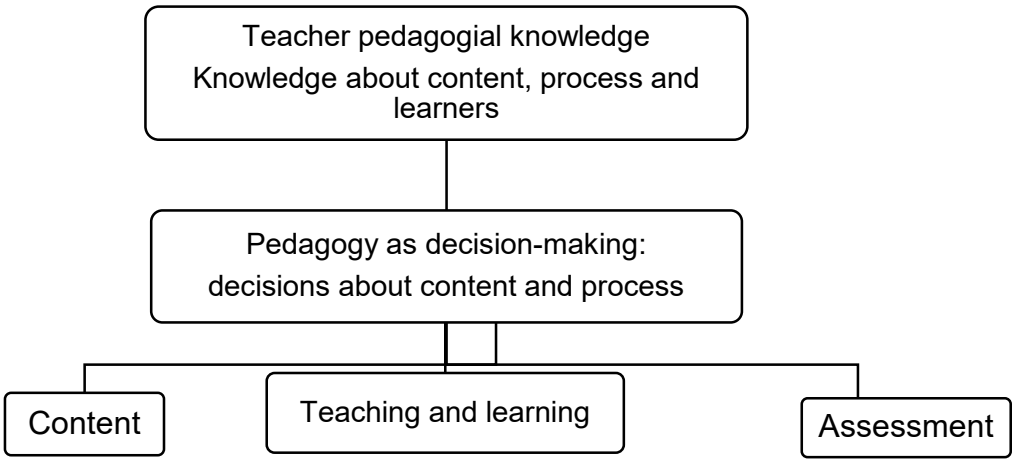

Figure 7: Shulman's PCK

3.7.3 Robin Alexander's conceptualisation of pedagogy

The literature reveals a multitude of definitions and interpretations of pedagogy. Thiessen, Campbell, Gaztambide-Fernandez, Niyozov, Anwaruddin, Cooke and Gladstone (2013:2-3 in Peresso, 2018) conducted a four year study to explore 'pedagogy', which revealed that:

> Some pedagogies seem related to, or derived from critical pedagogy… Some are connected to particular processes or qualities…or to causes and concerns… Still others are associated with particular groups in society… And others sometimes use the terms teaching and instruction as a synonym for pedagogy.

This draws our attention to the multiplicity of understandings of pedagogy in the literature.

For the purpose of this study, the researcher uses the definition of pedagogy by Robin Alexander, who made a major contribution in 2003 when he distinguished 'teaching' from 'pedagogy' in research and practice on teaching. The difference between the two terms is outlined as follows: "Teaching is an act while pedagogy is both act and discourse" (Alexander, 2008:6). Another important facet of pedagogy is the teachers' ability to justify their actions and decisions regarding their teaching:

> Pedagogy is the act of teaching together with its attendant discourse. It is what one needs to know, and the skills one needs to command, in order to make and justify the many different kinds of decisions of which teaching is constituted (Alexander, 2004:11).

This definition manifests the following components. (1) Orientation towards teaching: the values and beliefs of the teacher. (2) Aims: how the teacher understands and interprets the aims of the curriculum (CAPS). (3) Resources: textbooks and learning resources used. (4) Methodology: comprehension of instructional strategies. (5) Practice: classroom teaching: interaction between teacher and learner, and interaction between learner and learner. (6) Assessment: what procedures are used by the teacher to gauge what learners understand and know to advance their learning.

The researcher draws on the works of Robin Alexander because it underscores the link between a teacher's actions in class and the teacher's understandings and beliefs informing them (Alexander 2008). Therefore it serves as the lens, in conjunction with the framework of Shulman's PCK, through which the analysis of this study is informed.

3.7.4 Bloom's Taxonomy

The framework of Bloom's taxonomy is regarded as one of the most crucial models, which stood the test of time, to categorize a curriculum's goals in terms of explicit and implicit cognitive skills and abilities in the 21st century. A search engine presents more than 3 840 000 results for the keywords 'Bloom's taxonomy'. The essence of Bloom's work is by design focused on forming educational objectives according to their cognitive difficulty. The taxonomy was created to provide more clear definitions to ambiguous terms such as 'problem-solving' and 'thinking' to curriculum developers (Jacobs, Vakalisa and Gawe 2016: 79).

The taxonomy was also generated to upgrade the teaching-learning process, from the lower level of rote-learning and memorisation, to the higher level of analysis, evaluation,

creativity and problem-solving (Forehand, 2005). The framework was designed to organise different levels of expertise with respect to measurable learner outcomes.

Bloom realised that higher order thinking is dependent on the level that precedes it. Learners needed to be able to recall information, then comprehend, analyse, and apply it, and so on. In other words, Bloom determined that the aims of teaching needed to be geared toward the designing of tasks that guide learners to the realisation of the objectives, instead of given objectives for recall.

Bloom's Taxonomy is hierarchically organised in six categories ranging from lower to higher order thinking: (a) remembering (recalling information, listing, describing); (b) understanding (clarifying ideas or concepts); (c) applying (using information in a different but familiar situation), to higher order thinking like: (d) analysing (breaking information into parts to explore relationships); (e) evaluating (motivating a decision or course of action); (f) and creating (producing new ideas or ways of viewing things).

The taxonomy has its strengths and weaknesses, as found in all theories. The greatest strength of Bloom's taxonomy is that it created a framework for 'thinking' which grants practitioners a sensible structure to work with. The value of the taxonomy to practitioners is undeniable, as teachers who keep a list of questioning prompts relating to the different levels of Bloom's taxonomy are more effective in the development of learners' HOTS than their counterparts who do not plan their question prompts.

3.7.4.1 Critique of Bloom's taxonomy

A criticism of Bloom's taxonomy is that learning is regarded as sequential. Researchers presently sees the mind as a web; for example, a person can start with knowledge and move to application and then analyze this application and draw a conclusion; from there a person can re-analyze the conclusion drawn, and in this sense create a better synthesis of the information. Problem-based learning, which is a pedagogy to activate HOTS,

proposes that higher order thinking skills should be spread throughout a task (Anderson, 2000).

Another of the major criticisms is the neglect of the affective (attitudes, interests, feelings, values, self-image and motivation) and the psychomotor (motor skills, movement and physical activity) domains as a result of the excessive attention paid to the cognitive domain (intellectual or cognitive processes) (Krathwohl, 1965:88). In spite of the many criticisms of Bloom's ideas, it has significance for the mediation of learning. There is no denying the significance that all three domains play in the learning process, as discussed earlier, but as this study is focused on thinking, it becomes obvious to concentrate on the cognitive domain.

3.7.4.2 The revised Bloom's taxonomy

Bloom's taxonomy has been understood in several ways, elaborated upon, expanded on, and its breadth has also been expounded on. Resulting from studies on the original taxonomy, many comments and implementations which are different from the original taxonomy were suggested. An integrated version of these adaptations, which was designed by Krathwohl, one of Bloom's former students, is widely accepted (Forehand, 2005).

The revised Bloom's taxonomy defines HOTS among the three top levels of ability in the cognitive dimension (analysing, evaluating, creating), and in the three top levels of knowledge dimension (conceptual, procedural, metacognitive) (Anderson & Krathwohl, 2001; Thompson, 2008). HOTS can be measured by means of tasks that include analysing, evaluating, and creating conceptual and procedural knowledge, or metacognition. This means that developing learners' HOTS is important to prepare them for solving new issues, adapting themselves in a new environment, and making decisions about a particular problem. The revision of the taxonomy is illustrated in Figure 8 below:

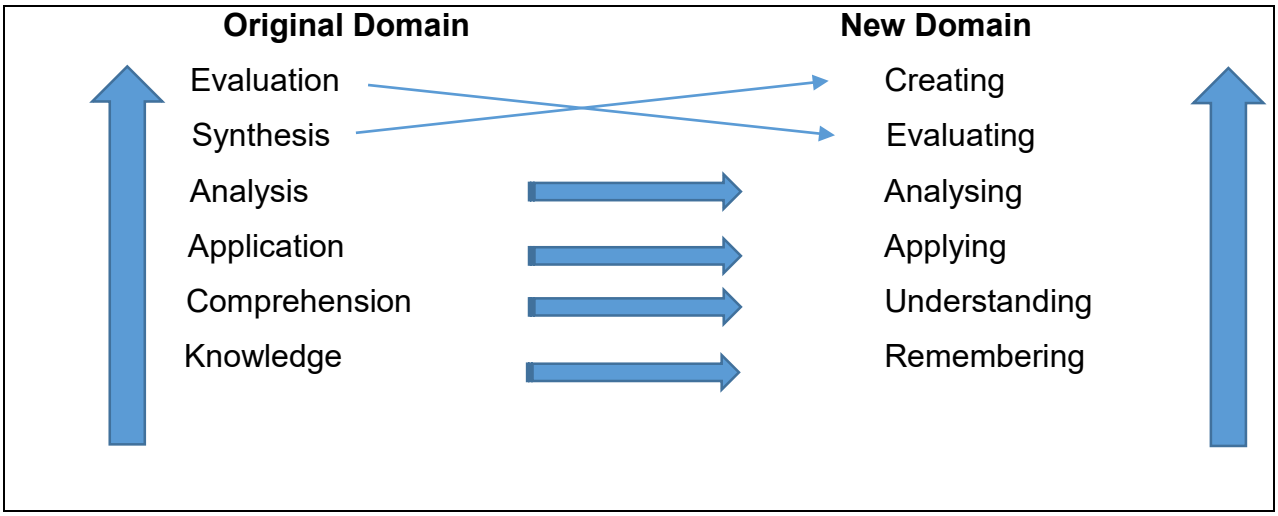

Figure 8: New Bloom's Taxonomy (Anderson, Krathwohl & Bloom, 2001)

The two long arrows on each side of Figure 8 indicate a continuum between lower order and higher order thinking. In the revised taxonomy, which is used in this study, 'creating' is the highest thinking skill, while 'remembering' is the lowest one.

This indicates that it is easier to remember something than to create something, and lying between these two boundaries are the four other levels, namely understanding, applying, analysing and evaluating. Jacobs et al. (2016: 81) explain:

> The most important thing to remember about Bloom's taxonomy is that learners must, from a young age, learn to think on all six cognitive levels. Incompetent teachers believe that the only thinking skill that they must teach children is the skill of remembering, while the other, more advanced thinking skills will 'develop all by themselves'. This is a serious misconception. It is of utmost importance for children to learn higher-order thinking, such as evaluating and creating, at the same age as lower order thinking, such as remembering and understanding. Learners who are taught only to *remember* and not how to *evaluate* and *create* from a young age may get stuck in lower-order thinking for the rest of their lives. When they reach high school, where higher-order thinking becomes increasingly important, they

often perform poorly, and many drop out of school. Owing to their weak problem-solving skills, these learners face bleak futures.

3.8 Studies pertaining to the instruction of higher order thinking skills

This section focuses on empirical research pertaining to the instruction of the higher order thinking skills, teacher beliefs and practice about higher order thinking skills, because the study is related to the pedagogical perspectives of primary school teachers in the Foundation Phase in South Africa. The study aims to ascertain how teachers infuse pedagogies of higher order thinking skills into their teaching. Research conducted in the international arena will be discussed first, followed by discussion of research in Africa, specifically South Africa.

3.8.1 Different approaches to the teaching of higher order thinking skills

There is unanimity among researchers in the field about the importance of teaching thinking skills, but the contention lies in how to best teach those skills (Tsui, 2002). Some researchers are of the opinion that higher order thinking skills should be infused into the curriculum, and this is commonly known as the ‘infusion approach’. This approach is used to teach thinking “based on the natural infusion of information that is taught in the content areas” with forms of higher order thinking skills that should be utilised on a daily basis (Swartz, Fisher & Parks, 1998:3). This definition of the infusion approach expounds the need for the explicit teaching of higher order thinking skills. The motivating factors for the infusion approach are threefold. Firstly, the explicit teaching of higher order thinking skills will have a greater influence on learners’ thinking faculties. Secondly, the value of good thinking will be regarded as an important aspect by learners when instruction embraces a collective atmosphere of thoughtfulness. Thirdly, learners will gain a deeper understanding of the content learnt when this approach is utilised.

A second approach is where generic thinking skills are taught on its own, without subject matter, and this is known as the ‘stand-alone approach’. This approach assumes that

teachers must educate for thinking. De Bono's (1992a) approach is one (out of more than a hundred) example of such a stand-alone programme, developed for educating HOTS as part of the curriculum. This is known as the Cognitive Research Trust (CORT) programme, which provides tools for teachers to teach thinking skills. It comprises 60 lessons, which ranges over six sections covering De Bono's definition of thinking skills: breadth, organisation, interaction, creativity, information, feeling and action. The rationale for this approach is to develop thinking through the implementation of structured lessons (Grissom, 2004).

In addition to this, a third approach, known as the 'immersion approach', is underscored by Angeli and Valanides (2009). This approach focuses on the promotion of ideas, rather than thinking skills. The approach engages learners in dialogue and encourages them to cultivate their thinking skills through analysis, metacognition and evaluation of subject matter. The proposed outcome is for learners to pick up critical thinking skills naturally, while engaging in the subject matter (Ennis, 1989).

Added to this is another approach which incorporates both subject-specific and generic approaches, which is known as the 'mixed approach'. The conflict around the use of the stand-alone programme and the infusion programme raises the question whether higher order thinking is domain-specific. Most researchers are in agreement that higher order thinking is domain-specific, and that the individual needs enough information to adequately evaluate and judge a challenge (Heong, Othman, Yunos, Kiong, Hassan, Mohamed, 2011).

Conformity is found among many researchers highlighting the importance of background knowledge to critical thinking, and the notion that comprehension of a discipline, is paramount to higher order thinking in the domain (Case, 2005; Willingham 2007; Heong et.al. 2011). Willingham (2007:17) upholds the view that there is not a set of critical thinking skills that can be acquired and deployed regardless of context.

In opposition to the above view, other researchers propose both general and domain-specific elements comprise HOTS. This view holds that even though critical thinking differs across domains, there are some common aspects that can be used across domains (Ennis, 1990). Similarly Paul (1992) draws attention to the view that critical thinking is domain-specific, but the use of generic critical thinking can be taught to individuals.

Both the stand-alone and infusion approaches are criticised by Hatcher (2006), whose concerns are on transferability in the stand-alone approach. The constraints in the infusion approach are highlighted as (1) competing demands between the teaching of critical thinking and content matter; (2) teachers' inclination (or lack of it) to teach and integrate it into the curriculum; (3) as well as the willingness of the institution to create a climate of higher order thinking.

A longitudinal comparative study by Hatcher (2006) to compare the gains achieved in HOTS by the stand-alone and infusion approaches, was undertaken with freshmen to senior years at Baker University. Three custom-made courses were designed in the General Education Programme, which attended to critical thinking and effective writing, and in the last session they were required to display their thinking through essay writing. The infusion approach gained higher scores in the post-test compared with post-test of the stand-alone approach.

In another study, comparing the impact of the stand-alone, immersion and infusion approaches on critical thinking to undergraduate students, Angeli and Valanides (2009), concluded the gains of the students in the stand-alone and control groups were significantly lower than the other two groups. Students' conceptual understanding was evaluated by way of a questionnaire at the completion of the intervention. The positive gains of all three approaches found in the students' understanding of HOTS, in comparison to the students who participated in the control group, were clear. We can thus derive from this that all three approaches to critical thinking have some benefit for the enhancement of individuals' critical thinking.

In terms of instructional interventions on the validities of HOTS, 117 studies were analysed by Abrami, Bernard, Borokhovski, Wade, Surkes, Tamim and Zang (2008). The central findings of the review indicated positive outcomes in most of the studies. However, Behar-Horenstein and Nui (2011) make the argument that there are inconclusive results in terms of the effectiveness of strategies and interventions of the teaching of HOTS among college students.

A more recent review focusing on developing countries was provided by Nag, Chiat, Torgersen and Snowling (2014). The review is important to this study as it concentrates on the teaching of literacy and numeracy in the early years of schooling. Their review covered a repertoire of studies that ranged across developing countries in Africa, Central Europe, Asia and South and Central America. It involved reports, with sample sizes above the total of 32, from primary data resultant from: (1) experimental methods and observational studies, and (2) intervention studies using quasi-experimental designs and randomised control trials.

According to Hoadley (2016:2), “The central findings of the review are useful in relation to South African research. Much of what is presented is recognisable in our own context, and confirmed by smaller, less robust studies here. Further, the review provides a useful background for the distilling of contextually specific issues in South Africa”. Findings in this review indicate that rote and surface learning are still prevalent in most of the South African classrooms, where the most visible aspects of pedagogies were chorusing, drill and copywriting. Few classes utilised an interactive or ‘dialogical’ approach, but rather “many teachers are entrenched in prescriptive/directive ways of instruction that are neither engaging nor effective” (Nag et. al., 2014:29). The researcher acknowledges that up to this point, the discussion of higher order thinking has drawn mostly on western thinkers. This is because the HOTS movement was initiated in the western arena. The following sections will discuss notions of HOTS in the South African milieu.

Relevant South African literature is reviewed in this section and it undertakes to gain a comprehensive picture of empirical findings on HOTS in the early schooling years. A limitation of empirical classroom-based research in South Africa on HOTS is observed, and more so in the Foundation Phase. Chisholm (1992:158) observes that there was little research that focussed with intricacy on educational constraints in the early 1990s.

Evidence suggests the access to schools by researchers has been difficult, and blames this on the legacy of apartheid, as teachers did not want to allow researchers into their classrooms (Biputh & McKenna, 2010). Most of the school-based research conducted prior to the 1990s was focussed on policy studies (Hoadley, 2016). Classroom practice studies prior to 1990s typify the prevalent teaching styles, as described by Chick (1996:21) as "…teachers adopting authoritarian roles and doing most of the talking, with few pupil initiations, and with most of the pupil responses taking the form of group chorusing".

In an attempt to redress the paucity of classroom-based research after South Africa became a democracy, the President's Educational Initiative (PEI), which was to conduct 5 small-scale studies, was formed in 1998. The main aims of this project was to investigate teachers' practices, the curriculum, as well as how teacher and learner materials were used in the class. Taylor and Vinjevold (1999: 230) claimed accordance among these studies around a number of concerns. One of the main issues found is teachers' shortfall in conceptual knowledge. Additionally, they highlighted the teachers' inability to interpret the new Curriculum 2005, as well as their inability to "ensure that the everyday approach prescribed by the new curriculum will result in learners developing sound conceptual frameworks". The researchers make the argument that even though learner-centred and co-operative learning was observed, very few gains were made in the cognitive development of learners (Taylor & Vinjevold, 1999). This indicates that teaching to promote learners' higher order thinking was limited.

Taylor (2014:1) states that in order to change the culture of passive learning, a National Education Evaluation and Development Unit (NEEDU) was established. The central aim

of NEEDU was “to identify approaches and strategies necessary for achieving quality in the provision of quality education”. Focussing on the Foundation Phase, NEEDU visited 133 urban schools across 15 districts in 2012. Concentrating on rural schools in 2013, they covered 219 rural schools in 17 districts in contrast with the previous year. This study concentrated on Intermediate Phase and reading. This report does not have relevance to this study, therefore it will not be discussed further.

Both reports though, add an instrumental description of school and classroom observations across provinces in South Africa. Having observed reading lessons in grade 2, NEEDU (2012:38) found that most of the observed lessons focused on sounds and pronunciation of a few (5 to 10) words, without any reference to comprehension. “Teachers were observed saying the words, writing the words on the board, reading them, getting the whole class to read in chorus, getting individual learners to read them, and finally, getting learners to suggest certain words”. The absence of HOTS was noticed in this study, as it indicated the low cognitive level of content and texts being used in the classrooms.

In their study of 46 classrooms, Hoadley and Galant (2014) support these findings by highlighting the shortcomings of higher order thinking pedagogies in these groups. Instead of making comprehension clear to learners, the pedagogies concentrate on word recognition and pronunciation of individual words. NEEDU (2012:39) found teachers’ pedagogies in relation to reading “…pursue low level shared reading activities and are not leading learners towards higher levels of fluency and comprehension”.

Recent studies have found that learners fall behind in sufficient utilisation of HOTS, like the case in developed countries. On the other hand, despite these unfavourable reports, significant development has occurred in improving the teaching and/or learning of HOTS. According to Collins (2014: 4):

> Assessing higher-order thinking skills has also been shown to assist disadvantaged students. The 'higher order thinking skills' (HOTS) program

designed by Pogrow (2005) specifically for educationally disadvantaged students, is based on four kinds of thinking skills: (1) metacognition, or the ability to think about thinking; (2) making inferences; (3) transfer, or generalising ideas across contexts; and (4) synthesising information. The project is a pure thinking skills approach to assist disadvantaged students in grades 4–8 in the United States. It combines the use of Socratic dialogue, drama, and technology, and has been used in approximately 2,600 schools in 48 states. It produced student gains in standardised tests, on measures of metacognition, in writing, in problem solving, and in grade point average.

3.8.2 Instructional models pertaining to higher order thinking skills

Co-operative learning and concept development or problem-centered inquiry are a few of the instructional models that teachers employ in their classrooms (Estes, Mintz & Gunther, 2011). They emphasize that teachers need to be knowledgeable about a selection of instructional models to choose the appropriate one for a specific topic.

Thomas and Thorne (2009) furthermore propose that lessons which are designed to teach HOTS should reflect the following: (1) Take the mystery away: to assist learners to understand their own higher order thinking challenges and strengths, higher order strategies should be taught explicitly to them. (2) Concepts are mental representations of a group of facts that are formally or informally related. Learners should be taught to build concepts, as concepts help in organizing thinking. (3) Name key concepts: in any learning area, learners' attention should be alerted when a new concept is introduced. (4) Move from concrete to abstract and back: concrete materials can be used to reinforce abstract concepts. (5) Schemas: activating prior knowledge to understand new ideas. (6) Inference: to draw conclusions from a set of facts.

The above are a few of the elements that could support teachers in structuring the teaching and learning process to underwrite the development of HOTS and how teachers

might stimulate critical thinking. It can be used to outline the rationale for a model that can effectively enhance teachers' abilities to facilitate critical thinking in school children (Thomas & Thorne, 2009). As the researcher is of the opinion that the teacher is central to learners' learning of HOT, these are some of the features that could be used to inform the framework of the proposed study, of which a few strategies will be discussed individually.

3.8.2.1 Co-operative learning and higher order thinking skills

Co-operative learning is a teaching strategy in which all members of a group work together to pool their ideas and to ensure that all members in the group assimilate and comprehend the same work. Johnson and Johnson (1992:218) describe it as communication in which learners in the group 'all work for one' and 'one works for all', with the vision of solving a problem, making a decision, reaching a goal or producing a product. A strong sense of co-operation and interdependence is encouraged through this strategy.

Group work also has the underlying principle of cultivating emotional and academic support for learners against the many obstacles they might encounter at school. Learners are introduced to co-operative learning at a young age. It must be borne in mind that this strategy is about empowerment and co-operation. As such, learners' gains include the inspiration to develop their full potential through the support and confidence derived from co-operative learning (Jacobs et al., 2016:198).

Contrary to this, Westbrook, Durrani, Brown, Orr, Pryor, Boddy and Solvi (2013), state that a superficial application of this pedagogy is observed in many classrooms. Learners were put into groups, but the underlying principles of group work were not enacted. By way of explanation, interaction was observed only between learners and teacher, without peer consultation. This view is asserted by Hoadley and Galant (2014) in South African classes teaching reading, and by Brodie, Lelliot and Davis (2002) in the teaching of mathematics.

3.8.2.2 Higher order thinking and questioning

Most teachers believe that effective questioning is a sophisticated teaching skill, especially with the use of higher cognitive-level questions, to develop and engage learners' HOTS (Elder & Paul, 2003b). Central to the repertoire of effective teaching skills is to produce outcomes that require learners to synthesise, analyse and evaluate information in their quest to solve problems and make decisions (Snyder and Snyder, 2008). Plenty of research is found on the use of teacher questioning in the literature (internationally and locally), which focuses on the cognitive level of questions asked by the teacher in correlation to the cognitive levels of learner responses.

McDermott and Rakgokong (2013:22) posit that building of connections between background knowledge and new knowledge, as well as drawing learners' attention to their metacognitive processes, are advanced through questioning. They further state that shared action when teaching for HOTS must be led by applicable and effective questioning by the teacher.

Steyn & Adendorff (2020) explored pre-service (final year students at university) teachers' practice of questioning in 7 Foundation Phase mathematics classes. They found a gap in pre-service teachers' understanding of how to use questioning techniques optimally to activate learners' HOTS. Questions asked by pre-service teachers did not promote higher order thinking of the learners. They concluded that student teachers need extra tuition in the pedagogy of acquiring effective questioning strategies. A gap in the teaching of questioning strategies in the university's curriculum was recognised and therefore they proposed that the explicit teaching of questioning strategies should be part of the teacher training curriculum.

The development of learners' HOTS is directly linked to the types of questions teachers ask that leads them to engage in higher cognitive levels of thinking, which includes application, interpretation, analysis, synthesis or evaluation (Nieman & Monyai, 2010). It

can thus be concluded that is possible to teach for, on and about HOTS in the early primary school years (Costa, 1985:20-21). In South Africa, as well as the international arena, we find only few studies related to the enactment of HOTS in the intended curriculum (Meng, 2016). This study is focusing on teachers' enactment of the curriculum, as well as the perspectives of their understanding.

3.8.2.3 Barriers to instructional practice of higher order thinking skills

The knowledge of the teacher informs their action when planning and executing the curriculum (Grove, Dixon and Pop, 2009). Cognisance should be taken of the fact that the beliefs and views that teachers hold about the nature of HOTS have a powerful impact on their implementation of the curriculum (Stein, Remillard & Smith, 2007). A culture of passive learning is found in many South African classrooms. To change this culture of passive learning, we must realise that teachers' beliefs regarding HOTS influence the preparation of their lessons, as well as the enactment of the curriculum.

Criticism of the American classrooms in the late 1960s, where passive learning was prevalent, should be heeded in the quest to change passive learning in the South African context. The learners were treated as empty vessels that need to be filled with information and had to regurgitate what was taught to pass tests. The learners never voiced their opinion and never questioned the authority of the teacher on learning content. Learners were "…almost never required to make observations, formulate definitions or perform any intellectual operations that go beyond repeating what someone says is true" (Postman & Weingartner,1969:19).

Most of the South African adult community (including the researcher) and teachers were brought up in a culture where the expression of individuals' views and opinions were suppressed. In order to foster higher order thinking skills, this cycle needs to be broken. Postman and Weingartner (1969:19) propose this can be achieved through individual or group assignments that encourage learners to study 'real world' issues or international issues, and the presentation of their findings orally, will help to stimulate HOTS and should

be encouraged for effective implementation thereof. Independent thinking and learners' inquisitiveness should be encouraged and nurtured in the quest to enhance learners' HOTS.

Scholtz (2019) embarked on a study to search how notions of critical thinking, proportionate to policy and pedagogy, manifest in initial science teacher education in South Africa. She found a definite need for institutions of higher learning to add the teaching of HOTS in their academic program for student teachers. This indicates that HOTS is an imperative objective of teachers intending to cultivate thinking learners.

Barnes (2011) conducted a study to assess the teaching practices and knowledge about critical thinking of seven education faculty members' beliefs and teaching practices that promote HOTS in their pre-service education classes. It yielded the same results as Paul, Elder and Bartell's (1997) study which included 38 public and 28 private colleges. Both studies found that there is no contention about the teaching of HOTS, but that most of the teachers did not have a conceptual understanding of it, and even less understanding of how to stimulate it in the class.

Paul et.al (1997) found that teachers agree that HOTS should form an integral part of education, but that few teachers have the conceptual knowledge of what HOTS is, and more so, of how to promote it in their classes. Due to teachers' lack of exposure to research on HOTS, teachers are not sure what it is, and how to execute the teaching of HOTS successfully in their classes. Therefore, this study focused on how teachers infuse pedagogies to promote HOTS in their Foundation Phase practice.

Teachers form their own interpretations on how the curriculum should be implemented, thus their understanding and perception of HOTS impact on how it is developed and delivered in the classroom (Stein, Remillard & Smith, 2007). Teacher beliefs inform their practice, therefore this study seeks to understand teachers' perceptions on why they use specific pedagogies to develop learners' higher order thinking skills.

3.9 Conceptual framework

The researcher concludes this chapter with a synthesis of a conceptual framework which ties all the literature reviewed together. The areas of knowledge covered are as follows. (1) What is HOTS? This covered the definition of the concept of HOTS, comprising the constituents and different approaches to HOTS. The researcher explored the various definitions and debates and summarised them. (2) What is teaching? This question involved the frameworks of Shulman and Alexander.

One of the key purposes of using Bloom's taxonomy in this framework is to get the learners to use HOTS. Bloom's taxonomy assists the researcher with a definition of the concept of HOTS, as advocated in the CAPS document. On the one hand the researcher draws on Shulman to see what teachers know about HOTS' content and how to teach it; on the other, the researcher draws on Alexander to assist in her observation of how the teachers teach HOTS. For example, when the researcher wrote about resources, she observed how the teacher used resources to teach HOTS. When the researcher observed their interactions, she reflected on her understanding to analyse the interactions in relation to the promotion of HOTS.

The rationale for looking at Shulman's PCK and Alexander's framework of pedagogy is that the former involves the concept of teachers' understanding and knowledge and the latter involves the concept of teaching. Bloom's taxonomy informs the definition and meaning of the concept of HOTS. (3) What does the empirical literature report about how to teach HOTS? The researcher thus ends up with the conceptual framework to guide the study with the aim of generating first hand information on how FP teachers infuse pedagogies to develop learners' HOTS. The conceptual framework is presented below and serves as the backdrop to the aim of the study, which was to explore and understand teachers' understanding and enactment of their HOTS practices.

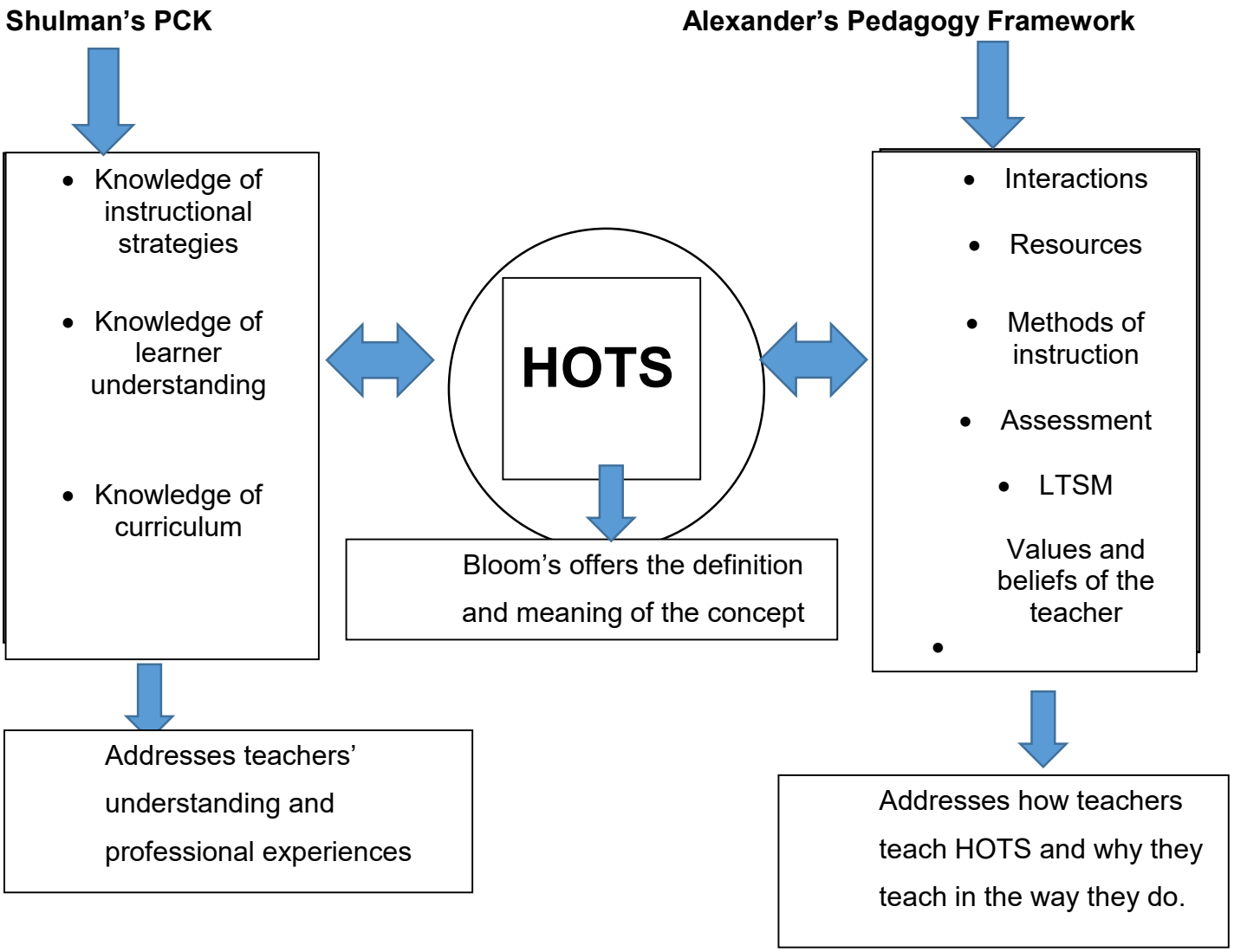

Figure 9: Conceptual framework

3.10 Conclusion

This literature review sought to make explicit what higher order thinking entails and the approaches to teaching HOTS to primary school learners, especially in the Foundation Phase. The literature review reported complex theoretical understandings of what HOTS involves. The review also provided a conceptual framework of Foundation Phase

teachers' practice and justification for the discussion in Chapter Five, in which the findings are discussed.

Discernible in the literature is the suggestion that HOTS can be successfully developed in learners from a young age, but there are few empirical studies found regarding HOTS to the teaching of young learners in South Africa, particularly from the outlook of Foundation Phase teaching.

The literature shows that learners' HOTS can be considerably enhanced if they are exposed to the different levels identified by Bloom and his associates. Learners should be encouraged to think critically at all levels of Bloom's taxonomy by creating opportunities for them to engage at the different levels of the taxonomy. Jacobs et al. (2016:89) note that, "The more time learners spend thinking on these different levels, the better their critical and creative thinking become, the more self-confident they feel and the more useful they are to society".

This chapter has outlined the rationale of the study through a review of the literature surrounding HOTS. The next chapter will look at the methodology the study adopted to answer the main research question: How do grade 3 teachers infuse pedagogies of higher order thinking skills in their teaching?

CHAPTER 4

METHODOLOGY

4.1 Introduction

In order to validate the research process, this chapter provides a detailed discussion of the methodology used to guide the study. The chapter offers the rationale behind the selection of techniques selected for data collection, as well as an accurate and detailed portrayal of how the research was conducted (Mouton, 2006). This chapter begins with a discussion of the research philosophy, outlining the ontological and epistemological assumptions of this research, as this is what frames the study as a whole.

In the first section the researcher defines the research paradigm that underpinned this study and the research methods that guided how data were collected and analysed. The second section of this chapter turns its attention to a communication of the design of the study. In particular, the researcher outlines the use of the case study as an approach for the study and why it was selected. The third section informs of the validity, reliability and trustworthiness issues, as they are important in determining the truthfulness and authenticity of the findings. The fourth section exhibits how data was recorded and transcribed. Finally, it identifies the limitations and ethical issues pertaining to this study, which are critical in a research study.

These specific details of the methodology are explained and justified in relation to the primary research question: *How do grade 3 teachers infuse pedagogies of higher order thinking skills in their teaching*? To determine the teachers' understanding of higher order thinking skills and their enactment in the classroom, data collection instruments that would generate in-depth and broad information on the topic were used.

4.2 Research philosophy

A research paradigm is a worldview regarding a set of beliefs, values and techniques that provides the researcher with an idea of how to choose the methods and research design for the study. Researchers, undertaking research and producing knowledge have to understand and communicate beliefs about dealing with different forms of knowledge, what can be known about it and how it was created. All of this forms the features of research paradigms (Kuhn, 1970). According to Creswell and Clark (2011:4), a paradigm may also be defined as a "world view, complete with the assumptions that are associated with that view". Patton (2002:134) adds that "When researchers operate from different frameworks, their results will not be readily interpretable by or meaningful to each other". In other words, a paradigm can be described as the lens through which the researcher sees the world.

A discussion of a researcher's ontological (assumptions about the nature of reality – how humans are) and epistemological (theory of knowledge – how reality can be examined) beliefs will give us a better understanding of the implication and the significance of the study. The researcher deliberates on three different approaches to educational research, which comprises positivism, interpretivism and pragmatism. An introduction to the three main world views will be discussed briefly to gain a clearer understanding of this study.

4.2.1 Positivism

Positivism is a worldview that is linked to a quantitative research methodology undertaking. This research epistemology maintains the view that the social worlds can be investigated using a rationalistic, empiricist approach that "reflects a deterministic philosophy in which causes probably determine effects or outcomes" (Creswell, 2003:7). It can thus be concluded it rests on the ontological view that there is one single reality and the epistemological viewpoint that knowledge can be measured.

4.2.2 Pragmatism

Pragmatism believes that reality is constantly negotiated, interpreted or debated. They assume that knowledge can be measured using reliable designs and tools, and that reality needs to be interpreted to discover the underlying meanings. It asserts the ontology that there is no single reality. Their epistemological stance is that knowledge should be studied using methods of research that are best suited for studying the occurrence at hand. Pragmatists often use a mixed-methods or multiple-methods approach (Creswell & Clark 2011).

4.2.3 Interpretivism

Interpretivism leans towards the "participant's view of the situation being studied" as proposed by Creswell (2003:8). Researchers hold the ontology that there are multiple realities and their epistemological stance holds that knowledge needs to be interpreted to locate the underlying meaning. In other words, knowledge is interpreted within the context in which the meaning is made, while meanings of actions do not operate outside the context of the action.

Guba and Lincoln (2005:82) assert that interpretivists believe truth is discovered instead of created in socially constructed multiple authenticities and that the epistemology is subjective. This suggests that reality and truth cannot be known as they are, for the reason that it is always negotiated by the researchers' worldviews, background and ideas. Interpretive methodology mostly encompasses qualitative data collection, collected over an extended period of time, as in case studies and ethnographic research (Cohen et.al, 2002:79).

Of the three paradigms discussed above, the researcher chose a version of Interpretivism for this study. Cohen et.al. (2007:21) assert that interpretivism in research obliges researchers to understand social occurrences "through the eyes of the participants rather than the researcher". Such was the intention of this study, which was conducted to

investigate teachers' classroom practices to engender higher order thinking in the Grade 3 classroom.

An interpretive qualitative case study was chosen, as it built descriptions of the context and afforded the flexibility to uncover and explore issues that emerged as potentially relevant to the research problem during data collection. Maree (2010:61) offers that "the aim of interpretivist research is to present a perspective of a situation and to analyse the situation under study to provide insight into the way in which a particular group of people make sense of their situation or the phenomena they encounter".

The study was conducted within an interpretive paradigm given that the mind constructs its own conceptual map for interpreting and interacting with the world around it (Cohen, Manion & Morrison, 2002:23). Accordingly, the researcher was dealing with people and was interested in what they thought and did, what kind of problems they were confronted with, and how they dealt with them. Creswell (2010:56) affirms that qualitative research studies aim not to engage in research that searches for causal relationships, but rather searches for a greater insight into a phenomenon. In this regard, the approach offered the researcher options to discover authentic thoughts and individual views of what was observed. "This technique could be used both for generating and testing theories" (Cohen et al., 2002:139).

From this paradigmatic understanding, the researcher determined the methodology to be used in this study. This offered the consideration of how data was gathered and stored, how it was analysed, and how the researcher evaluated and interpreted the participants' practises. The researcher established that the suitable methodology to guide this study was phenomenology. Holloway (2005: 47) states that 'Phenomenology aims to describe a person's lived experiences in an attempt to enrich lived experience by drawing out its meaning'. The main objective of phenomenology is to explain the lived experiences of participants without any preconceived ideas about the reality attached to the experiences (Holloway, 2005).

This methodology was considered ideal for the reason that it sought to “recognise, describe and interpret human behaviour and the meaning individuals make of their experience” (Carpenter, 2013:117). In using an interpretivist approach, with its focus on the making of meaning in the context of participants, the researcher chose the qualitative research approach, which is concerned with the understanding of human behaviour from the perspective of participants.

4.2.4 Qualitative research

Qualitative research is explained as an analysis of participants’ collective and individual social actions, thoughts, perceptions and beliefs (McMillan & Schumacher, 2010:320). Qualitative research aims to explore human understanding and how this understanding is constructed. It is essential, as a researcher, to describe the context in which this qualitative study was conducted. Denzin and Lincoln (2005:3) state when qualitative researchers endeavour to make sense of, or to understand occurrences in terms of the meanings people bring to them, they study things in their natural settings. Halpern (2001:276) corroborates the approach as it seeks to attain participants’ own justification and explanation of their practice.

Yin (2011: 7-8) highlights five elements that are associated with qualitative research: (1) to study the sense of people’s lives under real-life circumstances; (2) the representation of understandings and viewpoints of participants (individuals) in a study; (3) description of the contextual environment within which the participants find themselves; (4) causal effects and insights into prevailing or developing concepts that may assist in the explanation of human social behaviour; and (5) to draw on multiple sources of evidence, instead of relying on one single source of evidence alone. Since this study employed multiple data sources to provide insight into the teachers’ pedagogies to teach HOTS, through their lived experiences, the adoption of a qualitative approach based on these five elements provided a suitable approach.

As this inquiry was about ascertaining what and how teachers infuse pedagogies of higher order thinking skills into teaching and learning, it became imperative to consider a study design that would best yield the desired answers (Creswell 2010:78). The researcher investigated the participants' point of view, their interpretations of reality, their motives and their perceptions and experiences in their teaching practice, to research how they actualised higher order thinking skills in their classrooms. Considering that there are numerous ways of teaching, the qualitative approach assisted in exploring the unknown and provided new insights into this area of study. The focus in the data collection was not to search for negative or positive results of teachers' pedagogies of higher order thinking skills. The focus of the research was on describing how pedagogies of higher order thinking skills are experienced by teachers, using their interpretations and delving into their lived experiences during the study period (Cohen et. al., 2002).

4.3 Study Design

According to Yin (2009) the research design is governed by the end-product and all the measures in the procedure to accomplish that result. This view corresponds with Cohen et.al. (2002:73), who claim that the purpose of the research determines its methodology and design. For research to be reliable, authentic and practicable, the basics of the research and the instruments of its strategy must create guiding principles to give direction and order to the study. This will also assist in keeping the researcher focussed (Burton & Bartlett, 2005:215). To rise above criticisms such as lack of accuracy, impartiality and rigour, researchers must be focussed and mindful during the research, as cautioned by Yin (2009). Cohen et al. (2002:184) assert that the limitations of the case study as research design is outweighed, as the design is secured in real-life settings and "recognises the complexity and 'embeddedness' of social truths".

4.3.1 Case study

Case studies can place emphasis on several units (multiple-site study) or one phenomenon (contained by the location of the study). Analysis within and across settings is obtained through multiple studies, while a holistic case study with embedded units

permits the researcher to comprehend only one exclusive, significant case. More than one case is studied in a multiple case study, with the purpose to identify the comparisons and variations between the cases. These multiple case studies can be utilised to predict contrasting or similar results (Yin, 2003:47). This study used a single case study design as its focus was on what was happening at a single location.

As indicated earlier, this study was neither a comparative nor a predictive enquiry, but a way of understanding and exploring how Grade 3 teachers infuse higher order thinking pedagogies into their teaching. This was in effect an exploratory study. The researcher's 'case' in this study were the two grade 3 teachers who were observed over a period of two months. The research design undertaken was a single case study, analysed through qualitative methods to address the main research question. Yin (2014) emphasises that a case study works typically to answer 'how' or 'why' questions, where the experiences and events witnessed are of major importance to the application or critique of particular theories.

In this study the researcher asked 'what' and 'how' questions. Consequently it is deemed suitable for descriptive and empirical studies (Mouton, 2001). The researcher believes that the choice of a case study was highly appropriate because it is more flexible than many other types of research and allowed the researcher to discover and explore as the research developed. It was narrowly focussed and it was able to combine both objective and subjective data to achieve an in-depth understanding of the phenomenon studied. The findings of the case study were not intended to be generalised to the Foundation Phase of all schools. Lowe (2007:136) asserts that "true generalizability may not be possible in small scale research, but is possible to relate what you find out from a small sample to the wider population."

Thomas (2011) offers the understanding that two parts form the focus of a case study: a subject and an analytical frame or object. This necessitates that it should be made clear at the outset what the participant is a "case" of. In this study, the unit of analysis constituted the two teachers and the analytical frame was how they infused pedagogies

of higher order thinking skills into their teaching. The school and teachers were selected according to the sampling procedure delineated below.

4.3.2 Population and sample

There are two main methods of sampling, a probability (random sample) where the population is known, and a non-probability (purposive sample) where the population is unknown, as posited by Cohen et al. (2002:103). An opportunistic sample, also known as convenience sampling, involves a type of non-probability sample method taken from a group of people that is easily accessible (Cohen et. al., 2002: 102-103). This study used both a purposive and an opportunistic sample. It was purposive because participants were selected who could best inform the research questions and enhance understanding of the phenomenon under study, and opportunistic because the whole cohort of three grade 3 teachers was selected.

The researcher was interested in primary schools in the Western Cape, in a low income neighbourhood, as the criteria for choosing the school. The second purposive element was that the researcher chose grade 3 teachers. The research is focussed on the Foundation Phase, which is from Grade R to 3. The sample comprised Grade 3 teachers from the selected school from a population of twelve Foundation Phase teachers. The focus of the study was on the Grade 3s, which was not chosen purposively, as the whole population of three classes of Grade 3 was selected. At the beginning stages of the data collection, one of the teachers dropped out, resulting in a final sample of two participants. The researcher was also opportunistic, in the sense that she selected a school where access was easy, and where she is a practitioner.

The selection of Grade 3s was made on account of the suggestion in the PIRLS report, that weak results in language could be due to the fact that teachers in the Foundation Phase did not spend enough teaching time on comprehension and the analytical competency of their learners (Van Staden & Howie, 2010). Grade 3 is the exit grade of the Foundation Phase and represents a culmination of the skills and knowledge learnt

and acquired in this phase. As such, Grade 3 serves as an indicator of the state of health of the Foundation Phase. This meant that the Grade 3s were a suitable sample for this study. The sample was made up of two Grade 3 teachers from the same school. A researchers' knowledge and experience also allow her to select a sample in a particular environment, in other words, it was "handpicked" for the study (Cohen et. al., 2002:103).

A primary school in a working class suburb on the Cape Flats in the Western Cape was selected. The school is an Islamic faith-based Independent institution, which follows a dual curriculum (DBE and Islamic). As discussed in Chapter 3 (Literature Review), even though the school is a private institution, it does not have external funding and relies heavily on the government subsidy. School fees are below five hundred rand per month, which is generally indicative that it is positioned in a working-class community (quintile 4), which attracts learners from parents who earn a minimal wage.

The average number of learners per class is 24. The participating school serves 568 learners and has a teaching staff complement of 24 academic and 15 Arabic teachers. Twelve of the academic staff members teach in the Foundation Phase. The formal Language of Learning and Teaching (LoLT) of the school is English. Different cultures in the school include "Coloureds", a race classification in South Africa, which comprises a person of mixed European ("white") and African ("black") or Asian ancestry, and foreign nationals, who make up less than 1% of the total learners. In the Foundation Phase, there are three Grade R classes with 30 learners in each class, three Grade 1 classes with 24 learners in each class, three Grade 2 classes with 26 and three Grade 3 classes with 24 learners in each class.

As explicated earlier, qualitative researchers "handpick" samples, deeming this to be appropriate to provide maximum understanding and insight into what they are studying, thus building up a sample that is relevant to their study. Furthermore, the researcher is a practitioner at the school, which facilitated visiting the field site easier and minimised the expenditures incurred, thus making the selection of the school convenient.

4.4 Data collection instruments

This study used a multiplicity of data collection instruments which included the primary techniques of interviews, observations and post-observation interviews. Documentary review was a minor component to complement the primary techniques. To achieve the researcher's purposes of understanding people's behaviour and their constructions of meanings, the multiple data collection method stressed in the qualitative approach was useful. In this sub-section the researcher begins with a discussion of interviews and post-observation interviews, followed by a discussion of observations, and lastly the review of documents.

4.4.1 Interviews

In this qualitative case study, it was deemed appropriate to obtain participants' own understandings using interviews, which is one of the main data collection tools in qualitative research. Cohen, Manion and Morrison (2002) state that interviews seek to obtain data that cannot be observed such as the beliefs, intentions, feelings, thoughts and behaviours of participants. Furthermore, Merriam (1998:75) maintains that the strength of semi-structured interviews is to increase the data and to provide opportunities for new ideas to surface, which assists to create new knowledge of the case under review. Semi-structured interviews allow participants the choice to express their views in their own terms, and can provide reliable, comparable qualitative data (Cohen et al., 2002).

However, as cautioned by Maree (2010: 87), a notable demerit of this instrument is that the participant could be "sidetracked by trivial aspects that are not related to the study". In order to overcome and resolve unfocussed conversation, the researcher subtly guided the interview conversation back on track, by reminding the participant of the question, or by asking the subsequent question as prepared in the interview schedule.

Tuckman (1972, in Cohen, Manion and Morrison, 2002:279) reviewed the adoption of the interview procedures as follows:

> At the meeting, the interviewer should brief the respondent as to the nature or purpose of the interview (being as candid as possible without biasing responses) and attempt to make the respondent feel at ease. He should explain the manner in which he will be recording response, and if he plans to tape record, he should get the respondent's assent. At all times, an interviewer must remember that he is a data collection instrument and try not to let his own biases, opinions or curiosity affect his behaviour. It is important that the interviewer should not deviate from his format and interview schedule although many schedules will permit some flexibility in choice of questions. The respondent should be kept from rambling away from the essence of a question, but not at the sacrifice of courtesy.

It is not unusual for qualitative researchers to use open-ended questions, as it allows participants to express their views (Creswell, 2003:10). Moreover, it provides the researcher the opportunity to probe to clarify vague or ambiguous answers. It endeavours to use several sources of evidence to gain a contextualised perception of the subject (Yin, 2011). The interviews offered a two-way conversation to gain deeper understanding of the case observed. The post-observation interviews facilitated a process to verification of the observations.

The interviews in this study were used to seek teachers' own opinion and understanding of pedagogies used in their lessons to promote learners' HOTS. To achieve this, interview questions were developed from the conceptual framework outlined in Chapter 3. The broad categories of interview questions included: (1) knowledge and experience of HOTS; (2) teachers' practice; and (3) beliefs and experiences around HOTS (see appendix E attached).

The first activity in the data collection process was to conduct individual semi-structured interviews with both participants. A semi-structured interview schedule that focussed on teachers' professional knowledge and their current practices was used. In this study, the semi-structured interviews took place at the school site, during school time. This was

done during the teachers' administration periods and lasted approximately twenty to twenty-five minutes.

Post-observation interviews were conducted with each teacher after each observation. In order to fully understand the participants' perspectives and methodology, the post-observation interviews allowed the researcher to delve deeper into the teachers' thinking about whether their goals were achieved and if they had to teach the lesson again, would they make any changes, and why? A second focus of the post-observation interviews was to gain insight into the teachers' understanding and implementation of HOTS in their teaching and learning (see Appendix G). Development of both the semi-structured initial and post-observation interview schedules was informed by the literature review and advice of the researcher's supervisors.

The post-observation interviews were conducted on the same day on which the observation took place. This allowed for reflection of the lesson, as it was still fresh in the memory of both participant and researcher. Post-observation interviews ascertained participants' rationale behind strategies used and why they chose the strategies. These post-observation interviews lasted between five to ten minutes and were conducted immediately after the observation of the lessons.

The ethical dimension regarding interviews was adhered to by safeguarding the following: (1) informed consent of participants; (2) confidentiality; (3) anonymity; and (4) the assurance that the interview would not negatively affect the participants in any way (Cohen et. al., 2002: 279). To allow the interviews to be conducted in environments which provided some privacy and which were free of any noise and distractions, they were conducted in the privacy of the researcher's office at the school. A 'Please do not disturb' sign was posted on the door of the office, to avoid interruptions from outside, such as people talking loudly or knocking on the door.

Permission to record the interview at the onset of the interview was sought, and all interviews were audiorecorded. During the interview the researcher took notes where

necessary. All the interviews were later transcribed. During the transcription, codes were allocated to the names of the participants, to ensure their anonymity. Transcribed data was stored in a safe place, accessible only to the researcher.

4.4.2 Observations

Observation methods are powerful tools for researchers, which allow them to understand how participants interact, react and communicate with each other. Participant observation creates the opportunity for researchers to observe the information obtained from participants during interviews, as interviews "reveal only how people perceive what happens, not necessarily what actually happens" (Nisbet & Watt, 1978:13). Cohen et.al. (2002:315) suggest that interviews, with the additional strategy of participant observation, increase the validity and reliability of a study.

Observations were chosen as one of the data generating techniques to observe what the participants described in their interviews regarding the pedagogies they used to promote HOTS. Another advantage of using observations was that participants might have missed out in the interview on important things pertaining to the study. Consequently, important data that might have been otherwise missed was captured through the use of observation (Cohen et. al., 2002:305). According to Creswell (2008), observation is useful to provide tangible data which enables the researcher to notice typical behaviours amongst the participants and to also better understand the contexts of the study. Hammersley (1993: 197) states that observations are particularly useful in the provision of deep, rich data that affords credibility to the research process as "it provides a degree of life experience that is lacking in most academic environments".

An observation schedule (Appendix F) was created from the conceptual framework, as considered in the literature review (Chapter 3). The researcher carefully noted how the teacher participants interacted and engaged with the Grade 3 learners under their tutelage, how their dispositions impacted on the learning environment. and which pedagogies they made use of in relation to the teaching and promotion of HOTS. To gain

a reasonable understanding of classroom practice, observations of lessons were conducted during the allocated instructional times at the school. Both teachers were observed.

This number proved sufficient as Cohen et al. (2002:181) describe the distinctive feature of case studies in the following terms: "…contexts are unique and dynamic, hence case studies investigate and report the complex dynamic and interactions of events, human relationships and other factors in a unique instance". This case study attempted to make sense of occurrences and meanings that individuals generate to them. These occurrences were achieved through observations that allowed the researcher to observe typical behaviours amongst participants. All lessons were observed and audiotaped, to catch as much data as possible. Audio rather than video recordings were used as "…a videotape might yield more accurate data but might be even more constraining, with its connotation of surveillance" (Cohen et. al., 2002: 281).

The context of the Language, Mathematics and Life Skills lessons, such as duration of lessons, seating arrangements of the learners and teaching apparatus used, was observed. Teaching strategies, learner responses, researcher's intuitions and reflections were taken into consideration. Observations took place towards the end of the first term, where topics addressed were in conjunction with both CAPS (DBE 2011) and the textbooks that the teachers used. The researcher observed lessons that were presented for 45 to 60 minutes. During this time the Coronavirus pandemic spread to South Africa. The president, Cyril Ramaphosa, declared a state of disaster with early closure of schools on 18 March 2020. With the early school closure regarding the Covid 19 pandemic, the participants accommodated the researcher by allowing their last observations earlier than originally scheduled.

4.4.3 Documentary data

The primary techniques of data collection through interviews and observations were complemented by limited documentary data collection. In the view of McMillan and

Schumacher (2010:452) documents are printed or written records of earlier plans and events. McMillan and Schumacher (2010:360) affirm the benefits of observations, interviews and document reviews in the collection of data, as they constitute valuable and suitable sources of evidence. In this study, the review of documents supported and enriched the oral information acquired from participants by means of the interviews.

The CAPS document (2011) was reviewed to ascertain how HOTS are specified in the document and teachers' lesson plans were reviewed to establish how this impacts their HOTS pedagogies. The rationale of the document review was to substantiate and strengthen data obtained from interviews and observations relating to Grade 3 teachers' pedagogies to develop HOTS (Babbie and Mouton, 2004:146). Patton (2002) agrees that documentary data allows the researcher to gain access to background information not noticeable by other means. Lesson plans and the CAPS document provided insight into the infusion of HOTS in the curriculum; to notice activities and tasks embedded in HOTS; the use of Bloom's taxonomy to encourage HOTS; and to ascertain any other pedagogies used to develop learners' HOTS.

4.5 Process of data collection

The data collection process was conducted in three phases over a period of two months. The initial phase was the primary data collection technique of interviews. One interview was conducted with each participant in the last week of January 2020, which amounted to the collection of data of two interviews. The second phase was the review of teachers' lesson plans and the CAPS document, which was complementary to the lessons observed.

The next phase was the first lesson of observation with teacher 1 (T1) in the first week of February 2020. An observation schedule was used to observe teachers' infusion of HOTS during home language lessons. This was followed by a post-observation interview immediately after the lesson was observed. In the second week of February the second participant's (T2) home language lesson was observed followed up by a post observation interview. Mathematics lesson of T1, followed up with a post-observation interview, was

conducted in the third week of February and T2's observation and post observation interview of her Mathematics lesson was observed in the first week of March.

The Life Skills lessons of T1 and T2 were scheduled for the middle of March and the last week of March, but the teachers had to accommodate the researcher before the 16 of March due to the Covid academic, as noted above. The data collected were 2 interviews, 6 observations, 6 post-observation interviews and 6 lesson plans and information from the CAPS (FP) document.

4.6 Data analysis

Cohen, Manion and Morrison (2000) affirm that qualitative research investigates the perspective of the participants, therefore data analysis involves making sense of the data through interpretation, identification of themes and patterns across different cases. This is supported by Manion and Morrison (2000), who affirm qualitative research investigates the perspective of the participants.

According to McMillan and Schumacher (2001:493), "Qualitative data analysis involves cyclical phases, discovery analysis in the field, identification of topics that become categories, and synthesis of patterns amongst categories". Qualitative data analysis is "the classification and interpretation of linguistic (or visual) material to make statements about implicit and explicit dimensions and structures of meaning-making in the material and what is represented in it" (Flick, 2019: 5).

Thematic analysis is the process of identifying patterns or themes within qualitative data. Braun & Clarke (2006:78) suggest that it is the first qualitative method that should be learned as "...it provides core skills that will be useful for conducting many other kinds of analyses". The researcher conducted a thematic analysis, where the data was presented in the form of vignettes of the two participants. The analysis of the data considered the themes, codes and categories that emerged from the vignettes.

In this study, the researcher followed Braun & Clarke's (2006) six-step framework, since it offered a clear and usable framework for thematic analysis. The framework encompasses the following 6 steps: (1) become familiar with the data; (2) generate initial codes; (3) search for themes; (4) review themes; (5) define themes and (6) write up the findings. The researcher realised that these steps are not necessarily linear, as she had to move between the steps many times while working with the data, making the process of analysis iterative.

The aim of a thematic analysis is to identify themes (patterns in the data that are important or interesting) and use these themes to address the research or say something about a phenomenon. A good thematic analysis interprets and makes sense of the data, instead of simply summarising it. Clarke and Braun (2013) caution that a common drawback in thematic analysis is to use the main interview questions as the themes, which typically reflects the fact that the data have been summarised and organised, rather than analysed.

A distinction is made between two levels of themes: semantic (analysis that focuses on interpretation and explanation of data) and latent (looking beyond what has been said or observed). Braun and Clarke (2006: 84) explain semantic themes "…within the explicit or surface meanings of data and the analyst is not looking for anything beyond what a participant has said or what has been written". The latent level "…starts to identify or examine the underlying ideas, assumptions, and conceptualisations – and ideologies - that are theorised as shaping or informing the semantic content of the data".

By way of explanation, the main patterns in the data from observations and interview analyses include classifying, coding and grouping (Patton, 1990:381). During the data collection process, the raw data were processed: semi-structured interviews, observations and post-observation interviews were transcribed, which is the process of transforming audio recordings and notes of interviews and observations into texts.

The researcher fully understood that thematic analysis allows for much flexibility, which could become entirely subjective. As a result, the researcher was aware of her own

choices and interpretations while analysing the data. Getting to know the data was achieved through transcribing the interviews verbatim, and reading multiple times through the notes of the three data generation methods: interviews, observation, and documentary data.

The researcher used hard copies of anonymised transcripts to code the data. Different colour highlighters were used to highlight sections of the texts, to emphasise various phrases corresponding to different codes. All phrases and sentences that matched the codes were highlighted in the same colour. New codes were added as the researcher worked through the data. An example of some categories that emerged from the coding of data and the literature reviewed are: questioning on different thinking levels; accommodation of learners' responses; purposeful questioning; classroom atmosphere; the use of different types of questions; follow-up on questions, etc.

To create themes, the different codes were analysed to identify patterns amongst them. Several codes were combined to form a single theme. After all transcribed data had been coded, the researcher studied and compared coded sheets, in order to note patterns, themes, contradictions, similarities, and differences. An example of one of the categories that emerged from the iterative process of analysis (sub-categories are shown in brackets) was approaches for the teaching of HOTS**,** which is drawn from Alexander's (2004) observable aspects of teaching. These include interactions, resources, methods of instruction, assessment, learning and teaching support material (LTSM), and values and beliefs of the teacher.

The themes created were reviewed to make sure that they represented the data accurately, and to find any similarities and differences across the themes of all data collected. The findings from these coding sheets were then written up. "One strategy that will ensure that you remain true to the original case is to involve other research team members in the analysis phase and to ask them to provide feedback on your ability to integrate the data sources in an attempt to answer the research questions" (Baxter & Jack, 2008: 555). To ensure authenticity and reliability of the analysis, the researcher's

supervisors read through the analysis, and provided feedback and recommendations to revise drafts of the analysis, until they were convinced of its trustworthiness.

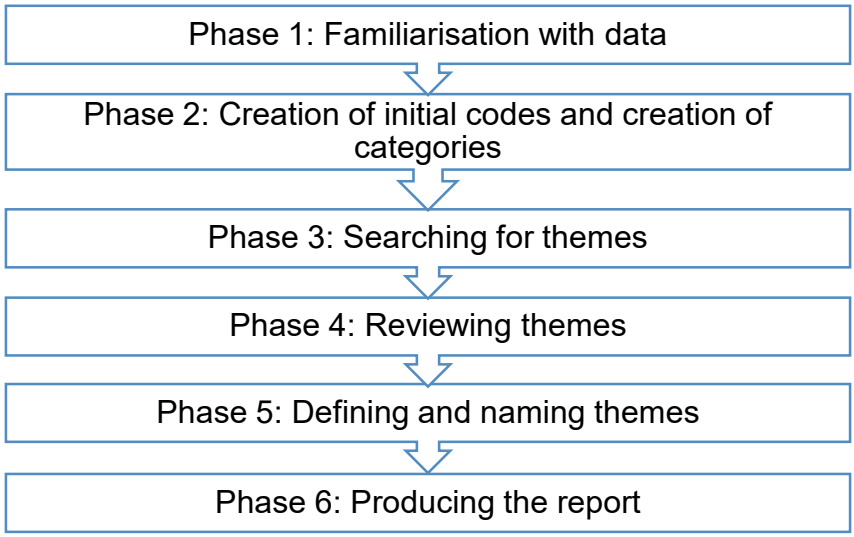

Figure 10: Data analysis

4.7 Trustworthiness

Validity and reliability in qualitative interpretivist research are not used as in quantitative research; instead the concept of trustworthiness is used. An essential characteristic of qualitative research is that it warrants the research reliable and believable in the authenticity with regards to the means used for research purposes. The strength of small scale studies lies in their trustworthiness, as they are not illustrative of the wider population. Trustworthiness certifies that the report and its findings are as accurate as possible, as qualitative research includes the investigation of participants' views. Rigorous, methodical and principled research is the basis on which the quality of qualitative research is shaped.

During the interviews, the researcher acted neutrally, without displaying any personal interest. This was enacted to enhance the degree of objectivity and to minimise the effect of bias (Cohen, 2002). Considering that this study included the exploration of participants' views, it was imperative that the report and its findings were as trustworthy as possible. Therefore the standards of rigour, represented by the credibility (measuring the study's

truth value), transferability (evaluating the study's applicability), conformability (determining the study's neutrality) and the dependability (assessing the study's consistency) as well as triangulation will be discussed (Ary, Jacobs & Sorenson, 2010:498).

4.7.1 Credibility

Structural corroboration needs to be met to enhance the credibility of the research, which necessitates using multiple sources of data. This was achieved in this study by collecting data from two interviews, six lesson observations and six post-observation interviews, including the review of six lesson plans.

4.7.2 Transferability

Transferability is the extent to which the findings of a study can be applied to a different setting or group of people from where the data will be collected (Ary et. al., 2010:499). Readers are the decision makers on whether the findings is transferable to their own contexts or not. Merriam (2002) states that transferability is authenticated by the provision of evidence that indicates to readers if the findings of the study could be applicable to other contexts, populations and situations. To facilitate this, a rich, detailed description of the study context is provided, as well as the raw data that reflect effective pedagogies of HOTS, and responses of learners and teachers.

4.7.3 Dependability

Koonin (2014: 259) explains dependability as, "The quality of the process of integration that takes place between the data collection method, data analysis and the theory generated from the data". In other words, the amount of rigour that can be ascribed to the consistency of findings encompasses dependability. In this study, a multiplicity of data collection instruments were used to establish that the phenomenon that was researched was adequately and representatively covered. The use of multiple data instruments, allowed for data to be studied from divergent angles.

4.7.4 Conformability

Conformability, according to Patton (1990), refers to the extent to which the data is checked by members. In other words, conformability is the extent to which the participants whom the researcher interviewed agreed with the transcription. To attain conformability, participants were asked to check the verbatim transcriptions of the interviews for accuracy. Both participants acknowledged that the transcripts produced a true reflection of their thinking.

4.7.5 Triangulation

A form of triangulation is multiple data collection techniques, which help to check the consistency of findings generated by different data collection methods (Creswell, 2010). Cohen et al. (2002:170) affirm that “One effective strategy employed to enhance the validity of research outcomes is that of triangulation”. They further state that in recent understandings of the concept of trustworthiness, it “can be addressed through the honesty, depth, richness and scope of the data achieved, the participants approached, the extent of triangulation and the objectivity of the researcher”.

The researcher achieved methodological triangulation of three data generation methods: interviews, observation and document review, to reduce the impact of being potentially biased, something which can occur in qualitative research (Cohen et.al, 2002). Yin (2003) notes that multiple data collection helps to permeate the limitations of other methods; for example, interviews provided information such as feelings and thoughts, which observations were not able to deliver. This approach was suitable to achieve the purposes of this study. Initially, it explained the meanings that teachers attached to their teaching pedagogies, allowing them to elucidate their thoughts.

Furthermore, it helped to explore the teachers’ pedagogies that they used to activate the learners’ higher order thinking skills. It facilitated a thick description of the patterns of thought and behaviour by teachers (Merriam, 1998: 38).

It assisted to overcome the limitations of a single method and created the opportunity to access more evidence of the phenomenon that was studied (Yin, 2003). Post-observation interviews were conducted with the participants after each lesson observation, which had the two-pronged advantage of seeking their perceptions of their teaching practice, and to confirm that the researcher had accurately interpreted the lessons that were observed.

Data triangulation was achieved by individual semi-structured and post-observation interviews, observation lessons and the review of different lesson plans. For example, in this study, each teacher was observed thrice, teaching the different subjects of Home Language, Mathematics and Life Skills. Data obtained from different situations and sources helped to strengthen internal validity of this study (Cohen et. al., 2002).

Member-checking: Cohen et al. (2002) describe this procedure as a technique to verify the researcher's interpretations with the participants' own. In this study, the participants were given their transcripts to check and give feedback about the accuracy and meaning of the findings, and also to remove or add any information as they wished. This technique reduced error and confirmed the participants' view as true, which allowed the researcher to strengthen the final report of the findings (Merriam, 2002).

4.7.6 Reflexivity

Researchers are cautioned to acknowledge potential bias as qualitative research is interpretive in nature, rendering thorough and sustained involvement with participants (Cohen et. al., 2002). In this study the researcher took on the role of interviewer, observer, reviewer of documents, collector of information, recorder of data, and analyser of data related to the participants. As the Head of Department (HOD) of the Foundation Phase, the use of reflexivity was embraced, thus weakening potential bias (Patton, 2015).

As part of the school management team, the educator and learners at the school experienced the researcher's presence in their classroom on many occasions. Therefore, it was significant to emphasise that the data obtained from the observations are not for

appraisal purposes. As an insider in the organisation, the researcher was aware that this positionality required reflection on, and careful consideration of, epistemology and methodology (Herr & Anderson, 2015).

Specific mechanisms for dealing with bias were employed by using the guidelines for validity criteria proposed by Herr and Anderson (2015), as well as triangulation of data, member validation and validation meetings as mentioned above. To overcome the Hawthorne effect, the researcher went into the classroom 10 minutes before the time, to avoid participants' wishes to impress, guide, deny or influence the researcher (Cohen et al., 2002:156).

To validate the development of the findings further, follow-up visits and post-observation interviews were conducted with participants, to seek clarity and validation on the interview transcripts and observations. The researcher was cognisant of and attentive to ethical issues, for example, confidentiality, informed consent and possible effects on the participants. In the next section, the ethical considerations are discussed.

4.8 Ethical considerations

In advance to the collection of data, ethical considerations were endorsed by the CPUT Faculty of Education Higher Degrees Committee (FHDC). Researchers need to set up their requirements with respect to the participants, who are involved in or affected by their research, to protect them from physical and psychological harm. (Cohen et.al 2002:49). This study involved educators as participants, therefore their right to privacy and confidentiality were given maximum consideration.

To ensure confidentiality, pseudonyms were used for the participants and the school, thus assuring that their professional integrity was not compromised. Consent was sought from the school's education board, Appendix B: Request for permission to conduct the study; Appendix C: Letter of invitation and consent to participants; Appendix D: participant biographical information; Appendix E: interview schedule; Appendix F: lesson observation schedule and Appendix G: post-observation interview schedule.

Prior to the research, participants were informed in writing about the purpose of the research, protection of confidentiality and management of data. All relevant role players were consulted. Permission to conduct the study was obtained from the school management and educators involved at the school. Informed consent was acquired by asking the participants to participate voluntarily in the study, as well as by giving an explanation of the research.

Participants were assured that they had the right to withdraw at any time, without any prejudice afforded to them. All information was treated as confidential and names of the school and teachers remained anonymous. Interview transcripts were represented to participants for verification and agreement. No data were fabricated. All interviews and observation recordings and transcriptions were stored securely in a computer accessible by password held by the researcher. All data and information related to the identity of the participants were kept securely.

4.9 Limitations to the study

This case study, using the qualitative approach, has some limitations. Considering that this is a small scale study, involving two Foundation Phase teachers, the findings cannot be generalised across the wider population. The sample of one school and one grade was not descriptive of all private Islamic schools on the Cape Flats in the Western Cape. The researcher was of the opinion that there is no single method of teaching and that learning occurs within the socio-cultural contexts of the learners, and therefore emphasis was placed on the different instructional practices that teachers employed to activate the higher order thinking skills of learners under their tutelage.

It was borne in mind by the researcher that a sample size should be large enough to address the research question and successfully define the phenomenon of interest at hand, as well as the fact that a considerable sample size runs the threat of yielding repetitive data. The possibility of saturation, which occurs when additional participants in a study do not result in further viewpoints or evidence, was also understood (Glaser & Strauss, 1967:40) . Consequently, even though the researcher used only one school to

lead the investigation, the sample size was rich enough to echo significant features in the population, but small enough to afford rigorous inquiry techniques (Patton, 2002).

Another limitation encountered by the researcher was the time restrictions during which the study was managed. In an ideal situation, doing the research over a longer period of time would have yielded the opportunity to ascertain the relative effects of the teachers' pedagogies, and how they changed or maintained their strategies over time.

4.10 Conclusion

This chapter described the research approach and design. This was achieved as the chapter illustrated a comprehensive qualitative investigation that comprised the research methodology, and referred to the research approach, the design and the data collecting techniques. The researcher employed a qualitative inquiry to understand and describe the perceptions and experiences of the participants in their quest to infuse higher order thinking skills in their teaching and learning.

A phenomenological design of inquiry was adhered to, which used transcriptions of participants' lived experiences to define their contexts, situation and conditions. Secondly, the data collection process, with regard to the site, use of purposive and opportunistic sampling, as well as the rationale behind the choice of data collection instruments, were expounded. Three data collection instruments were used: (1) semi-structured interviews and post-observation interviews; (2) observations; and (3) complementary documentary data sources such as the teachers' lesson plans for the lessons observed.

This chapter explored how ethical considerations were observed and also briefly explained how the collected data were to be analysed in Chapter 5. The duration of the above fieldwork took approximately two months. Interviews conducted lasted about 20 to 25 minutes each. The data analysis commenced as early as possible in the data collection process, as transcriptions of data could become time-consuming. It should be noted that the researcher acknowledged and adhered strictly to the social responsibility that

research intends and demands. The following chapter discusses the findings in relation to the research questions.

CHAPTER 5

PRESENTATION AND DISCUSSION OF FINDINGS

5.1 Introduction

In the previous chapter, the researcher covered the research methodology used in this study. In this chapter, the researcher presents and discusses the findings of the study, which seeks to understand how Grade 3 teachers infuse pedagogies of higher order thinking skills in their teaching. The conceptual framework outlined in Chapter 3, Shulman's PCK, Alexander's pedagogy framework and Bloom's taxonomy is drawn on and used to investigate and find answers to the research question and sub-questions below.

The participants of the study were assigned non-identifiable pseudonyms in order to organise, store and report the research findings, namely Saarah, and Aasiyah. The identities of the teachers were coded, to ensure their responses bear no consequence for their profession as teachers.

The first part of this chapter answers sub-research question 1: What do teachers understand by HOTS and what professional experiences do they have in teaching HOTS? In answering sub-research question 1, the researcher looked at the following: (1) their own schooling; (2) their definition of HOTS; and (3) their beliefs regarding HOTS. The rationale for looking at these three aspects was to gain insight into what they believed about the value of the concept for their pedagogy in general; as well as how they were prepared or what skills they had to teach HOTS.

The sub-research questions are presented for the individual teachers first and then by comparison. The chapter is arranged in three parts: the findings related to Saarah, followed by the findings related to Aasiyah across both sub-research questions are discussed. Then lastly, a summary and comparison of findings across both Saarah and Aasiyah are discussed.

5.2. Saarah

Saarah is a single female, in her late 40s, with a Bachelor of Education degree in the Foundation Phase. Saarah has teaching experience of more than 15 years and has been teaching at the school for approximately 10 years. She started her teaching career as a Grade R teacher at an informal educare centre. Saarah's home language is Afrikaans, but she has been teaching in the medium of English since she started at her current school. Her class consisted of 24 learners, of which all learners' home language is English, except for one learner, whose home language is Arabic.

All interviews were conducted during the teachers' free time at school, in the researcher's office, which allowed for privacy and noise reduction. All observations were concluded in the participants' classes, as both are Foundation Phase teachers, who teach their learners all four academic subjects. The 24 learners in Saarah's class comprised 10 boys and 14 girls, aged between 9 and 10 years old. Her learners' desks were arranged in order for them to work in groups and the teacher's desk was in the right hand corner, in front of the board, allowing the teacher to see all the learners in her class. Saarah has a big mat in the middle of her class, which she uses to teach group work. Her room is airy and filtered with natural lighting. Her walls are decorated with learners' work, posters which explain different concepts of different subjects, and some class rules that learners have to adhere to.

Saarah was educated in the apartheid era (prior to 1994), where learners had to listen to the teacher and accept all information that was taught as valid. According to Saarah, she and her peers did not have the opportunity to question their teachers. Saarah reflected that even though corporal punishment was prevalent during her schooling years, she enjoyed school and respected her teachers. HOTS was not applied during her time at school, because of the education ideology that was fundamental to apartheid education (see 2.3.2.1). Children who could retain information well excelled at school during that time.

In her own words Saarah stated **(Int: 5:02:20):**

> During my school years all 'Indians', 'Coloureds' and 'Blacks' were deprived of a good education. The education level was very low compared to the education level of the European ('White') schools. Schools were overcrowded and teachers could hardly cope with a variety of barriers in class. Teachers were not educated enough to deal with those barriers.

Saarah relayed that she was taught in a culture that discouraged the expression of individual views. It is the researcher's opinion that Saarah must break away from this habit in order to foster HOTS among her learners. This becomes necessary as the literature reveals that for a teacher to teach HOTS, the teacher must be able to think critically herself (Jacobs et al., 2016). This information brought the following questions to mind: How did Saarah's education inform her own practice? Was she able to break the cycle that the legacy of the apartheid education had on her identity as a teacher?

5.2.1 Teacher's understanding of HOTS

5.2.1.1 HOTS and teacher's own schooling

As stated previously, Saarah attended school during the apartheid era and was taught in a culture where the knowledge that teachers imparted were not questioned. Critical thinking was suppressed during that time. Learners had to sit quietly and listen to the teacher. Most of the teachers' questions were closed questions, with only one correct answer. Learners were expected to give answers as they were taught and this obviously resulted in the impediment of critical thinking (Hoadley & Jansen, 2010). Saarah reflected **(Int.: 5:02:20):**

> What I remember of my school years was that as a person of 'colour', we were deprived of a good education. The education level was very low compared to the education level of European (White) schools. Schools were overcrowded and teachers would discipline us with the use of a cane. But we had good times then. We respected our teachers and

> worked hard to please them. We all used to sit facing the board. The teacher would be the only one talking and we were too scared to speak to the teacher.

With the admission of the fact that she was scared of her teachers, we could assume that it was difficult for her to voice her opinion at the time. As a teacher in the 21st century, it must be easy for learners to talk to Saarah, in order for them to approach her with questions or anything that they need to clarify. This synopsis of Saarah's schooling, exemplifies an orientation to learning where the individual is seen as an 'empty vessel that needs to be filled'. At the time of her schooling, Saarah revealed that bodies of knowledge were imparted which could not be challenged by the learner.

The assumption that underpins the way that Saarah was taught is that learning is "orderly, predictable, and in particular, controllable" (Nieman & Monyai, 2010:73). Therefore, Saarah's schooling brings to mind the question: will the consequence of her own teaching impact on her views as a teacher? If not, what influences and experiences shaped her way of teaching differently to how she was taught?

On the basis of the above discussion, the researcher argues that Saarah needs to be a critical thinker herself to design lessons that are HOTS oriented, in order to nurture HOTS abilities among the learners under her tutelage. She must be able to create experiences and assessment tools to suit the specific needs and situation of her learners to deliver learners capable of HOTS.

Saarah revealed that she believes in life-long learning and that she furthered her studies for the following reasons **(Int: 5:02:20):**

> I wanted to empower myself academically to become an excellent educator, and to be able to identify learners with barriers and to be able to assist them as far as possible to become independent in the world. I want to help learners to better themselves. Teaching is not just a job where I can get a salary, but a passion to be able to work and mould learners to think open-mindedly or coherently with confidence. Using their ability to make the right decisions in life.

Saarah disclosed that she did not receive any training to teach HOTS, but that she gained her knowledge of HOTS through the CAPS document and other reading material. She explained that even though she had been furthering her studies, and had been busy with it for the past few years, she had not received any formal professional training regarding HOTS. She attended a few workshops a few years earlier, where HOTS was mentioned, but it was not discussed in depth. Upon reflection, Saarah felt that training of any sort in HOTS pedagogy, would be of benefit to her. Saarah seems to realise the importance of the explicit teaching of HOTS pedagogy to educators, even though she does not say it in so many words. She also realises that her knowledge about HOTS is fairly limited **(Int: 05:02:20):**

> Only books. And the books don't always help. We never actually had classes where we attended to study about it. I am busy with my studies now for the past few years. It was a correspondence course with a university. They had university classes, where they give you assignments. And they had university classes to prepare for your exams. But they also don't go into detail with you regarding HOTS.

By reflecting on the various influences in Saarah's life examples, the researcher became aware of the many-faceted and complex ways in which her professional experience has grown. Her knowledge developed through what she was taught explicitly (the way she was taught at school and university, the political beliefs at the time in which she grew up and the dominant educational practices she was exposed to. Her way of teaching could be modeled on the things she learnt implicitly in the way she was taught at school or university. These influences shape the person or teacher who that person becomes. Saarah brought to light that she grew up in an intensely strict but supportive environment. It is the researcher's assumption that these experiences could predispose Saarah to advance her teaching approach in a structured and mostly teacher-centered way, as stated by Hoadley and Jansen (2010:127-128).

5.2.1.2 Definition of HOTS

Saarah explained her understanding of HOTS in the following words **(Int: 5:02:20):**

> To give them the opportunity to give you answers, about their opinions and thoughts or answers - Hmm. They must also tell you…or give reasons why they say so.

Her responses to this theme appears to indicate that she understands the importance of HOTS. She seems to understand that the advantages of HOTS encompass the ability of learners to solve complex and various problems. In the semi-structured interviews, the data revealed that Saarah had some idea of what HOTS entails and expressed different viewpoints. Saarah suggested that **(Int: 5:02:20):**

> For me HOTS give learners, allow the learners and encourage them to think beyond normal questioning, reasoning, memorising and simply remembering things. It also promotes critical thinking.

The above précis of what Saarah believes HOTS to be appears to be compatible with research findings. HOTS include critical, logical, reflective, metacognitive and creative thinking (Paul and Elder, 2019). Saarah seems to hold the idea that the culture of learning, which prevails in many South African classrooms, should be avoided. She believes that HOTS encourages learners to move away from simply sitting and listening to teachers in order to remember enough information to pass a test. Saarah's understanding seems to accord with the view of Postman and Weingartner (1969: 19) who state that passive learning should be guarded against in the quest to promote learners' HOTS. Saarah implicitly confirms the understanding that breaking away from these forms of learning promotes HOTS.

5.2.1.3 Teacher beliefs regarding HOTS teaching

Saarah appears to believe that for the development of HOTS, the learners need background knowledge in the learning area or context, and that they should make these connections to their prior knowledge. She stated **(Int: 5:02:20):**

> The learners build on their own knowledge that they have and through experiences that they went through already.

In Saarah's perspective, for learners to gain strength in the art of HOTS, opportunities should be created for them to practice them on a regular basis. Her apparent conviction becomes evident when she says **(Int: 5:02:20):**

> With the practice of higher order questions, their skills improve and increase. The more they do it, and the more questions you ask them, the more their knowledge and their thinking increases. It is where you take facts or concepts that you are busy teaching them. They can apply it to when they seek new knowledge.

This is congruent with Thorndike's (1932) principles of learning whereby the "law of exercises" espouses the theory that things most often repeated are best remembered and that learners do not learn complex tasks in a single session**.** Saarah seems to display the understanding that acquisition, organisation and application of knowledge is important for teaching and learning. This is achieved by ensuring that a concept or skill is not taught before the learners are ready to learn the new concept. This readiness refers to a combination of "maturity, ability, prior knowledge and motivation" (Jacobs et al., 2016:173).

Saarah further justifies why she teaches in the manner that she does **(Int: 5:02:20):**

> At this school I am lucky. Most of my learners' home language is English, which makes things easier for me, than my peers at the state schools. I only have one learner whose home language is Arabic, and since she is here from grade R, her language proficiency is

adequate. Most of the parents of my learners are very involved in their learning, and this allows for the success in way I teach, I think.

Saarah acknowledges that the context in which she teaches frames the choice of teaching strategies that she uses. Saarah also seems to imply that it is easier to teach HOTS effectively to learners who are in quintile 4 or 5 schools than learners coming from lower quintile schools (see section 2.6). She also refers to fact that the home language of almost all her learners is the same as their language of learning and teaching (LoLT), which is English. This means that she do not have to struggle with learners' who are not being taught in their home language. This indicates that the LoLT has an impact on the development of HOTS (Jacobs et al., 2016).

Saarah seems to believe that the higher quintile schools hosts families that come from a richer background and home environment. Thus the parents of these learners have more time at home, which affords the learners more exposure to adult communication, than their lower quintile counterpart learners. Most parents in lower quintile schools do not have their own transport and live further away from their places of work. They will thus have to use public transport, which takes up more time out of their day, affording their children less adult communication time. Parents of learners in the higher quintile schools are generally more equipped to assist the learners with their schoolwork, and will also have more resources to do so, than parents in the lower quintile schools.

In the same vein, the researcher argues that the LoLT plays an integral part in Saarah's infusion of HOTS, as the learners do not have the added issues of translating into their HL before engaging with HOTS (see section 1.1).

This explains why Saarah is able to engage her learners in the pedagogy that she is doing. Learners in this quintile would be more receptive to the teaching of HOTS because of their richer cultural background and LoLT, which is their HL. The data reveals that HOTS development is easier when dealing with quintile 4 or 5 learners due to their home environment, and learners whose HL is the same as their LoLT.

Saarah sees the value of HOTS, as indicated in her comment below **(Int: 5:02:20):**

> Children of today are exposed to so many things in this world…hmm via the internet, Youtube, television and they even see things on the road outside and in front of their houses. So I feel it is important to get them to think critically. So that they can be prepared for this life out there.

This summary indicates that Saarah seems to believe HOTS is important in the everyday lives of learners. That they need critical thinking to make positive life choices. She further stated **(Int: 5:02:20):**

> It is important. But it depends on the learners' level that you are currently…. That you have in your class. Will the learner be able to cope with it? Then there is others that need a little bit more time with the lower order …level of Bloom.

In the above synopsis, it seems that even though Saarah has an idea of the value of HOTS, she also displayed some doubts regarding HOTS and her weaker learners. This view may cause Saarah to treat her learners in a non-egalitarian way. In their study to ascertain if low achieving students benefit from learning processes that are designed to foster HOTS, the main findings of Zohar and Dori (2003) suggest that teachers should encourage learners in tasks that involve HOTS, irrespective of their academic proficiency.

Saarah implied the value of life-long learning and realises that the teaching of HOTS starts from early at the primary school and should be inculcated right through the learners' path of learning, when she said **(Int: 5:02:20):**

> Thinking skills you just don't develop in grade three. It already starts in grade 0. Where it goes to secondary school and even further to higher education.

With this statement, Saarah seems to understand that thinking skills are developed over time. She indicated that these skills continue into the different phases of schooling and

university. She also seems to believe that the purpose of HOTS is to be able to manage and survive in higher levels of education. Snyder and Snyder (2008) state that the main goal of HOTS is to produce life-long learners who are competent in the twenty-first century.

HOTS activities inspire learners to make judgement calls, to motivate their viewpoints, to see relationships between problems, to find answers to problems, to infer, and to make predictions, etc. (Nieman & Monyai, 2010:81). Saarah indicated that she aspires to the following outcomes **(Int: 5:02:20):**

> Preparing the learners to be critical, independent and creative thinkers and to become competent citizens of our country. I want them to… to identify and solve problems, work well with others in groups. I want them to be able to be respectful, not just towards me, but also to their friends. Through participation children learn to be aware of potentially dangerous things to them and their friends. HOTS will make them think of being safe. Not just doing anything without looking at the pros and cons.

This seems to give the impression that Saarah understands what the aims and goals of teaching HOTS are. The above summary defines Saarah's understandings and beliefs about HOTS. The following is a discussion of her pedagogy to infuse HOTS.

5.2.2 Pedagogy

It is generally accepted that the successful implementation of HOTS, or any curriculum for that matter, is central to the teachers having a substantially established individual construct. This necessitates teachers to be knowledgeable in regard to pedagogical content knowledge (PCK) of HOTS (knowing what to teach and how to teach it). Shulman (1987) describes PCK as the knowledge the teacher has about how children learn and includes the knowledge about any misconceptions the learners may encounter, and how to address those misconceptions.

To expand on Shulman's theory, the researcher found it best to draw on Alexander's (2008) conceptualisation of pedagogy to analyse the observation of the participants' lessons. Both Saarah and Aasiyah's pedagogy in relation to some of Alexander's observable aspects of teaching are discussed: resources, interactions, methods of instruction, assessment, and LTSM. The researcher used Shulman's PCK, Bloom's taxonomy and Alexander's conceptualisation of pedagogy and their interconnectedness as the lens to observe the lessons presented.

5.2.2.1 Resources

Saarah's class evidenced a display of concrete apparatus and manipulatives for Mathematics teaching and learning. A variety of teaching aids were observed, such as different textbooks and the CAPS document. Loads of fiction and non-fiction books on the level of the learners were found in the reading corner, of which about 20% was in Afrikaans, while the rest were English books. These resources were easily available to the learners.

Saarah's class had 'word walls' displayed in both English and Afrikaans, and one section of the wall was used by the Arabic teachers to display their Arabic alphabet and words. Afrikaans is the first additional, while Arabic is the second additional language at the school. Bright and colourful charts of all four subjects taught in FP were displayed on the walls, which made the classroom print-rich and conducive to teaching and learning.

The literature reveals the importance, especially in the Foundation Phase, for children to learn things by physically manipulating objects, and here Saarah made ample provision for that, with the sorting and classifying of the different shapes. Saarah mentioned that she has ample resources available to assist her in teaching for HOTS **(Post Int: 12:02:20):**

> I must say, that the school has ample resources for me to use when I teach a lesson. We built up lots of resources over the years, like textbooks, mathematical kits, physical education apparatus etc. If there is anything that I need, and the school does not have, I usually send in a request to the school management or I ask my parents to supply it. For

instance, when I needed different shapes for my lesson, the learners brought all these different shapes and boxes from home.

5.2.2.2 HOTS and teacher's planning

The planning of lessons in advance is key to the successful delivery of lessons. However, teachers should guard against following the plans rigidly, without making use of "teachable moments" that arise during the lessons (Jacobs et. al., 2016:15). In response to the interview question on the important aspects she includes in her lesson planning, Saarah stated **(Int: 5:02:20):**

> I use Bloom's taxonomy. The different levels of questioning. I will most of the time divide my class actually into different groups… In the CAPS document they show us what to ask for on the different levels.

For the categorisation of educational objectives, Bloom's framework offers a clear distinction between higher and lower order thinking. Higher order thinking incorporates analysis, synthesis and evaluation, while lower order thinking includes knowledge, understanding and application (Bloom, 1974:18). According to Bloom's taxonomy, the following indicates the amount of objectives and questions planned for the different levels, from all Saarah's lesson plans in Table 5.

Table 5: Objectives and questions on levels of Bloom's taxonomy of Saarah

Levels of cognition	Key words to activate thinking on this level	**Saarah** - times used in lesson plans
Evaluation	Evaluate, judge, decide, choose, select the best, appreciate, which of the following is the best	2

Synthesis	Construct, formulate, suggest, design, what would happen if, plan	3
Analysis	Determine, analyse, distinguish, deconstruct, find the cause, identify	6
Application	How would you, demonstrate, solve, calculate, explain how	2
Comprehension	Describe, compare, explain, why, distinguish, explain in your own words, rearrange	24
Knowledge	Where, with, who, define, when, how, list, name, how much, what is,	48

The documentary data from Saarah's lesson plans indicates that her planning is somewhat superficial, specifically in the aspects of teaching HOTS and general assessment for learning. The basics of the lesson that she is going to teach are covered and some of the activities are included, but there is little evidence of the types of questions that she is going to use in her lessons. When asked during the post-observation interview about her planning, Saarah explained **(Post-Int: 12:02:20):**

> Because I am teaching this lessons for the past 10 years, I don't have to plan that much. My experience allows me to teach the lesson and I know more or less what to expect in the lesson.

Saarah suggests that she relies on her expertise and memory, therefore she does not prepare her lessons for HOTS in any depth. This stands in contrast to the view of Jacobs et al. (2016), who posit the importance of planning for HOTS.

5.2.2.3 Interactions and pedagogy to promote HOTS

In all of Saarah's lessons the learners were actively involved in the lesson. The rapport between Saarah and her learners was polite and relaxed. The learners were not too shy to ask questions and they were eager to assist one another during their group activities. Saarah's classroom seemed organised and her learners knew exactly what was expected of them.

5.2.2.4 Activating learners' prior knowledge

In this section of the English home language lesson in figure 5.3 below, Saarah taps into the learners' prior knowledge. Subconsciously, she is transferring their Life Skills knowledge into her English lesson. This reflects the opinion of De Bono (1992) noted in (section 3.4.2), that when authentic learning activities are practiced in a school setting, the transference of HOTS is possible to deal with problems experienced in daily life **(Obs. 26:02:20):**

Box 1: Excerpt of Saarah's English lesson depicting transfer and use of learners' prior knowledge

T1: Today we are going to do a comprehension. Who can tell me what does the word comprehension mean? Who can tell me? Yes?

L1: A paragraph.

T1: Yes a paragraph. What else can you tell me about the comprehension?

L1: They ask questions and you must answer.

T1: Yes, you need to read, you need to comprehend. Remember what you read and then you will answer the questions ok. So today's comprehension that I gave you is called Butterfly… Butterfly Facts. But firstly, who knows what a butterfly is? Don't shout out the answer. Put up your hand. Yes L2?

L2: A living thing

T1: Yes it is a living thing. Give me more information?

L3: It has different stages

T1: I don't want stages. I want know what is a butterfly? Okay, it seems that you do not understand my question. (Teacher takes out a rose from her vase on the table and holds it up so that everyone can see it). What is this?

Learners' chorus: A rose!

T1: Yes! So how can we classify it?

Learner' chorus: A flower

L3: (Looks at the teacher uncertainly)…mmm

T1: L3, your two cats at home…I will classify them as animals…so L3, What is a butterfly?

L3: (Face lights up) Miss…the butterfly is an insect

T1: Thanks. A butterfly firstly is an insect. A butterfly is an insect right. Who can tell me how many body parts does a butterfly have? Yes sir.

L4: Three.

The strategy of activating the learners' previous knowledge is evidenced in the above transcription of Saarah's lesson (Box 1). Saarah indicated that the saying below is displayed on a poster in her class, to assist and remind her to implement it in her lessons. During the interview session, Saarah related aspirations to the following outcomes **(Int: 5:02:20):**

> My mantra of teaching is the age-old saying: "Tell me and I forget; teach me and I remember; involve me and I learn." I believe that every learner comes with their own knowledge and I try to tap in on it. So before I start my lesson, I always draw on their existing knowledge, by questioning them.

Reflecting on the above extract, the interactions between Saarah and her learners are relaxed and Saarah acknowledges their input by responding to their answers. This seems to make the learners eager to participate in her lesson, because they feel valued.

5.2.2.5 Questioning

The observation data revealed in the context of Saarah's Life Skills lesson on Hygiene, the objectives and questioning that she used, can be located at the lower end of Bloom's taxonomy. As this excerpt of the lesson indicates in Box 2:

Box 2: Excerpt of Saarah's Life Skills lesson depicting the telling method

T1: Today we are going to do the topic Hygiene. Who can tell me what hygiene means?

L1: To stay healthy.

T1: To stay healthy. Hygiene?

L2: To eat healthy food.

T1: Not healthy foods. Hygiene has to do with cleanliness. Right here is the word 'cleanliness'. Right, so hygiene…look on the board. Hygiene is firstly to prevent us from getting diseases. Remember, if you don't wash, what is going to happen?

L2: We are going to stink.

Further on in the lesson…

T1: How many minutes must you wash your hands?

L1: 20 minutes

T1: No, two minutes. Two minutes and not twenty minutes. Then you need to rinse it properly with a bit of warm water. Remember that you can burn yourself if the water is too hot. You need to wash your hands thoroughly.

Saarah's lesson seems to have taken on the form of 'the telling method', where the teacher gives an oral presentation about a topic to a class. The telling method is the oldest and most used method of teaching (O'Grady, 2008:4). In higher education it takes on the form of 'lecturing' and in schools it is referred to as 'explanation'. Criticos, Gultig and Stielau (2009:195), define explanation as "structured teacher-talk aimed at clarifying concepts so that students are able to understand them. In order to work, an explanation must engage students and change the way in which they think".

The researcher notes a relationship between the telling method that Saarah engaged in, and Bloom's taxonomy, with the words "change the way in which they think", as both have the objective of enhancing the thought processes of learners. All six levels of the taxonomy identified by Bloom can be developed with the telling method. To clarify, the rationale for the use of the telling method is to assist learners either to remember, understand, apply, analyse, evaluate or create something (Jacobs et. al., 2016:163). From this we can derive that more than one of these thinking levels can be used in the same lesson.

For instance, when Saarah uses the telling method, she seems to want her learners to understand and remember the importance of washing their hands and general hygiene rules. The data reveals that she made use of these levels (understand and remember), which are found on the lower level of Bloom's taxonomy.

It was interesting that during the interview she talked about Bloom's taxonomy. She seemed to have a theoretical understanding of it, but in the practical sense, it was not visible in her class. Given the lesson that she did, could she have asked different questions? If her planning was more detailed, would it allow her to activate her learners' HOTS?

To answer these questions, the literature reveals that the way a question is structured is important, as well as the planning of it (Nieman & Monyai, 2010:130). The types of questions teachers ask should cover different levels of thinking. For example, open questions expand learners' thinking and often have more than one correct answer, which avoids answers eliciting a 'yes' or 'no' response.

Upon reflection of her lesson on what she would do differently, during her post-observation interview, Saarah indicated **(Post-Obs. 18:03:20):**

> I would do a practical lesson. Take them to the toilet and actually show them the running water and how they must wash their hands first. They must wet it. Close the tap, not to

> waste water. Apply hand wash and rub their fingers for a minute or two. Maybe showing them practically will help better.

The researcher argues that the lesson could have been excellent if Saarah had brought the real world into her lesson and incorporated more levels of thinking. In the post-observation interview, Saarah explained the reason for her choice of strategy **(Post-Obs. 18:03:20):**

> I gave each group a specific topic, and they had to give me feedback on what they understand of the topic that I gave them. That is how I find out that they are actually using their thinking skills. What is actually really happening in their heads and what is their understanding on that specific concept.

Her response suggests that she was working towards the learners' understanding of the concepts in this particular lesson. Even though Saarah displayed knowledge of Bloom's taxonomy to guide her teaching, it did not filter through so clearly in her practice. There were many questions asked and learners were actively involved in the lesson, but the data revealed that the questions posed were all closed questions, which stimulated one word answers or choral responses from the learners in the context of this lesson.

5.2.2.6 Cross-curricular teaching

Stepping into Saarah's class for the observation of her Mathematics lesson, two learners were absent. At the start of the Mathematics lesson in Saarah's class, learners did some counting at their tables, while Saarah walked around counting with them. Thereafter, the learners were placed into different groups with different types of objects at their tables. Different two- and three-dimensional objects had to be sorted and learners had to give a presentation on where these objects could be found in their surroundings. Saarah displayed a good rapport with her learners by making jokes in during the lesson. Box 3 is an extract of Saarah's lesson where she rectifies a language concept in her lesson. This seems to demonstrate that various subjects can be connected, as proposed in the literature.

Box 3: Excerpt of Saarah's Mathematics lesson demonstrating cross curricular teaching

T: Who can tell me the difference between a 2D and 3D shape?
L1: Their dimensions is different miss.
T: Watch your language, L1. Do we say 'is' or 'are' different?
(Learners laughing) Choral response: 'are'!
T: Yes, L2 can you explain to L1 why we use the word 'are'?
L2: We use 'is' when we talk about one thing, miss… and 'are' for more than one thing.

In the above extract Saarah seems to make use of the opportunity to bring in some language rules into the Mathematics lesson. Saarah also encourages talk between learners when she asks L2 to explain something to L1.

Saarah's mantra for teaching, to involve her learners in her lessons, as mentioned earlier, is also evidenced in the context of her Mathematics lesson. During the post-observation interview, Saarah seemed satisfied with her lesson. She mentioned that the only thing she would change would be to take the learners outside of the class to physically touch and look at the different shapes that they identified. She said **(Post Obs. 12:02:20):**

> I won't make any changes but I will add to it. Have a little more of kind of 3D shapes so the children can see and so that I can maybe take them out one day and show them outside. Maybe that is what I will add, but I won't change anything.

5.2.2.7 Transfer of knowledge

The transference of knowledge to develop HOTS is evidenced in Saarah's Mathematics lesson, of which the value is found in the literature review (see 5.4.2.6). The following extract in Box 4 depicts the transference of knowledge, where the learners must name the different kinds of shapes they see in the classroom or outside **(Obs. 12:02:20):**

Box 4: Extract depicting transference of knowledge

T: So everywhere where we drive around, even in class, we are surrounded by 2D shapes and 3D shapes. So I want you to tell me where you find the different shapes in the environment, whether it is in class or outside.

L1: In the class….The table miss…it's a rectangle.

T: Ok, L1…what kind of shape is a rectangle?

L1: A 2D shape?
(Learners shout: teacher…teacher!) It's a 3D shape!

T: Right, let us hear. L2, why do you say it's a 3D shape and not a 2D shape?

L2: Because a 3D has 3 dimensions. Length, width and height. And a 2D has 2…only length and width.

T: Let's give L2 a round of applause. (learners clap) Now where else would we find another 3D shape?

L3: In the toilet, miss. A cylinder shape. (Class laughs) …the toilet paper roll.

T: Where else would we find the cylinder shape?

L4: The rolling pin (Making the movements of rolling a piece of dough) Teacher and whole class start laughing.

T: Yes, it is something that we use at home. Where else can we find a cylinder shape?

L5: A bin.

T: Yes what still?

L6: A hose pipe.

T: A hose pipe yes.

Saarah brought the real world into her class, when she asks her learners to think about where the kinds of shapes could be found in their environment. This seems to be in agreement to the literature reviewed in chapter 3, that in the quest for transference of knowledge to take place, learners should practice HOTS in all domains and subject areas (Halpern, 2001).

5.2.2.8 Assessment

Saarah related that she assesses HOTS in the following manner: **(Obs. 12:02:20)**

> I will specify clearly to my learners what I want to assess. I will maybe give them a task (booklet form) and the learners must do their own research on a specific topic for me and then they must do a presentation in class. (Hmm) Yes, that is how I assess them.

The above sketch suggests that Saarah's ability and understanding of measurement and assessment of HOTS is limited. The researcher argues that HOTS is one of the key aspects in the current education milieu, and that the onus does not singularly fall on the teacher for the successful implementation thereof. Other stakeholders, like the government, which promotes these policies, educational experts and stakeholders should all partner together for the successful implementation of HOTS. This can be achieved through the professional development of teachers with regards to HOTS development (Retnawati, Djidu, Kartianom, Apino & Anazifa, 2018:215)

Saarah reflected during the post-observation that her choice of strategies works for her in her class. In her own words, Saarah explains **(Obs. 26:02:20):**

> I feel that it works for me. The learners know what I expect from them. I feel it is to find out what learners are really thinking. What is really going on in their minds? Sometimes a child reads a question then he answers it from the passage just like that. But when… I think if you ask the child explain, define, and give more information, elaborate… They will come out with their own thoughts and ideas.

The above summary of the interview suggests that Saarah understands that the type of questions that she uses is important. The way a question is structured will provide either a closed answer or an answer that stretches the learners' thinking. Curiously, earlier Saarah could not articulate her assessment strategies that she used to promote HOTS, but it comes out clearly in the above summary of the interview that her questioning

strategy forms part of her assessment. Below it is evidenced in the synopsis of her Life Skills lesson (Box 5) **(Obs. 18:03:20):**

Box 5: Extract depicting Saarah's assessment of HOTS

T: Symmetrical. Where else do we find the word symmetrical? Who can tell me? Yes ma'am?

L1: In our Mathematics, miss.

T: In mathematics yes. Hmm… Who can tell me how we use 'symmetrical' in Mathematics? (Most of the learners put their hands up and shout "miss…miss") Ok, let's hear what L2 has to say. Give him a chance…Listen carefully and if your answer is different to his, we will listen to you.

L2: Miss…symmetrical means it looks the same. So it means that the butterfly has symmetrical wings…

T: Yes, it looks the same…Does anybody want to add to L2's explanation?… Yes, L3

L3: It's like a mirror image. When you look in the mirror you see exactly your same face like you have.

L4: Miss! When we went to "Butterfly world in Ms X's class, the man said we get different kinds of butterflies… They belong to different groups (smiles)…I love butterflies miss. (Learners laugh).

T: Ok, class… I want you to look at this word (starts to write on the board) SPECIES… say the word…This is the scientific word for "different groups" that L4 mentioned.

L4: Yes miss! The man at 'Butterfly World' told us you get almost twenty thousand different species of butterflies in the world.

T: Oh, that's lovely. I can see that you are really interested in butterflies. That's so awesome.

L4: Yes miss…my mom gave me a book just on butterflies.

T: Great, maybe you can bring it along to school one day, and then you can tell us a bit more on what you know.

5.2.3 Constraints to the implementation of HOTS

The framework used to analyse constraints in Saarah's lesson comprises (1) government policy and policies; (2) how the school is managed and governed; (3) context of the

learner (background, home, family, community, resources etc.); and (4) gaps in teachers' own practice.

5.2.3.1 Weak learners

Saarah disclosed that she experiences different forms of constraints in the teaching of HOTS **(Int. 5:02:20):**

> What I can say now is some of my learners that are weak that cannot read, so maybe they will have difficulties. Like I said earlier on with this higher order questionings. They will not quite understand what I am referring to. So I need to first work with them. Like I said from the lower level up onto the higher order questioning. The learners that cannot read as yet. And we do have a lot of them.

This suggests that Saarah realised the importance of lower order thinking (LOT) questions to build on to HOT development. She seems to believe that struggling learners do not have the ability to engage with HOTS, which can become detrimental to the weaker learners' HOTS development. Research findings indicate that all learners are able to think critically, if they are exposed to it, through explicit teaching and practice. The studies of Heyman (2008) and Facione (1990) have shown that being able to read is not a prerequisite for children to think critically (see 5.4.2.6).

5.2.3.2 Time constraints

Saarah seemed a bit agitated when she signified that she experienced time constraints: **(Int. 5:02:20)**

> There just isn't enough time to concentrate on learners' HOTS as I would like to. All our work and assessments have to be done by a certain time. The admin that we have to complete, takes up so much of a person's time. I think it's ridiculous! Sorry for getting so upset, but it really frustrates me.

Saarah revealed that her administration duties compelled her to work against time, in order to cover all the work that the learners had to finish according to the CAPS document. Saarah seemed irritated when she shares that the external Systemic Exams that the grade 3's write for the Department of Basic Education also impact on her time **(Int. 5:02:20):**

> The systemic tests that we write every year takes up a lot of my teaching time, as I have to prepare my learners for it. The school board measures our value to how successful we are in our systemic exam (sighs). I have to do a lot of practice with them, to teach them how to answer the questions etc.

The systemic assessments that Saarah refers to are executed on an annual basis across South Africa. This is to scale the standard of all learners' work nationally, in order to ascertain the areas in which the learners need intervention. In South Africa, the grades 3, 6 and 9 learners are assessed on their Mathematics and Language skills by external examiners annually (de Jager, 2015:108).

5.2.3.3 Gaps in teacher knowledge

Saarah revealed from the onset of the interview that she had not received any formal training regarding HOTS. She also revealed that she did not really know as much about HOTS as she would like. She expressed the shortcomings in the following way **(Int. 5:02:20):**

> I would really like to learn more about HOTS, so that I can be more confident in my understanding of it. It would be so much better if someone can show me practically how to do it, instead of just me reading about it… (Blushes).

Saarah realises that her understanding and pedagogies of HOTS can be improved through professional development. She also refers to the value of being taught HOTS through demonstration instead of theoretically.

5.2.3.4 Conclusion for Saarah

Now that the researcher has discussed in detail Saarah's practices and her professional experiences, and her understandings and beliefs about HOTS, the following section discusses Aasiyah in the same manner.

5.3 Aasiyah

Aasiyah is a married female in her late 20's, with an Honours degree in Islamic Studies. She is in her final year of her Postgraduate Certificate in Education (PGCE) in Foundation Phase. Aasiyah has been teaching at the school for 4 years of which this is her 1st year as a grade 3 teacher. She has a class of 24 learners of which the home language of all the learners is English.

Aasiyah is passionate about teaching and stressed that one of the main things she focusses on in her lessons is body movements and to get everybody thinking and involved in the lessons. She also aspires to show the learners that what they learn in school is relevant to their home environment. Her home language is English.

Aasiyah seemed a bit apprehensive and nervous at the beginning of the interview, upon which the researcher had to make an extra effort to make her feel comfortable and at ease, by explaining to her that the research is not for appraisal purposes, but instead to understand her approach and understanding of HOTS.

5.3.1 Teacher's understanding of HOTS

5.3.1.1 HOTS and teacher's own schooling

Aasiyah was schooled in the post-apartheid era. She was introduced to critical thinking with the implementation of Outcomes Based Education (OBE). Her schooling years exposed her to collaboration with others. At school Aasiyah was taught HOTS by using the concepts such as making inferences, developing a questioning attitude and thinking

critically. According to Aasiyah, her school teachers provided her with many situations that compelled her to think deeply about her responses **(Int. 7:02:20):**

> In primary school, they would provide clues to guide my thinking, but in high school they allowed me the freedom to think creatively and solve problems either in a group or independently. At varsity, I was taught to think more critically. This might also have to do with the fact that I studied Critical Media Studies, in which I was taught to pay careful attention to every single word - because they are carefully selected when used, and to look out for key words such as “allegedly” in a newspaper and so on.

This made her more aware of examining word choices and think about her answers more carefully, while studying, and in her professional life as an educator. To Aasiyah HOTS and reading are intricately related, as taught in her critical media studies classes. She tries to implement HOTS in all of her lessons at least once or twice per week. She further divulged **(Int. 7:02:20):**

> My high school Mathematics teacher noticed that I was struggling to solve certain sums and she encouraged me by showing me different methods to get to the answer. This gave me a lot of confidence, because it helped me realise that there isn’t only one way to find answers. My high school teachers taught me various ways to connect concepts and ideas so it made it much easier for me to cope with university level work and to question myself and use methods that works for me, in order to connect ideas to address real-world problems.

Aasiyah passionately explained that this is what she aspires to teach her learners. She wants them to become independent and to think critically. Even though she was schooled with HOTS in mind, Aasiyah only received professional training in HOTS pedagogy in the 1st year of her PGCE. She felt that she, and most of her colleagues, would benefit from courses which focus on the teaching and implementation of HOTS.

As noted above, Aasiyah completed a course in critical media studies, which empowered her to think critically and engage in HOTS in her personal endeavours as well. She

disclosed a choice she had to make when she was younger. She was asked to get married before she completed her degree. Aasiyah was at crossroads in her life, because she wanted to get married, as well as please her parents who encouraged her to get married, but she also needed to complete her studies. She weighed her options and asked her then future husband if he could wait for two years. Even though it meant that they would not be able to court in the two years, due to their religion, he agreed and they eventually got married when she completed her studies.

Aasiyah reflected on her choices and feels liberated that she could make these decisions on her own, and she is also pleased with the results **(Int. 7:02:20):**

> I feel that with the responsibility of marriage and the time that I had to engage with my studies, would have been detrimental to my relationship with my husband. We both needed the freedom and time to work on our marriage. I feel we needed the time to get to know each other. And now that we are strong in our relationship, I could further my studies.

Aasiyah seems to believe that HOTS is important for learners and this opinion was developed through her years at school and at university, reading articles on HOTS and gaining information from the CAPS document and internet. It seems as if Aasiyah's life history prepared her for the successful implementation of HOTS.

5.3.1.2 Definition of HOTS

Research has shown that ordinary thinking is not as complex as critical thinking, as critical thinking involves the ability to argue a point, well-thought argumentation and presentation of opinion that is supported by evidence. During the interview, Aasiyah stated **(Int. 7:02:20):**

> I think that HOTS is about getting the learners not to answer questions verbatim. So they should not give just one word answers. It's about getting them to think deeper when they answer questions.

This idea seems in keeping with the notion that HOT encompasses thinking that is higher than retelling something to someone exactly the way it was told to them. That learners should be able to do something with facts learnt, instead of just restating them. They should be able to understand them, connect them to other concepts or facts, manipulate them, put them together in different ways and apply them to find new solutions (Thomas & Thorne, 2009).

This appears to indicate that Aasiyah has a fair idea of what HOTS entails. She seems to understand that learners should think before giving feedback, by stating their opinion in an organised manner. Her understanding hints that she is aware that deep thought and consideration form part of HOTS. The philosophical perspective focusses on the ideal thinker, where HOTS is considered as the norm of good thinking (Lipman, 1980). This is evidenced in Aasiyah's answer to the question of what she thinks HOTS is about. She seems to understand that one word answers, and answering questions verbatim do not constitute deep thinking (HOTS).

5.3.1.3 Teacher beliefs regarding HOTS teaching

The data suggests that Aasiyah believes that she needs to apply the participative approach in her quest to facilitate effective HOTS learning within her classroom **(Int: 7:02:20):**

> I think interaction is very important for the learners so I would like them to think, ah, aloud and collectively. So that the one can influence the other. So that they can push each other to think further, because the one would give his response, another one would want to give you something different. So I think by an interactive approach, and discussing their thinking, it will be a good way forward to use the higher order thinking skills.

This accentuates the notion that she believes the interaction and participation of learners during the lessons are critical in the development of HOTS. This is consistent to what emerged in the literature reviewed in the literature review chapter. Kauchak and Eggen

(1998) emphasise the importance of interaction and the opportunity for learners to think aloud about their thought processes.

Aasiyah values the context of the school in which she teaches. This is echoed in her own words **(Int: 7:02:20):**

> I love the school that I am teaching at. Even though we do not receive the same benefits financially from WCED, the advantages of teaching here is good. The type of learner that we deal with is the same as what I would want to inculcate in my own child. They are well-mannered, a bit naughty (smiling), but on the whole they are co-operative and interested. The parents are extremely forthcoming. They are interested in the learners' work and they are always helpful. I'm not saying that everything is perfect, you do get learners and parents that isn't co-operative etc. But those are few and far in between. Yes, so the values part plays a major role. And it makes my work less stressful.

It is found that attitude and motivational factors play a major role in the advancement of HOTS in learners. Aasiyah can therefore apply pedagogies to promote HOTS successfully due to the context of the school environment that she finds herself in. During the semi-structured interview, Aasiyah excitedly relayed what values she attaches to the teaching of HOTS in the following manner **(Int: 7:02:20):**

> I think it's especially important in this time because nowadays even the grade 3s have cell phones - even children younger than them. So it's too easy for them to, for example, to go google and just get the information and use the calculator on their cell phones. It is as if they don't have a need to think anymore. So it is important for us as teachers to get them to think, and to make them not to rely so much on technology, hmm, without using their own brains and own ideas, their own creativity, their originality - to be able to perform tasks and to make a living for themselves one day.

In Aasiyah's perspective, it is important for children to use their critical thinking skills, especially since information can be easily accessed through the click of a button via the media and World Wide Web. The above extract implies that Aasiyah wants her learners

to think creatively and to demonstrate insight in their choices, and draw discerning conclusions regarding their life choices.

Aasiyah states that her main goal for the implementation of HOTS is to get the learners to think critically **(Int: 7:02:20):**

> The HOTS outcomes I work towards is to get my learners to move beyond the simple recall of facts. As I said before, I want them to be able to use their knowledge and make good decisions.

This extract seems to accentuate Aasiyah's goal for the development of HOTS in her learners. She elaborated:

> In this day it is important for learners to be active in their thinking. They must know the dangers of speaking to strangers on the internet. The other day I did a Life Skills lesson with them regarding bullying… Not just physically, but in the cyber world as well. The lesson took on the other dangers of the internet as well…like going on to websites that they are not allowed to use… We had a lovely discussion. So it got them thinking…You know…how they will feel…what could happen to them etc.

Aasiyah also mentioned that the learners showed some signs of thinking before saying something, which is a huge improvement in their HOTS according to her. Aasiyah's logic behind these learning outcomes is articulated **(Int: 7:02:20):**

> There will definitely come a time in a person's life, where you do not agree with something, and you do not necessarily have to follow everyone's ideas or thinking. Each of us have our own set of beliefs, our own thinking about what is right and wrong and how we respond to a situation. The learners will definitely be exposed to peer pressure later in their lives, and it's my intention to equip them with the skills to make sound decisions.

Aasiyah gives the impression that she believes in the ability of the learners, to distinguish between what is right and what is wrong, which will assist them in making sound life choices. Especially since they are confronted with loads of information and issues on

social media. She wants to assist her learners to develop morally, by allowing them to debate issues like what it entails to be ethical, honest and loyal. To her, the ultimate aim of teaching her learners HOTS is to assist them to 'make sound decisions' on their life journey.

5.3.2 Pedagogy

Taking into consideration the global era that we are in, the expectation for our teachers to promote HOTS in the classroom is extremely important, as noted in the literature review. The literature stresses the importance of teacher effectiveness in the promotion of HOTS (Nieman & Monyai, 2010).

The same process that the researcher used for the lesson observations of Saarah were used for Aasiyah. The interconnectedness of Bloom's taxonomy, Shulman's PCK, and Alexander's pedagogy framework were the lens through which the lessons were observed and analysed.

5.3.2.1 HOTS and teacher's planning

Aasiyah's response to the question of what she deems important to add to her lesson planning for the development of HOTS is captured in the following words **(Int: 7:02:20):**

> I never knew teachers had this method when they set up papers, or plan their lessons, for example, using Bloom's taxonomy. I never knew there was such a model in place to guide the questions. So for me it was very useful when I read about that. I make an effort to plan my questions that I am going to ask in my lessons. I intentionally plan to ask them questions that leads to HOTS. You know, sometimes I get so carried away in the lesson that I just ask a question that pops to my mind, not thinking if it will allow the learners to use their HOTS. That's why I find that it works better for me to plan for HOTS. Yes, so the questions that I ask them…that's important to me.

Data obtained from her responses seems to indicate that she is familiar with the framework of Bloom's taxonomy. As such, the question arises: to what degree has HOTS been incorporated in Aasiyah's lesson plans? The following figures, in accord with Bloom's taxonomy, indicate the number of objectives and questions planned for the different levels in all Aasiyah's lesson plans in Table 6.

Table 6: Objectives and questions on levels of Bloom's taxonomy of Aasiyah

Levels of cognition	Key words to activate thinking on this level	**Aasiyah** - times used in lesson plans
Evaluation	Evaluate, judge, decide, choose, select the best, appreciate, which of the following is the best	3
Synthesis	Construct, formulate, suggest, design, what would happen if, plan	5
Analysis	Determine, analyse, distinguish, deconstruct, find the cause, identify	8
Application	How would you, demonstrate, solve, calculate, explain how	14
Comprehension	Describe, compare, explain, why, distinguish, explain in your own words, rearrange	16
Knowledge	Where, with, who, define, when, how, list, name, how much, what is,	21

5.3.2.2 Questioning

At the start of the lesson, all the learners were sitting on the mat with their number charts. Aasiyah started her lesson with counting activities and a word sum that she pasted on the board. The learners read the sum aloud and had to work it out on their own. The excitement and fervour with which the learners tackled the sum were tangible. HOTS seemed prevalent in learner talk and a large part of this comprised answers and responses to teacher questions, as the data reveals in Box 6.

Box 6: Excerpt of Aasiyah's Mathematics lesson depicting her questioning strategy.

Teacher pasted question on the board, written in bold and big enough for the whole class to be able to read it.

On the farm of Mr. Brown there are calves and chickens. If there are 48 legs altogether, how many of each animal could there be?

(The learners immediately started working out their answers) Enough time was given to learners to work through the problem.

T: Ok guys, who wants to share their thinking with us?

L1: If there is 48 legs miss…split between chickens and calves. So miss, I say that there is only one calf …that is 4 legs. The remainder of the legs is 44. So I divide that 44 legs in half…which gives me 22 chickens. So my answer is 1 calf and 22 chickens.

T: Great L1, who can tell me why L1 divided the remainder of his legs in half? (Most of the class excitedly lift up their hands) The teacher notices one of the learners who looks down and tries to hide behind his book…

T: Let us give L2 a chance. L2, why do you think he divided the remaining legs in half?

L2: (softly) because that is what he had left...?

L3: (Hand raised, excitedly) Miss, miss…I know!

T: Ok L3…Let us give L2 a chance… (Looking at L2)

T: Yes, he had that amount left, but why did he divide it in half? (Silence) …Ok, how many legs does one calf have?

L2: (nervously) one calf has 4 legs…

T: How many legs does one chicken have?

L2: (face lights up) oh miss, 2…That is why it was divided in half.

T: Awesome L2… Ok, my class of stars…Could there be more than one answer to this problem?

Chorus: Yes miss!

T: Great! Let us find out how many different answers we got for this question…AND…an explanation of how you worked it out.

The above excerpt in Box 6 attests to Aasiyah's questioning strategy to involve the learners in her lesson, not only learners that know the answers, but also those who are struggling. These interactions reflect HOTS as noted by Lipman (1990), who states that critical thinking can be judged according to the relevance and acceptability of the supporting reasons for answers given.

During her post-observation interview of the above lesson in Figure 5.9, Aasiyah explained **(Post-Obs: 19:02:20):**

> I try use this type of questioning as part of my introduction to my Mathematics lessons every day. I try to let them solve one word problem every day… and I'm so excited…I can see the difference and improvement in their thinking since the beginning of the year. It is exciting for me to see how they start to explain their thinking. Most of my learners are not that shy anymore, except for a few weaker ones... (Smiling) but I'm working on it.

This seems to imply that Aasiyah values problem-solving as an activity to develop her learners' HOTS, which is proposed by many scholars in the literature reviewed (Ennis, 1985; Facione, 1990; Paul, 1992). Aasiyah asserts that all the learners' input is valued in her class. She makes a concerted effort to praise them whenever they contribute to the lesson. In this way, she develops their confidence to share their thinking, which is also evidenced in Box 6 above.

5.3.2.3 Problem solving

In the context of this lesson, all of the 24 learners were present. The learners were sitting on the mat and the teacher sat on a small chair in front of the learners. Aasiyah's introduction to her Life skills lesson started with her asking her learners, "Who likes to draw? To sing? To write?" The learners were split into their groups accordingly.

She teased their curiosity with a big black bag. From the bag, Aasiyah handed over a hairdryer and a bottle of water to one group. The next group received wood, newspaper and a lighter. Each group received a different set of things. Learners' reactions could be felt in class and some of them could not contain themselves. Whispers and shifting, and some glances were passed amongst the learners.

The teacher captured the confusion by saying she would give them a chance to speak, but they must first listen to her. She seemed to use mild suspense to create excitement and anticipation in her lesson. Aasiyah appeared to see HOTS as an infusion of real world problem-solving in all her lessons. Box 7 is an extract of Aasiyah's Life Skills lesson **(Obs: 10:03:20):**

Box 7: Excerpt of Aasiyah's Life Skills lesson depicting problem solving

T: Right the second row, here is some Doom. Once they have started the fire I want you to spray on the fire so that the flames can become be nice and big. So that we all can get warm at the same time ok?

Learner chorus: …ooh…oh no Miss!

T: Do not touch it yet. A hairdryer.

Learners: Shhhtt.

T: I know you are confused. Why do I have a hairdryer? But my hair is actually wet because it was load shedding this morning. So I want this group to dry my hair.

Learners: laughing

T: But to cool the hairdryer off when it becomes too hot, I want you to throw water over it. Here we go, keep this. (Passes a bottle of water)

Through the use of cognitive dissonance in Box 7, Aasiyah seems to play the devil's advocate by giving instructions to intentionally mislead the learners, which prompts them to think. The shock on the learners' faces are clear when the teacher gives them their different tasks. Some of the learners' jaws drop and some whisper excitedly to their friends, while other learners display signs of nervousness. The learners start talking to the teacher, giving their opinion and showing alarm and concern. The teacher questions them and elicits answers from them that seems to indicate HOT on their part.

5.3.2.4 Transfer of knowledge

The following extract is a selection from the same Life Skills lesson, Box 8 **(Obs: 10:03:20):**

Box 8: Excerpt of Aasiyah's Life Skills lesson depicting transference of knowledge

L1: Oh! Miss, it's dangerous! We cannot play with fire.
T2: Do you agree?
L2: Yes, miss. You can hurt yourself with the fire.
T2: Why?
L2: We are not allowed to make a fire in the class. It is dangerous. All of us can get hurt, by inhaling the smoke and by burning ourselves. The fire can get out of control. My mom said we should never play with fire, cos we can burn.
T2: I think L2 thought this through well. Do all of you feel the same? Who is thinking differently?

This lesson evidenced Aasiyah's PCK of how knowledge can be transferred from one domain to another. She allows the learners to make the connection that what they learn at school can be applied to their life at home and vice versa. With reference to the literature review in chapter 3, De Bono (1992.b) highlights that the transference of HOTS is possible from the school setting to the learners' everyday lives.

It seems that Aasiyah's focus is more than simply teaching them facts, but rather on engaging her learners to think critically. Through role play, her learners could discover and discuss the dangers of hazardous situations. Aasiyah's introduction and flow of her lesson seems consistent to problem-based learning. It is an active learning strategy and ameliorates passive learning, where learners use their prior knowledge to analyse, synthesise and evaluate information through group discussion or individually (Hmelo-Silver, 2004).

Aasiyah values the importance of concrete learning and teaching support material for Foundation Phase learners. She elaborated further on what she looks for to ascertain if her learners are developing their HOTS.

Even though Aasiyah mentioned that it is difficult to gauge whether the learners are engaging in HOT, she verbalised the following **(Int: 7:02:20):**

> I can see that they are thinking by the amount of time they take to respond to a question. So if they just give me a plain and simple one word answer, then I immediately know they haven't given it much thought. But when they take some time to respond and I can see their facial expressions as well, then I know they are actually thinking about the topic and they don't just want to give any answer that comes to their mind. But there are learners who think out of the box and give smart responses that I don't expect. That is when I know they are really engaging in higher order thinking.

5.3.2.5 Inferencing and justification of thinking

Aasiyah encourages her learners to do some thinking and analysis before responding to questions asked. She thus expects them to justify their answers instead of simply giving a 'yes' or 'no' answer **(Int: 7:02:20):**

> If they give a certain answer, they need to clarify why they said either 'yes' or 'no'. This is to make sure that they are thinking, instead of just following the other learners in the class. It does not really matter to me if their answers are right or wrong, as long as they explain their thinking.

Learners are asked to give their opinion about characters in the stories that they read or listen to, and they are required to validate their answers with explanations. This extract in Box 9 exemplifies how they motivate their answers:

Box 9: Excerpt depicting inferencing motivation of their thinking

T2: All the animals that entered the cave to visit the sick lion, did not come out again. Why do you think they did not return?

L1: I think that they got eaten by the lion.

T2: What makes you say that?

L1: Maybe he was hungry… (Smiling)… (Class laughing)…The lion is clever miss. He got all the animals that he normally eats inside of his house, instead of going out to hunt for them. The animals did not think before they went inside.

L2: Yes miss! I agree…

T2: Great... L2, remember no shouting please…So that's your idea. Your thinking is great! Does anybody else think differently?

L3: Miss… I think they could not come out because they got sick…maybe they caught from the lion's germs. And they feel tired and feverish.

5.3.2.6 Real world application

After completing her story Aasiyah encourages her learners to think about what they would do, if they were in such a predicament. Where they know that danger is lurking, but that the dangerous person is friendly and caring towards them. Here Aasiyah seems to connect the story to the real world. Aasiyah's lesson aligns with the literature reviewed where Collins (1993) states that logical reasoning skills are developed when learners elaborate on their point of views and when they work together to solve problems, thus nurturing them to become critical thinkers and learners **(Post Int: 2:03:20):**

> I make an effort to always give feedback to my learners' answers as this encourage them to respond to my questions freely. I believe that they feel valued and respected by

interacting freely in the class. I also like to connect what we discuss in class to their own context that they live in.

5.3.2.7 Assessment

With the use of the above strategies to promote HOTS, Aasiyah feels that her learners must go through the process of thinking about more than one possibility to answer a question. She does not want them to jump to conclusions, or have a narrow mindset. They must decide on an answer and be able to state their reasoning to support their decisions **(Post-Int 2:03:20):**

> For me, they sometimes have to think about different perspectives regarding an issue. They must keep in mind that there can be different solutions to a problem. So…my main aim is to make them think – by posing these questions: Do you think there is another solution to this problem? Do you agree with his thinking? Motivate… So basically I want them to move away from 'tunnel vision'.

During the post-observation of her home language lesson, Aasiyah reflected **(Post-Int 10:03:20):**

> The lesson that I did was a story telling lesson and the reason I chose to bring physical objects to the classroom, such as the puppets, is that they are still Foundation Phase learners. So seeing things makes it easier for them to understand and it gives them something more to think about. They also get more drawn to a story by seeing the story put into action. I then used a questioning strategy to tap into their previous knowledge and to get them thinking about more details that they might have overlooked if they were just to read the story on their own. So to me, by questioning them, I get them to think deeper about what is happening and about what possible events could have happened in the story.

5.3.2.8 Co-operative learning and group work

During some of her lessons, Aasiyah gets her learners to work in groups. At most times she groups them differently **(Post-Int 10:03:20):**

> The method of grouping my learners depends on the lesson that I am going to teach. Sometimes I teach the whole class as a group, sometimes in smaller groups or pairs…or even individually.

Aasiyah emphasised the importance of group work and stressed that it promotes the learners' ability to share and communicate, it improves their listening skills and it also makes them realise that other people may agree with their thinking, or that they may hold a different view to their own views. Learners can also change their views on a topic after deliberation with their peers. It thus calls for co-operative learning **(Post-Int 10:03:20):**

> Learners get the opportunity to learn from one another. This forms an essential part of our existence, as we always have to work with people throughout our lives.

Her aim with smaller groups is to provide each learner with the opportunity to voice their opinion, as time constraints in bigger would not allow for a lot of learner voices to be heard **(Post-Int 10:03:20):**

> I also find that in smaller groups, learners are less likely to be shy, so they will air their views, and as such, more of their opinions or ideas will be encountered.

Aasiyah showed her poster with the rules for group work. Some of the rules indicate that only one learner should speak at a time. The group must respect the person who is speaking, by listening to them. Everybody in the group must wait until it is their turn to speak, etc. She states that at the end of the class discussions, the groups reassemble and have one person report back on their findings. Aasiyah demonstrated this in her Life Skills lesson in Box 10 **(Obs 10:03:20):**

Box 10: Excerpt of Aasiyah's Life Skills lesson: depicting learners' reflection on their own assumptions

L1: Our group talked about the dangers of playing with candles that are burning in a room. Some of our friends in the group said that it is not dangerous, as people use candles to make light in their houses at night, because they do not have electricity. Or when we have load shedding…

T: Ah…I was hoping that someone would talk about that…thanks group 1. I can see that you talked this through. Ok, group 2- You had the same problem, what is your group's opinion?

L2: Miss said we must run around with the candle while it was burning. That makes it more dangerous. We can fall with the burning candle. The mat can burn…the cloth on miss's desk can burn. We can burn ourselves or our friend in the class miss.

T: Interesting… group 1…Now that you have listened to group 4's view, does it change your thinking? How? Why?

Aasiyah encouraged her learners to listen to others' opinion and reflect on their own ideas and assumptions. She nods her head while learners are giving feedback and shows them that she values their input. She also invites others to react to the feedback that the different groups offer.

Saarah's pedagogy to develop HOTS seems consistent to the view of the Delphi Report (Falcione, 1990) that views HOTS as "purposeful, self-regulatory judgement which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgement is based".

Aasiyah believes that through prompting and questioning, the responses that she gets from learners indicate that their thinking is on a higher level. She is not satisfied with answers that are superficial, therefore she plans thoroughly to guide her learners by asking them questions which encourage class discussions, evaluation of information to solve problems, and connecting their prior knowledge to solve the problems that they encounter. This is evidenced in Aasiyah's response during the interview **(Int 7:02:20):**

> Getting learners to give us basic information and then to…create more, and more prompt questions, not necessarily difficult questions, to get them to think and give us more sophisticated responses and answers.

Upon further questioning on what she meant by 'sophisticated questioning', Aasiyah said **(Int 7:02:20):**

> Like well thought out answers, you know. Where I can see that they were really thinking about it. Answers that make them think deeper. I make it a point to ask questions to check for their understanding, to correct any errors they make, to stretch their thinking and also to…to guide their understanding of new concepts.

Aasiyah revealed that she promotes HOTS in her learners by asking them rigorous and challenging questions during her lessons. For her, the ultimate aim of reading is that her learners must be able to understand the relevance and full meaning of a text that they read or listen to. She uses questioning to encourage her learners to think about the underlying messages in the texts and move beyond reading and understanding. She develops her learners' thinking with different types of questions. She commented **(Int 7:02:20):**

> For example, based on the story of 'Goldilocks and the three bears', I asked the learners questions like: Do you think it was right of Goldilocks to go into the house of the bears without their permission? How do you think the bears felt when they discovered someone invaded their privacy? What would you have done? Why?

The data reveals that Aasiyah seems to encourage HOTS through learning by presenting her learners with opportunities to wonder, to speak, to question, to justify their opinion and thinking, to design, to give examples and to construct. This appears to correspond with the view of Lipman's (1998) Philosophy for Children (P4C), which encompasses philosophical discussions relating to children's literature. Aasiyah reflected on a lesson where she allowed the learners to ask questions instead of just her questioning them, at the end of a story **(Int 7:02:20):**

> The story was about Eskimos in the North Pole. I clearly remember some of the questions that they were wondering about (smiling)… For example they asked: Why is there so much snow in the North Pole? Does the snow melt in summer? Why is the North Pole so cold? Why would anyone want to live there? Can the North Pole get hot?

She excitedly draws to the researcher's attention that these types of questions indicate to her that her learners are engaging in HOTS. The assessment of the learners' HOTS is important to her **(Int 7:02:20):**

> I normally look at the type of questions they ask, how they apply their knowledge. I normally follow up their answers with "why? How did you get to that answer? Motivate". These are the kinds of questions I ask them, and if they can explain to me their logic, then I am satisfied that they are thinking on a higher level.

Aasiyah's strategy of guiding her learners to motivate their thinking is evidenced in Box 11.

Box 11: Extract depicting motivations for answers

T1: Ok class, our topic for today is Time. Now I want to start by asking you a few questions. Let me start over here. L1, why do you think time is important? Why do people want to know what time it is? L1: (hesitant)…to make time for wudhu and to make salaah. Teacher: Ok, yes L1, so you say for religious reasons… in order to make time to salaah. I see your hand is up. Do you have a different reason why people take note of the time? L2: They need to know what time it is because – they must know where to go and when to be back. Like when we go to a party or wedding, then my daddy would always say to my mommy…"hurry up, we are late!" (Class burst out laughing.) Teacher smiles at the learner. T1: Can anyone else relate to what L2 just said? L3: Yes miss…like every morning my mom tells us to hurry up or she will be late for work. She will always tell us that if we are 5 minutes late, then the traffic will be thicker in the morning. T2: Great! Are there any other ideas?

The learners were fully engaged in the lesson, and this excerpt seems to show that Aasiyah's learners respect one another and keep quiet when they are talking. This proves consistent with the statement of flexibility (Facione, 1990; Halpern, 1998) and acknowledgement of other people's perspective and view (Bailin et. al., 1999; Facione, 1990). The teacher controls her class by reminding them of the class rules every time they become excited and want to all be heard at the same time.

Aasiyah stated that the learners related what they learn to their own environment and therefore they were not too shy to respond to her questions. She commented that the learners' responses relay to her that they were thinking critically about the topic.

5.3.3 Constraints to the implementation of HOTS

5.3.3.1 Time

To Aasiyah, time is a constraint when it comes to implement HOTS. She feels driven to complete the syllabus and sometimes the learners need more time to think critically **(Int 7:02:20):**

> Time constraints stresses me out, as we have Islamic teachers that also teach our children, so we do not have the luxury of pinching some time from our other lessons to complete the lesson. I sometimes have to stop myself from giving them the answers when they take so long to answer. So it would be a luxury to give them the extra time to think and have discussions in their groups or with a partner.

This indicates that the development of HOTS needs time to be implemented successfully. It also brings to mind that the CAPS document outlines the work that must be covered for the year, and this is also regarded as a factor that hinders HOTS development at grassroots level.

5.3.3.2 Immaturity of learners

Aasiyah revealed that another constraint she has is the impulsiveness and the short attention span of her 9 year old learners. They can seldom contain their excitement to give their opinion, and they become despondent when they have to wait for their turn to speak. Consequently, Aasiyah finds it difficult to get learners to listen to one another, as they want to be heard immediately.

5.3.3.3 Co-operative learning concerns

Aasiyah revealed that she experiences some constraints advancing the implementation of co-operative learning **(Int 7:02:20):**

> Even though learners are less likely to be shy in smaller groups, you do find that some learners do not participate. On the other hand, you get those learners again who dominates the group. They either make jokes or talk excessively about other things that has no bearing on the lesson. To overcome these difficulties, we abide to rules that we came up with as a class.

Ayesha further revealed that when her learners are busy with co-operative learning, the noise levels in her classroom can become concerning. She thus needs to be extra vigilant to control the groups. Aasiyah shared **(Int 7:02:20):**

> …But the value of co-operative learning far outweighs the concerns. The interaction between learners increases and this improves the relationship between all learners in the class. Consequently they learn to know and understand one another better.

5.3.3.4 Conclusion

This draws to conclusion the discussion of the findings of Saarah and Aasiyah individually. The next section discusses and compares the findings across Saarah and Aasiyah, according to the research sub-questions.

5.4 Summary and comparison of findings across Saarah and Aasiyah

In this section, the researcher presents the findings for both sub-research questions for Saarah and Aasiyah.

5.4.1 Understanding of HOTS

The researcher contrasts and compares Saarah and Aasiyah's data as it relates to sub-research question 1: *What do teachers understand by HOTS and what professional experiences do they have in teaching HOTS?*

Table 7 depicts a summary of Saarah and Aasiyah's understanding of HOTS, which is used in the discussion that follows.

Table 7: Saarah and Aasiyah's understanding of HOTS

	Saarah	**Aasiyah**
Teachers' own schooling	Was schooled in the apartheid era. Rote learning was dominant. Teacher-centred.	Schooled in the post-apartheid era. OBE. Learner-centred.
Definition of HOTS	Culture of passive learning should be avoided.	Not answering questions verbatim.
Teacher beliefs regarding HOTS teaching	Believes in the value of HOTS and intends to strengthen learners' ability through creation of opportunities to practice.	Believes in the value of HOTS. To get her learners to think critically.

5.4.1.1 Saarah and Aasiyah's own schooling

The dichotomy in the schooling experiences of Saarah and Aasiyah is clearly portrayed in the data. Saarah was schooled in a culture that discouraged HOTS, where the regurgitation of knowledge was prevalent and the curriculum delivered was teacher-centred. Teachers expected only one answer as correct and learners were disciplined in the form of corporal punishment. In contrast, Aasiyah was educated within a school climate that was learner-centred and whose teachers made use of alternative forms of discipline.

For Saarah, this meant that the influences and experiences that she had of teaching were autocratic and punitive, while Aasiyah experienced influences that were democratic and where discipline was obtained through the reward and encouragement of good behaviour. This life history of Aasiyah places her in a more advantageous position than Saarah, as the literature reveals that the choices teachers make to deliver the curriculum, are influenced by their own experiences (Hoadley & Jansen, 2010:97).

5.4.1.2 Teachers' definition of HOTS

In keeping with the definition of HOTS in the literature review (see ch.3), and the intended curriculum in the CAPS document, both Saarah and Aasiyah are in agreement that HOTS goes beyond ordinary thinking. Saarah included views which are generally acknowledged by most scholars as comprising HOTS, namely the ability for learners to solve complex problems and allowing them to think beyond the literal meaning of things to promote critical thinking. She believes that passive thinking should be avoided and that HOTS is lifelong learning. Saarah also acknowledged the importance of learners' background knowledge in the promotion of HOTS. Aasiyah focused on thinking that includes depth, instead of learners giving one word answers and restating facts as learnt, and she encourages her learners to motivate their thinking, which is compliant with the view of Flavell (1979), who promotes metacognition.

Both Saarah and Aasiyah see HOTS as getting learners to not answer questions verbatim and that they should think before giving answers. They believe that the answers the learners give should reflect deep thinking and they should be able to explain how they got to their answer. It is observed that both Saarah and Aasiyah do not see HOTS as just class-based. Rather, they both view HOTS as being displayed most succinctly when learners can relate or apply HOTS to real life problem-solving or decision-making. This is in accordance with their rationale for teaching HOTS: to get learners to think more deeply when they answer questions and to solve complex and various problems, and also to take into consideration others' opinions and to reflect on their own biases.

Contrary to Saarah, who is of the opinion that the weaker learners cannot indulge in thinking at a higher level, Aasiyah believes that all learners are capable of HOTS if they are taught explicitly. She teaches her learners the art of metacognition (thinking about thinking) by taking them through her own thinking. She discusses with her learners real-life issues that she is experiencing, and takes them through the steps to get to a decision. By reminding her learners to evaluate situations critically, by questioning them on what is right or wrong in class, Aasiyah hopes that her learners will be able to apply this strategy in their real life. This centrally underpins her belief in the transference of knowledge from school to real life. She teaches her learners to think critically, and to also think about the choices that they make.

5.4.1.3 Teacher beliefs regarding HOTS teaching

Aasiyah's professional identity shows a strong belief in the development of HOTS and she is not satisfied with surface answers, therefore she pushes her learners to apply their thinking to real world situations. In the same vein, Saarah's belief in the value of HOTS encourages her to create opportunities for her learners to practice it on a regular basis.

Both teachers' desired outcomes for learners are to think critically and to transfer their thinking into real world situations. They want their learners to reason and look at situations from different perspectives, before making a decision about the situation. To Saarah,

developing learners who can think critically is her main aim of teaching. She wants them to respect not just others' opinions, but their peers' opinions as well.

Aasiyah concurs with Saarah, and sees positive decision making as an outcome of HOTS teaching. She hopes for her learners to become independent and critical thinkers in their everyday lives. She also aspires to their making decisions that are in line with their value system and anticipates that their moral compass will allow them to make beneficial choices in their lives.

Taking into account the South African context (see ch.2) with all its extremes, both Saarah and Aasiyah consider themselves fortunate to find themselves in a school where they have a limited amount of learners in their class and where they can rely on the support of their parent cohort, compared to their peers who might find themselves teaching in classes filled beyond capacity, poor mastery of LoLT and where parental involvement is limited (Nieman & Monyai, 2010:xii). The values, interest and participation of their parent-cohort also have a positive impact on their HOTS development.

Even though Saarah and Aasiyah believe that their ability to promote HOTS has much to do with the fact that they teach in a quintile 4 school, the researcher argues that the quintile ranking of the school bears no consequence for the infusion of HOTS. Both teachers accentuate the added advantage that most of their learners' LOLT is their home language.

Saarah and Aasiyah's beliefs on the value of HOTS, which shapes their professional teacher identity, was motivated by their professional experiences, interactions with colleagues and people, textbooks and continual reading of HOTS-related information. Saarah was motivated by all three dynamics mentioned and her professional work experiences, while Aasiyah furthered the development of her conviction through conventional learning, as she was exposed to Critical Media Studies at the University of Cape Town, in South Africa. This was followed by a personal pursuit of learning, through a two year PGCE course at the Cape Peninsula University of Technology.

Having answered, compared and contrasted Saarah and Aasiyah's answers to their understanding of HOTS, the researcher moves on to comparing and contrasting their different pedagogic approaches in the next section, in relation to sub-research question 2.

5.4.2 HOTS pedagogies

This section covers Saarah and Aasiyah's data as it relates to sub-research question 2: *How do teachers teach HOTS?*

A summary of Saarah and Aasiyah's pedagogies for the development of HOTS is depicted in Table 8. A discussion on these pedagogies ensue following the table.

Table 8: Summary of Saarah and Aasiyah's pedagogies to develop HOTS

Approach	**Saarah**	**Aasiyah**
Teacher planning	Relies on her experience – Planning not in depth for HOTS	In-depth planning for HOTS
Modelling thinking	Questioning to activate and develop learners' thinking	Role model thinking aloud to learners. Application of thinking aloud to assist learners to process their thinking and motivate their responses
Use of LTSM's	Text Shared experiences Stories Visual aids Songs	Text Shared experiences Stories Scenarios Visual aids Songs

		Puppets
Using group work	Group discussions Co-operative learning Debates	Group discussions Co-operative learning Community of Inquiry (P4C)
Infusion of HOTS into real world experiences	HOTS in relation to learners own experiences	Infusion of HOTS using different scenarios relating it to real life
Questioning	Problem solving Questioning to activate prior knowledge	Questioning on different levels of Bloom's taxonomy Cognitive dissonance
Transfer of learning	To real life situations and other subjects	To real life situations and other subjects
Assessment	Tasks Presentations	Reasons that support their thinking Questioning strategies

5.4.2.1 Teacher Planning

Both Saarah and Aasiyah believes that the planning of lessons is fundamental to the success of any lesson taught. Yet the data revealed that Saarah's planning was minimal, covering only the basics of what she was going to teach, not including the types of questions she was going to ask. On the other hand, Aasiyah's planning was in-depth, covering all activities and assessment strategies. Aasiyah integrated her personal belief in HOTS by including all six levels of Bloom's taxonomy in her planning. The researcher colour coded the different levels of questioning from the teachers' planning. The following figure depicts a comparison of Saarah and Aasiyah's planning, benchmarked against Bloom's taxonomy:

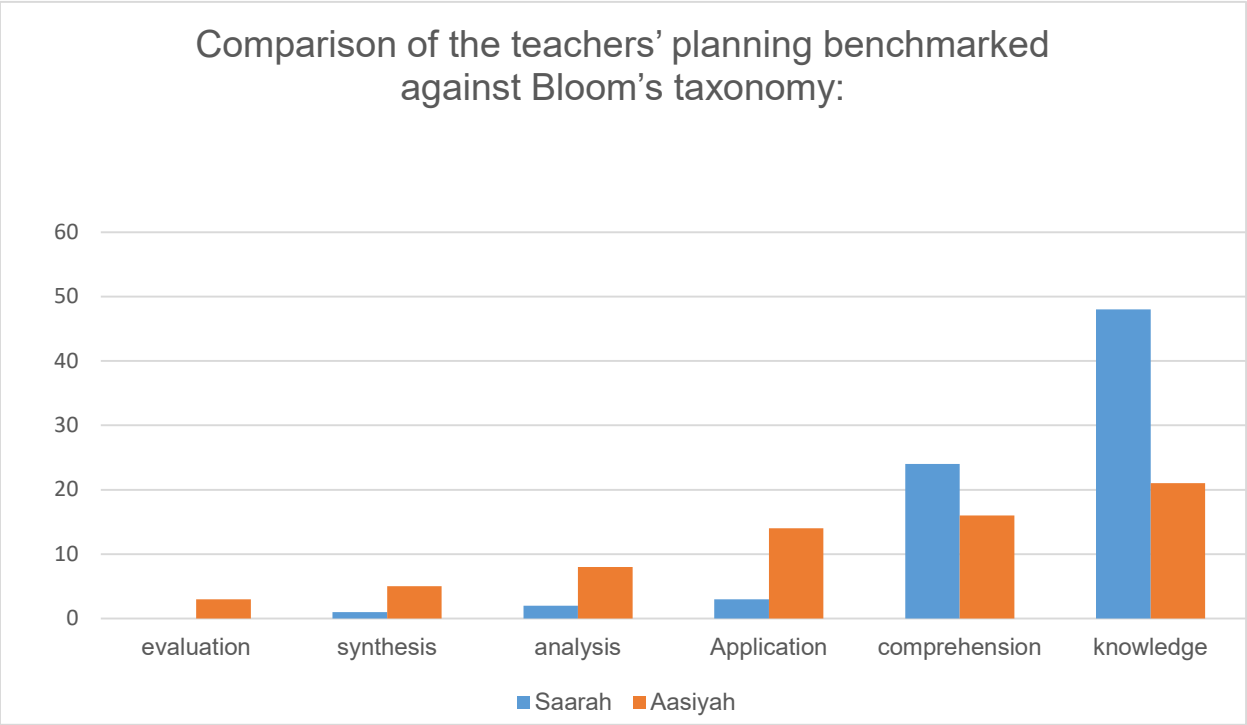

Figure 11: Comparison of Saarah and Aasiyah's planning

Saarah believes that her expertise allows her not to plan as in depth as she would when she started teaching in Grade 3. She feels that she has taught most of the lessons over the ten years that she taught in the grade, therefore she has the knowledge and expertise to steer the lessons to enhance learners' HOTS. Alternatively Aasiyah feels more confident when she plans thoroughly for her lessons to advance HOTS.

5.4.2.2 Modelling thinking

Both Saarah and Aasiyah echo the belief that thinking should be modelled in class, in order for learners to understand and become HOT learners themselves. They both understand that all thinking goes on in the mind, therefore they question their learners to find out how they analyse their thinking and also why they answer questions in the way they do. In other words they encourage their learners to motivate why they say something.

Saarah indicated that through modelling of her thinking, the learners can use the same thinking to argue a point or make a decision in the real life. Aasiyah believes that by sharing her way of thinking to tackle personal dilemmas in her life, her learners can benefit from her modelling her thinking. Aasiyah further believes that being an analytical and reflective thinker herself, these qualities will eventually rub off on the learners under her tutelage. This view corresponds with those of Jacobs et al. (2016).

5.4.2.3 Use of LTSMs

Both Saarah and Aasiyah make use of a range of tools to engage learners' HOTS. These include shared experiences, puppets, texts, stories, songs and visual aids. Saarah encouraged her learners to compare and contrast different shapes, connect it to their real life by discussing where it is used in their environment. She also encourages her learners to ask questions, even if it is routine, as they are still young, by paying attention to their questions and making them feel valued. She is of the opinion that it encourage and motivate them to participate in the lessons.

Aasiyah made use of questioning and allowed her learners to think and wonder about the characters in her story. Young learners were made to wonder when Aasiyah asked questions like: Why is it so? What do you think happened? I wonder if there is another way, rather than feeding them with answers. These types of questions seemed to encourage her learners to wonder and talk about their thinking.

Aasiyah encouraged her learners to ask questions about the texts or everyday situations. She used LTSMs to get her learners to become inquisitive and naturally curious about things that they did not understand. Aasiyah used LTSM to actively involve her learners in different interesting and meaningful activities, which were on their achievement level. These achievable tasks boost the learners' self-confidence and simultaneously served as motivation for her learners' future activities.

5.4.2.4 Group work

The researcher observed that both Saarah and Aasiyah made use of group work in the process of infusing HOTS, with Aasiyah using it more extensively than Saarah. Aasiyah indicated that she used group work almost every day, while Saarah indicated that she used group work only twice or thrice per week.

In this study, both Saarah and Aasiyah provided opportunities for their learners to work with their peers in heterogeneous groups. Saarah grouped her learners according to abilities, while Aasiyah grouped her learners according to their learning styles and abilities. Through the use of group work and co-operative learning, both of them created opportunities for learners to learn from one another, respect other peoples' views and work with one another in a collaborative manner. All of which the literature reveals as means to develop learners' HOTS.

Both of them created ample opportunity for their learners to learn from one another by engaging in dialogue with themselves as the teachers, as well as with their peers. Co-operative work was used for all lessons observed, which encompassed Mathematics, Home Language and Life Skills lessons. It was observed in one of Aasiyah's lessons that her learners had to form a big group as a class, where they discussed the relevance and full meaning of a text. This corresponds with Lipman's P4C view, which promotes young learners to speak, question and justify their thinking through philosophical discussions related to children's literature.

Saarah stated the ground rules for group work explicitly before her learners started with their tasks. On the other hand, Aasiyah let her learners read out the ground rules for group work from the chart in front of her class. The researcher observed that most of the learners were fully engaged in the group discussions and both teachers participated in the discussions by moving around to the different groups. Sometimes the teachers had to remind the learners to stay on task or they had to ask them to lower the noise levels.

Most of the time the learners listened to one another and worked well in their groups. They respected the view of their peers and they actively built on to what was said by their peers. HOTS were evidenced as the learners verbalised their thinking and motivated their thoughts through reasoning. Both participants created the opportunity for their learners to reassemble as a whole class to report back on their findings.

5.4.2.5 Infusion of HOTS into real world experiences

Both Saarah and Aasiyah infused HOTS in their own unique way, with their focus on learners' real world experiences. Saarah made the effort to connect what was taught in class to real life situations by questioning her learners. She let them link how different 3D shapes are used in the environment, during her Mathematics lesson.

Aasiyah used real life scenarios to engage learners in thinking of what they would do and motivate why they chose to do it. She capitalised on the use of cognitive dissonance to prompt her learners to think during her Life Skills lesson. She made use of contentious real life issues to get her learners to weigh the pros and cons of what they would do and to explain the reasons for their choices.

Aasiyah also encouraged her learners to reflect on the situations in the stories discussed, and think about how they would react or solve the problem in their own life.

5.4.2.6 Questioning

The use of questioning to infuse HOTS was observed in both of their classes. Both Saarah and Aasiyah used questioning widely to ascertain learners' background knowledge, what they knew and what they thought, and to promote the learners' thinking on different problems raised in the class.

While Saarah made use of questioning to gauge her learners' thinking on different levels and during her Life Skills lesson, her questioning was found to be located at the lower end of Bloom's taxonomy. The researcher concluded that the context of the lesson could

perhaps lend itself to that level of questioning only. In the other lessons observed Saarah posed questions that enabled her learners to look at different perspectives of an issue.

Aasiyah made use of thought-provoking questions, and her meticulous lesson planning to develop HOTS shone through in all of her lessons. She made use of questioning that seemed to push her learners beyond surface reading and answers, to get her learners to think about the underlying messages in the different scenarios. She encouraged her learners to deep thinking by questioning them to motivate and validate their thinking.

5.4.2.8 Assessment

Both Saarah and Aasiyah made use of continual questioning and classroom discussions as part of their assessment for HOTS. Even though Saarah could not verbalise clearly how she assessed HOTS in the classroom, the researcher evidenced classroom discussions and feedback as forms of assessment in both of their classrooms.

Aasiyah included all of her learners in her classroom discussions, by calling on the weaker ones to respond to her questioning. Both teachers acknowledged learners' opinions with feedback and this encouraged the learners to talk freely in the classrooms. They were not shy to give their opinion or listen to others' opinions. Both participants used questioning to allow learners to make inferences in order to judge them on their motivations or arguments.

In the preceding sections, the researcher compared the pedagogies of how Saarah and Aasiyah taught HOTS. In the section below, the researcher compares and contrasts what they identified as the constraints that impact on HOTS.

5.4.2.7 Transfer of learning

Both participants endeavoured to see the transference of HOTS to life and other subjects. Aasiyah modelled thinking to her learners of her daily life, in the hope that her learners would eventually do the same and implement HOTS in their own lives. She deliberately

built in opportunities in her Life Skills lesson for transfer of knowledge, by asking the learners to envisage issues and predictable complications in order to make sound decisions. Aasiyah's focus was to engage her learners in HOTS, allowing them to discuss the dangers of hazardous situations, by drawing on their everyday knowledge.

Saarah brought the real world into her class by questioning, which elicited answers drawn from her learners' everyday lives. She brought an English language rule into her Mathematics lesson when she draw her learners' attention to rectify a language construction error. This indicated to the learners that what they learn is not in isolation to other subjects or their everyday lives.

5.5 HOTS constraints

Both participants had issues with the infusion of HOTS, even though both of them developed HOTS actively in their classrooms. Both Saarah and Aasiyah indicated constraints that related to classroom issues. Table 9 depicts teacher constraints related to the infusion of HOTS.

Table 9: Depicting HOTS constraints

Teacher constraints	**Saarah**	**Aasiyah**
Weak learners	✓	
Time constraints	✓	✓
Gaps in teacher knowledge	✓	
Immaturity of learners		✓
Group work concerns	✓	✓

Both participants indicated their main concern was time to infuse HOTS in their lessons. They indicated that time was needed to plan relevant lessons and resources. Saarah indicated that extra time was needed to prepare learners for their annual systemic assessments and that she had to finish the syllabus according to CAPS. Aasiyah indicated that the development of HOTS took more time than to teach a lesson didactically. HOTS compels the teacher to let the learners' responses lead the flow of the

lesson and therefore she needed more time (Madaus, 1988; Darling-Hammond & Wise, 1985). Aasiyah indicated that the Islamic studies teachers obliged her to work against time, as they had their allocated times for her learners. Despite these concerns about time, both teachers realised the value of HOTS and made use of their limited time to develop their learners' HOTS.

For Saarah, weak learners were a source of concern, as she felt that they could not cope with HOTS. This is in contrast to the literature reviewed, which indicates that all learners are capable of HOTS through explicit teaching and practice. Aasiyah on the other hand indicated the impulsivity and limited attention span of her age learners. She reported that all of them wanted to be heard at the same time and that they still needed lots of practice to control their emotions.

Despite the fact that both participants were not formally educated in the teaching of HOTS, only Saarah brought it up as a concern. She realised the gaps in her knowledge and felt that she would be more confident to teach HOTS if she was more knowledgeable about it.

Aasiyah on the other hand, was the only one who expressed concerns regarding non-participation of learners and also of learners who dominated the groups with excessive talking and not focussing on the task at hand. This could make her class become too noisy and she had to struggle with disciplining them. Even though Aasiyah raised these concerns, she indicated that the value of co-operative learning far outweighed the concerns indicated by her.

5.6 Conclusion

In this chapter, the researcher reported how Saarah defined her professional experience, and the way she taught HOTS in accordance with the research questions. Having done the same with Aasiyah, the researcher compared them across their definitions, professional experiences and teaching. It represents the synthesis and discussion of the findings across the two teachers. The key research questions were addressed in keeping

with the participants' definition of HOTS, their professional experience and their approaches to the teaching for HOTS, and the constraints that they were experiencing in the development of HOTS. The following chapter delivers a summary and synthesis of both research questions, the conclusion, and recommendations of this study for future research.

CHAPTER 6

CONCLUSION

6. Introduction

Chapter 5 discussed the results of the study. This chapter concludes the study and puts forward a summary and synthesis of the findings, recommendations based on the study for policy and practice, for in-service teachers, initial teacher education providers, as well as the Departments of Basic Education. Thereafter, it discusses the suggestions for further research, concluding with reflections on the research journey.

6.1 Summary and synthesis of the study

The research in this study focused on the understandings of FP teachers with regard to infusing HOTS pedagogies in their teaching. The study aimed to explore Grade 3 teachers' pedagogies used to promote HOTS in a South African context. The study's sub-research questions are: (1) What do teachers understand by HOTS and what professional experiences do they have in teaching HOTS? (2) How do teachers teach HOTS? Data were gathered in response to these questions by means of semi-structured and post-observation interviews, observations, and complementary document review. These data were discussed in chapter 5 where themes were drawn from the analysis. The researcher set out to find out how teachers define HOTS, what professional experiences they have about HOTS and their beliefs about HOTS.

For sub-research question 1, across Saarah and Aasiyah, the three main conclusions drawn by the researcher for this study are:

- Teachers' own background and biography influence what they think and understand of HOTS and how they develop HOTS.
- Teacher motivation is imperative in the infusion of HOTS.

- Teacher beliefs about teaching are not perfectly aligned with the philosophies of HOTS.

A summary of the findings in relation to this question is presented below.

6.1.1 Summary and synthesis of sub-research question 1

Hoadley and Jansen (2010) suggest that teachers' experiences and their own schooling orientate them to teach in the way that they were taught. Their environments, which encompass their families, culture, initial schooling, higher education, and the school in which they teach etc., shape them into the teachers that they are. Since teachers have attended school for thirteen years of their lives, much of what they perceive about schooling comes from their experiences.

These past school experiences are described as an 'apprenticeship of observation', which places teachers in a unique position in comparison to other professions, according to Lortie (1975:61) in Botha (2020). However, Botha (2020) states that teachers have the ability to accept or reject these influences on their agency. Among the literature reviewed in Chapter 2 on the education system during the apartheid era, Sayed and Kanjee (2013), point out fragmentation and inequality as its most salient features. This implies that education was racially and ethnically divided under apartheid rule.

The key aspect gleaned from both Saarah and Aasiyah, albeit differently, is that apartheid had a formative influence on what people teach and think in relation to HOTS. Under apartheid rule, HOTS was not encouraged, particularly for 'black' teachers teaching in 'black' schools, because it was part of the oppression strategies of apartheid. Analyses of South Africa's apartheid education report on encounters that were subjected to abject repression and racism.

This involved racial segregation of schools, manifest inequalities in educational supplies, discriminations in schools, the prohibiting of educational information and organisations, marginalization of 'black' views and experiences in the production of knowledge (Soudien,

2007). As indicated in Chapter 2, these policies shaped a curriculum that mandated rote learning, with poorly qualified teachers

This study resonates partially with the above views, as there do not seem to have been enough practical aspects of HOTS in the participants' schooling or university education. Even though Saarah's education leans less to HOTS exposure than Aasiyah's, Saarah did do things particularly well in some aspects of HOTS without this training and background.

The researcher's finding is that both participants have a theoretical understanding of what HOTS is and a sound knowledge of the benefits of HOTS. However, there is a disjuncture between the theory and the practice. The researcher does not diminish the teachers' HOTS practice in class, but maintains that there is a degree of slippage in how they actually practice these HOTS.

The literature has found that teachers teach the way they were schooled, but the finding of this study is that experience appears to have matured Saarah in her theoretical understanding and practical infusion of HOTS. This finding correlates with that of Cox (2014), whose empirical research with 44 university instructors throughout the state of Utah, found a significant difference between how teachers teach and how they were taught. This disputes the consensus in research literature that experienced teachers' professional biographies and backgrounds are difficult to change and are deeply embedded (Wallace, 2014; Pajares, 1992).

As noted in Chapter 3, Hasni, Ramli & Rafek (2018) state that it is not easy to say why teachers teach the way they do, but all teachers have life histories which shape their understanding of their content knowledge, their learners, their career and their world view. The findings suggest that the teachers' beliefs about teaching suggest that there is a discrepancy between their beliefs and practice with regard to teaching HOTS. Both Saarah and Aasiyah exhibit certain traditional perceptions. Reflecting upon their schooling and upbringing, glimpses of traditional teaching were found in their classrooms.

Saarah and Aasiyah indicated a fear of losing control of their class, and this was seen in the way their learners sometimes responded to them. Learners were not allowed to talk out of their turn or speak to the person sitting next to them. They had to ask permission if they wanted to find out something from their peers. This is in tandem with Calderhead's (1996) argument that makes a distinction between teacher beliefs which places emphasis on the control of order and discipline in the classroom and of the activities of the learners.

Saarah and Aasiyah's commitment to teaching HOTS is demonstrated through their beliefs, persuasions and desired outcomes for learners. As noted in the literature review, Lawrence, Serdikoff, Zin & Baker (2008) draw our attention to the importance of teachers' enthusiasm and commitment to the promotion of HOTS. Most teachers would agree on the value of teaching HOTS, but not all the teachers value it enough to execute it in their classroom. Others again would like to implement it in their classroom, but they do not know how to implement it successfully. This view that HOTS is valued by teachers, but is not effectively addressed, is supported by Case and Wright (1997). It is thus necessary to have workshops or professional development sessions to develop teachers' understanding of the practical ways to teach HOTS.

Passion and commitment are enablers to teach HOTS. Thompson (1992) and Bryan (2003) advocate that beliefs are not static and that they are modifiable. This resonates with this study, which found that both Saarah and Aasiyah's motivation to teach HOTS compelled them to search for information and ways to develop HOTS in their classrooms. Jacobs et al. (2016) argue that teachers who are committed to teaching HOTS will find a way to implement it into their lessons, despite time constraints. Even though Saarah and Aasiyah indicated that time was a constraint, they were confident enough to implement HOTS despite these time pressures to complete the syllabus. It must also be recognised that there is a difference in the depth and degree with which HOTS was implemented between Saarah and Aasiyah. Their beliefs were mirrored in the techniques with which they applied and their pedagogical content knowledge (PCK) in practice.

These are explored with the second sub-research question of which the following three main conclusions were drawn:

- HOTS cannot be taught directly.
- Teachers possess knowledge of a range of pedagogies to infuse HOTS.
- Levels of questioning need not be only on the higher levels of Bloom's Taxonomy.

These findings are elaborated upon below in the summary of the second sub-research question.

6.1.2 Summary and synthesis of sub-research question 2

The findings indicate that in the enactment of learning, learners should be exposed to HOTS. This mediation of learning is in the practice of skill through activities that encourage its development, as it cannot be imparted to learners directly.

Both Saarah and Aasiyah displayed an acceptable repertoire of teaching strategies to promote HOTS. They taught HOTS by their presentation (the way they were teaching). Some of their presentations were traditional (mostly teacher talk and choral or one word answers) and some of it was constructivist (learner-centered activity which incorporated HOTS). The findings reveal that both Saarah and Aasiyah have the knowledge and understanding of various strategies and models of learning to infuse HOTS in their teaching.

Saarah and Aasiyah were teachers with experience ranging from between 5 and 20 years and both displayed strong pedagogical skills. They also displayed a fair amount of competence in teaching HOTS, using a range of strategies. These strategies incorporated co-operative learning, metacognition, group work, LTSM, transfer of learning, connecting to learners' prior knowledge, assessments and mostly questioning to make HOTS visible in their classroom. There was a focus on real-world issues and their approaches were learner-centred.

In the implementation of HOTS, these strategies were put forth in the model proposed by Shulman (1986) and Alexander's (2004) conceptualisation of pedagogy in Chapter 3. Bloom's taxonomy created a framework for thinking which granted the researcher a sensible structure to work with in the analysis of the teachers' pedagogies. The findings indicate that the levels of questioning need not always be on the higher levels of Bloom's taxonomy, but that it can range across the levels from 1 to 5, and that questions should generally be put into context (Collins, 2014).

This corresponds with Moodley (2013) who proposes that learner performance develops when a blend of lower and higher order questions are used. In the same vein, HOTS questioning does not always have to be on the higher levels of Bloom's, as some are recall questions to ascertain understandings and misconceptions (Apino & Retwani, 2017). This resonates with Alexander's dialogic teaching, which promotes dialogue and interaction between teacher and learner; and between learner and learner (see 3.7.3).

To develop learners' HOTS, teachers require a range of different activities, for example discussion, role-play, questioning, and assessment for learning (Jacobs et al., 2014; Nieman & Monyai, 2010). If the LoLT is the same as learners' HL, then the chances are that they will be able to understand metacognition. They can thus apply HOTS more easily, as they do not have to struggle with understanding the language and translate it first into their HL, with corresponding benefits for the teachers and teaching process (Nieman & Monyai, 2010; de Jager 2015).

Although this study is a small one, the findings in this study stand in contrast with the review of Hoadley (2016) and NEEDU (2012), which indicate findings of dominance of rote and surface learning in most FP classes in South Africa (Chapter 3). It is more aligned with the findings of Apino & Retnawati (2017); Collins (2014) and Abrami et al. (2008), which propose that HOTS-oriented learning can be successful through learner-centered activities with minimal teacher domination.

6.1.3 Conclusion

HOTS is inextricably linked to the kind of experiences and understandings that teachers have. In other words, what teachers do to promote HOTS in the classroom is determined by what they understand about it and their own experiences, how they teach it (their pedagogy) and their beliefs. HOTS is not only applicable to the learners' school life, but it includes finding solutions to needs and problems in their social activities outside of the boundaries of school. Learners are faced with decisions throughout their lives, and HOTS can guide their decisions in life, which can influence them to make positive contributions towards society. This research supports the theoretical views that it is feasible to attain HOTS goals for all learners, instead of just those with high academic achievements.

6.2 Recommendations for policy and practice

6.2.1 Practice

Teachers' conviction, passion and commitment are the necessary constituents for the implementation of HOTS. Their beliefs, values of HOTS and desired outcomes for learners form the momentum to infuse pedagogies of HOTS in their teaching. This implies that before teachers are required to infuse HOTS in their teaching, there is a need to empower their personal beliefs and views on the value of HOTS.

Research studies have shown that teacher beliefs have the greatest influence on their actions and play an integral part in their classroom practice (Jacobs et al., 2016:316). Elmore, Petersen and McCarthey (1996) state that teachers' practices are likely to change when they are exposed to what teaching looks like when it is done differently to their way of teaching. Teachers also need an explanation to assist in their understanding of differences in the way that they are teaching and the way that they aspire to teach. In keeping with these findings, the following are some proposed ways to build teacher competency in HOTS through professional development.

Teachers should be encouraged to share their own HOTS practices. Professional Learning Communities (PLC) could be the platform for teachers to engage in discussions with teachers who are proficient in developing HOTS in all levels of schooling.

Keeping in mind that one of the fundamentals for enhancing learners' HOTS, which is the belief that teachers must be able to use HOTS themselves, it seems imperative that all pre-service teachers should explicitly experience HOTS in their subject disciplines and that they should be equipped with HOTS strategies to infuse it in their teaching.

6.2.2 Policy

One of the constraints to the teaching of HOTS concerned the curriculum. Both Saarah and Aasiyah indicated that time is a major constraint, as the full curriculum has to be covered. This implies that superficial learning would hamper deeper understanding, which is a prerequisite to teach HOTS. Therefore, curriculum developers should attend to a curriculum design that has less prescribed content and is more learner-centered, and which attends to issues of deeper understanding. This will allow more time for teachers to develop learners' HOTS.

It is essential for the education authorities to conduct HOTS courses for in-service teachers, such as questioning for HOTS, HOTS strategies, nurturing thinking dispositions, and assessment for learning. There should be more attention to practical aspects of teaching HOTS, and this should be done in depth for teachers to start taking on HOTS. The lecturers or facilitators of these courses must actually model the process in the classroom, and it should not just be a theoretical course. They should practically demonstrate how it should be implemented. These courses should be taught over a year instead of just a few weeks, as found in the courses presented at the Cape Teacher Learning Institute (CTLI), or other professional development organisations.

In the CAPS document, examples of HOTS questions and Bloom's taxonomy are given, but there is no policy to ensure that teachers implement HOTS in their teaching. It is left

to teachers' own interpretation. This results in the disjuncture between CAPS as a curriculum statement and classroom practice. Consequently, there is a need for policy makers to have clearer insistence on HOTS in order for it to become compulsory in the curriculum. Therefore, teacher training is needed to enable them to accomplish the objectives of CAPS related to content, as well as the objectives related to the development of thinking skills and thinking dispositions.

Literature and research on HOTS should be made available to all schools, in order for teachers to learn more about HOTS and also to empower them with the knowledge of how to infuse it in their teaching.

6.3 Implications for future research

In light of the limited scope of this study, it merits further research. Future research could investigate how pre-service Foundation Phase teachers' university courses prepare them to infuse HOTS in their teaching, as the teachers in this study indicated that they did not receive any professional training to teach HOTS.

The focus of this study was on the teachers (how they understand HOTS and how they actualise HOTS in their practice). Another important direction for future research would be to focus on the learners. The reasoning behind this is that learners' educational experiences and their cultural beliefs about the value of HOTS could have an influence on the effectiveness of HOTS education.

This study focused on the implementation of HOTS at primary school level. Further studies can include secondary schools. Since the researcher's study was conducted at one primary school, this study can be replicated at other primary schools. A comparison can be done of HOTS implementation and implications in rural, suburban and urban schools. This study focused on level one educators' perceptions and experiences of HOTS development with the exclusion of the school management team (SMT). Further research can also include views of these stakeholders.

A larger sample can be used with both qualitative and quantitative approaches to gain a wider perspective, and likewise other phases can be used to gain a broader perception on HOTS teaching. This will be useful to determine if the annual systemic tests reduced teachers' ability to experiment with new ideas and adapt curriculum and instruction to infuse pedagogies to promote HOTS.

6.4 Contribution of the study

This study offers five important contributions to knowledge. Firstly, it contributes to the understanding of how teachers develop HOTS in the Foundation Phase in a selected school in the Western Cape. To the best knowledge of the researcher, this has not been written about before.

Secondly, it complements studies which have been primarily quantitative and not focused in-depth on the HOTS experiences of teachers, thus allowing the researcher to explore the ideas and experiences of the teachers in depth. Teachers might refrain from assigning HOT tasks to struggling learners, as they believe that the learners will find such tasks difficult. This study contributes to changing teacher beliefs on HOTS experiences for young learners.

Thirdly, this study provides useful information regarding pre-service teacher education and in-service teacher professional development, with the proposal that it should be more practical and in-depth. Teachers should be accredited for completing a full year course on HOTS and how to promote it in their teaching and learning.

Fourthly, it reveals teachers' understandings and how teachers teach HOTS and adds the knowledge that all teachers do not just promote rote learning, as found in many studies conducted in South Africa (Taylor, 2014; Hoadley, 2016). This study found that there are teachers who are successfully implementing HOTS teaching in their everyday classrooms.

The fifth contribution is methodological. This study serves as an illustration of teachers' understandings and how teachers infuse pedagogies to develop learners' HOTS, using a qualitative approach. The approach specifically contextualised the research design, followed by using narratives to clarify sampling, data collection methods (pre- and post-interviews, observations, complementary document review), data analysis and trustworthiness, presentation of data as vignettes (see Chapter 5). The approach should be of value to future researchers pursuing a similar research design or research topic.

6.5 Concluding reflections of the study

This study was conducted in the midst of the Coronavirus pandemic (Covid 19), and the researcher was personally affected by it. The impact of the virus laid the researcher off from work and studies for a period of four months. This had a major impact on the conclusion and submission of this study. Despite these adversities, the researcher realised that there are teachers who are selfless and dedicated to the teaching profession as they taught their learners diligently throughout this difficult period, which is still prevalent at the time of submission of this thesis.

The researcher's reflection leads her to believe that HOTS is not something that can be taught to a learner, but it is a pedagogical approach that teachers need to have that will develop these HOTS in learners. The researcher has learned through the works of Shulman (1986), Alexander (2003), Bloom (1956) and others who contributed towards a framework for HOTS which is founded on extensive classroom-based research. The researcher concludes that it is tantamount for teachers to offer their learners multiple opportunities to learn to think, to solve problems in the real world, and thus develop their HOTS. Consequently, it is the researcher's argument that HOTS should be at the forefront in the act of teaching and learning in the times that we find ourselves in, as well as in the future.

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Appendix A – Ethics clearance certificate

Cape Peninsula University of Technology

***For office use only	
Date submitted	27/8/2019
Meeting date	15/10/2019
Approval	P/Y/N
Ethical Clearance number	EFEC 6-10/2019

FACULTY OF EDUCATION

RESEARCH ETHICS CLEARANCE CERTIFICATE

This certificate is issued by the Education Faculty Ethics Committee (EFEC) at Cape Peninsula University of Technology to the applicant/s whose details appear below.

1. **Applicant and project details (Applicant to complete this section of the certificate and submit with application as a Word document)**

Name(s) of applicant(s):	R Petersen		
Project/study Title:	Pedagogies used by Grade 3 teachers to promote Higher Order Thinking skills in learners		
Is this a staff research project, i.e. not for degree purposes?	No		
If for degree purposes the degree is indicated:	Yes M.Ed		
If for degree purposes, the proposal has been approved by the FRC	Yes		
Funding sources:	NRF		

2. **Remarks by Education Faculty Ethics Committee:**

Ethical clearance granted until 31st of December 2024		
Approved: X	**Referred back:**	**Approved subject to adaptations:**
Chairperson Name: Dr Candice Livingston **Chairperson Signature:** Livingston	**Date: 15th October 2019**	
Approval Certificate/Reference: EFEC 6-10/2019		

EFEC Form V3_updated 2016

Appendix B – Request for permission to conduct research in school

Respected members of the Board

My name is Rachmat Petersen, and I am a Master of Education student at the Education Faculty of CPUT in Mowbray, and also an employee at your institution of learning. The research I wish to conduct for my Master's dissertation involves the **exploration of pedagogies used to promote higher order thinking skills in the grade 3 classroom**. This project will be conducted under the supervision of Professor Agnes Chigona and Dr. Osman Sadeck.

I am hereby seeking your consent to approach the Al-Azhar Primary School to provide participants for this project.

I have attached a copy of my dissertation proposal which includes copies of the measure and consent and assent forms to be used in the research process, as well as a copy of the approval letter which I received from CPUT Research Ethics Committee (Human).

If you require any further information, please do not hesitate to contact me on 065 974 6771 / ragmatpdt@gmail.com. Thank you for your time and consideration in this matter.

Yours sincerely.

Ms. R. Petersen

Cape Peninsula University of Technology

Appendix C - Letter of invitation and informed consent form

Dear Participant

I am a Master of Education student at the Education Faculty of CPUT in Mowbray and a teacher at the Al-Azhar Primary school. As part of my studies, I am required to conduct a research project to complete this degree. The Topic of my research is: ***Grade 3 teachers' pedagogies used to promote higher order thinking skills in learners.***

The purpose of the study is to explore the pedagogies Grade 3 teachers use to develop learners' higher order thinking skills.

I would like to invite you to take part in an individual semi-structured interview, and classroom observations, for this study by sharing your experience and views about higher order thinking. Data collection will take place for about 45 minutes (interview) and 4 x 30 minute periods of classroom observations. Data from these sessions will be audio recorded.

There are no potential benefits derived from participating other than adding new knowledge to the existing body of knowledge regarding pedagogies of higher order thinking skills. Participation in this research is voluntary and you are free to withdraw from the study at any time, without explanation and negative or undesired impact by doing so. Participants' response will be recorded and their identity will not be revealed. The information and data collected will be kept in a safe place and will only be used for the purpose of this research project. For more information, please feel free to contact me or my supervisors on the contact details below.

Thanking you in advance

Yours sincerely

_____

Ms. R. Petersen

ragmatpdt@gmail.com / 065 974 6771

Prof Agnes Chigona at ChigonaA@cput.ac.za

Dr. Osman Sadeck at osadeck@gmail.com

Kindly complete the table below before participating in the research.

Tick the appropriate column	YES	NO
1. I understand the purpose of the research.		
2. I understand what the research requires of me.		
3. I volunteer to take part in the research.		
4. I know that I can withdraw at any time.		
5. I understand that there will not be any form of discrimination against me as a result of my participation or non-participation.		
6. Other		

Name: _____

Signature: _____

Date: _____

Appendix D – Participant biographical information

Name: …….. **School: ……**

Pseudonym: …… **Date: …….**

All information will be confidential and you will not be identified in any way.

Do you agree to this face to face interview?

Yes	No

Do you agree to be audio recorded?

Yes	No

Please select and fill in where applicable.

Position at school	**Teacher**	**Head teacher of the grade**		**Foundation Phase HOD**	
Years in teaching	**1st year**	**2 – 4 years**	**5 – 10 years**	**10 – 15 years**	**15 + years**
Years teaching in FP	**1st year**	**2 – 4 years**	**5 – 10 years**	**10 – 15 years**	**15 + years**
Professional qualifications trained in:	**Foundation Phase**	**Intermediate Phase**	**Senior Phase**	**FET**	
Years teaching in Grade 3					
Years teaching at this school					

Teacher signature: **Date: ……..**

Appendix E – Interview schedule

Research Question: ***What specific pedagogies do Grade 3 teachers use to develop learners' Higher Order Thinking Skills?***
Higher Order Thinking Skills will be referred to as HOTS.
I would like to find out what you think about HOTS. I want to also find out about the strategies that you are using in the classroom. I would like to get a sense of what strategies you use and how you use it. Then I would like to hear a little bit about the training you may have received. I would like us to finish up by hearing of any challenges that you might experience or anything that you have in mind that may assist in the teaching of HOTS.
Knowledge and experience about HOTS
1. Could you please tell with me what you think HOTS is about? 2. In your experiences of HOTS, do you think it is important to teach it? Can you reveal to me why do you think it's important/not important? 3. Did you receive any professional development training to teach HOTS? (If yes) Can you please elaborate on what training you received? How useful do you feel the training was? Why? (if no) How come?
Teachers' Practice (Pedagogical decisions)
1. Please tell me what methodologies you use to develop HOTS. 2.Will you share with me the important things that you plan in a lesson to develop HOTS.

3. How do you make this happen in the class? 4. Which of these strategies do you find works better than the others? 5. Please tell to me why you chose these strategies?
Assessment (for learning)
1. How do you get a sense of when the learners are beginning to develop HOTS? 2. What type of assessment tasks do you give them?
Beliefs and experiences in HOTS
1. What challenges do you face in teaching HOTS? 2. From your experience, what assistance or support would you like in teaching HOTS from: the HOD WCED your colleagues
A copy of the transcripts will be forwarded to check if everything is right. (This is for validation purposes). Thank you so much for your thoughts, time and efforts to participate in this study, it is appreciated.

Appendix F – Lesson observation schedule

Teacher:	Date:
Topic:	Lesson Focus:
Lesson Duration:	Number of learners:

	Notes
How does the teacher introduce the lesson?	
What do the learners have to do in class?	
What does the teacher do in terms of instruction? When the teacher does something…what happens to the learners (how do they respond?)	

When the learner does something, what effect does it have on the teacher?	
What happens at the end of the lesson?	

Appendix G – Post-observation interview schedule

School:	Date:
Topic:	Lesson Focus:
Lesson Duration:	Number of learners:
What do you think worked well in this lesson?	
If you could teach the same class again, what would you do differently? What would you do the same way?	
Why did you choose that strategy? Did the students respond as you had expected? Were you satisfied with the student response?	
What did you learn from teaching this class?	